

Red Seal Occupational Standard

Glazier



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Canada

RED SEAL OCCUPATIONAL STANDARD GLAZIER



Title: Glazier

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Red Seal Occupational Standard (RSOS) as the Red Seal standard for the Glazier trade.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. Employment and Social Development Canada (ESDC) sponsors the Red Seal Program, which, under the guidance of the CCDA, develops a national occupational standard for each of the Red Seal trades.

Standards have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and assessment tools for apprenticeship and certification authorities;
- to develop common tools for apprenticeship on-the-job and technical training in Canada;
- to facilitate the mobility of apprentices and skilled workers in Canada;
- to supply employers, employees, associations, industries, training institutions and governments with occupational standards.

Any questions, comments, or suggestions for changes, corrections, or revisions to this standard or any of its related products may be forwarded to:

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This standard was prepared by the Apprenticeship and Sectoral Initiatives Directorate of ESDC. The coordinating, facilitating and processing of this standard were undertaken by employees of the standards development team of the Trades and Apprenticeship Division and of British Columbia, the host jurisdiction for this trade.

STRUCTURE OF THE OCCUPATIONAL STANDARD

This standard contains the following sections:

Methodology: an overview of the process for development, review, validation and weighting of the standard

Description of the Glazier trade: an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

Trends in the Glazier trade: some of the trends identified by industry as being the most important for workers in this trade

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade

Roles and Opportunities for Skilled Trades in a Sustainable Future: an overarching description of how in the context of climate change, skilled trades play a large role in implementing solutions and adjusting to changes in the world. In addition to highlighting the importance of this awareness, the standard may also contain more details on activities, skills and knowledge elements that are specific to the trade

Industry Expected Performance: description of the expectations regarding the level of performance of the tasks, including information related to specific codes, regulations and standards that must be observed

Language Requirements: description of the language requirements for working and studying in this trade in Canada

Pie Chart of Red Seal Examination Weightings: a graph which depicts the national percentages of exam questions assigned to the major work activities

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard

Harmonization of Apprenticeship Training: the aspects of apprenticeship training that participating provinces and territories have agreed upon to substantively align apprenticeship systems across Canada

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities

Task: distinct actions that describe the activities within a major work activity

Task Descriptor: a general description of the task

Sub-task: distinct actions that describe the activities within a task

Skills:

Performance Criteria: description of the activities that are done as the sub-task is performed

Evidence of Attainment: proof that the activities of the sub-task meet the expected performance of a tradesperson who has reached journeyperson level

Knowledge:

Learning Outcomes: describes what should be learned relating to a sub-task while participating in technical or in-school training

Learning Objectives: topics to be covered during technical or in-school training in order to meet the learning outcomes for the sub-task

Range of Variables: elements that provide a more in-depth description of a term used in the performance criteria, evidence of attainment, learning outcomes, or learning objectives

Appendix A – Acronyms: a list of acronyms used in the standard with their full name

Appendix B – Tools and Equipment / Outils et équipement: a non-exhaustive list of tools and equipment used in this trade

Appendix C – Glossary / Glossaire: definitions or explanations of selected technical terms used in the standard

METHODOLOGY

Development of the Standard

A draft standard is developed by a broad group of trade representatives, including tradespeople, instructors and employers at a National Workshop led by a team of facilitators. This draft standard breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Harmonization of Apprenticeship Training

An analysis of all provinces' and territories' apprenticeship programs is performed and recommendations are made on harmonizing the name of the trade, the hours of training required and the number of levels of training. Provinces and territories consult with their respective industry stakeholders on these elements and revisions are discussed until consensus is reached. Following the development of the workshop draft of the RSOS, participants discuss and come to consensus on the sequence of training topics, as expressed in the new standard. Their sequencing recommendations are reviewed by stakeholders in participating provinces and territories and further discussions are convened to reach consensus and to identify any exceptions.

Online Survey

Stakeholders are asked to review and validate the activities described in the new standard via an online survey. These stakeholders are invited to participate in this consultation through apprenticeship authorities, as well as national stakeholder groups.

Draft Review

The RSOS development team forwards a copy of the standard and its translation to provincial and territorial authorities who consult with industry representatives to review it. Their recommendations are assessed and incorporated into the standard.

Validation and Weighting

Participating provinces and territories also consult with industry to validate and weight the document for the purpose of planning the makeup of the Red Seal Interprovincial Examination for the trade. They validate and weight the major work activities (MWA), tasks and sub-tasks, of the standard as follows:

MWA	Each jurisdiction assigns a percentage of questions to each MWA for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a MWA.
SUB-TASKS	Each jurisdiction indicates, with a YES or NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the RSOS development team who then analyzes the data and incorporates it into the document. The RSOS provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for MWA and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

The validation of the RSOS is used to identify common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions' industry performs a sub-task, it shall be considered common core. Interprovincial Red Seal Examination questions are limited to the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in that province or territory
NO	sub-task not performed by qualified workers in the occupation in that province or territory
NV	standard <u>N</u> ot <u>V</u> alidated by that province or territory
ND	trade <u>N</u> ot <u>D</u> esignated in a province or territory
NOT COMMON CORE (NCC)	sub-task, task or MWA performed less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGE %	average percentage of questions assigned to each MWA and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

DESCRIPTION OF THE GLAZIER TRADE

“Glazier” is this trade’s official Red Seal occupational title approved by the CCDA. This standard covers tasks performed by glaziers whose occupational title has been identified by provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Glazier	■	■	■	■			■	■	■	■	■	■	■
Architectural Glass and Metal Technician						■							
Erector Mechanic (Glazier)					■								

Glaziers measure, handle, cut, prepare, fit, install, replace and repair all types of glass and glass substitutes, typically in industrial, commercial, institutional and residential applications. In these applications, they fabricate, lay out and install curtain wall framing, windows, doors, structural silicone glazing (SSG), skylights, sloped glazing and storefront frames. In residential applications, they install doors, windows, skylights, mirrors, shower doors, specialty glass and backsplash.

Glaziers also install specialty glass products such as glass railings/guardrails, smoke baffles, shower enclosures, and glass and mirror walls. Other duties include layout, preparation, fabrication and replacement of architectural metal systems and components in applications such as partition glass, entranceways, windows, sunshades, insulated glass, points-supported glazing and fittings, panels and pre-glazed curtain walls, including the respective seals, sealants, anchors and fasteners.

Most glaziers work on construction, service or renovation (retrofitting) projects. Specialty areas of this trade include installing skylights and other special glassworks like electrochromic glass, photovoltaic panels, fire-rated glass and compatible systems, obscured glass, patterned glass, ballistic/bomb-resistant glass in security areas, leaded x-ray glass in hospitals, low-iron glass for showcases in museums and acid-etched glass for bird-friendly glazing applications. Glaziers are employed by construction glass installation contractors, fabrication shops, retail service and repair shops. They may also be self-employed.

Besides working with glass, glaziers also work with plastics, granite, and other similar materials used as glass substitutes, as well as films or laminates that improve the durability or safety of the glass. Glaziers are also involved in manufacturing display cabinets and decorative windows. They may also be requested to create custom-designed glass installations for residential and commercial use.

Glaziers require good reading, writing and communication skills, as well as mathematical ability to accomplish tasks within their trade. Physical strength and stamina are necessary to work with heavy glass materials, and good eyesight is needed to measure, cut and detect flaws in glass and other materials. Manual dexterity and the ability to work alone and in teams are important qualities for those working in this trade. As well, analytical ability and troubleshooting skills are important assets in this trade, especially in the context of renovation and repair projects involving older structures and products.

Glaziers work in a variety of environments; some work outdoors on construction sites while others work indoors, in shops. When working on commercial applications, glaziers are expected to work from power-elevated work platforms, scaffolds and suspended work platform systems, sometimes at great heights, to manoeuvre glass panels that are lifted by cranes and other lifting equipment. Glaziers do a considerable amount of bending, kneeling, lifting, and standing during the installation process. There are some risks of injuries from falls from heights, lifting heavy materials, repetitive actions, sharp edges and broken glass.

This standard recognizes similarities or overlaps with the work of carpenters, sheet metal workers, concrete finishers, operating engineers, electricians, roofers, bricklayers, tilesetters and ironworkers.

With experience, glaziers may act as mentors and trainers to apprentices in the trade. Glaziers may advance to supervisory positions such as foreperson, contract managers, project managers, consultants, inspectors, instructors, or set up their own shops.

TRENDS IN THE GLAZIER TRADE

Equipment:

Due to the improvements in the thermal capacity of modern glass, as well as greater client demand for windows that admit more natural light and permit better outside views, the industry has seen an increase in the use of larger, heavier modules. This results in glaziers having to increase their knowledge of and their ability to use hoisting, lifting and rigging equipment, such as mini-cranes, manipulators, and custom power cups and rigging.

3D laser scanners and total stations are being used to perform layout, take field measurements, check embeds and help create computer-aided design (CAD) drawings for fabrication. This improves the efficiency and accuracy of measurements for installations, and facilitates measuring awkward or difficult locations and shapes.

There is an increase in the amount of fabrication that is done in a controlled shop environment, leading to faster installation times of unitized panels. Computer Numerical Control (CNC) machines designed specifically for the glazing industry are being used by more and more fabrication shops.

Products and Design:

Due to growing concerns about climate change and energy efficiency, Leadership in Energy and Environmental Design (LEED), passive house and net-zero design involves significant consideration in the glazing industry. This includes more stringent standards, as well as new materials, design and installation techniques.

There are new standards being used for measuring insulation value; in some jurisdictions, R-value is being supplemented by U-value measures, which measure total energy loss, not just heat loss.

Insulating values of glass are increasing and various new coatings can cause new compatibility concerns with various products and sealants.

Other emerging technologies that improve insulating value are argon and krypton gas-filled sealed units, low-E glass, upgrades in thermally broken extrusions, triple-glazed glass and vacuum-sealed insulated units. In addition, curtain walls made of fiberglass-reinforced plastics (FRP) improve thermal performance (conduction, convection and radiation). Other systems include wood-framed curtain walls for thermal value and aesthetic improvements. There is a greater emphasis on proper membrane installation to improve the integrity of the overall building envelope.

In residential and commercial buildings, there is an increase in the use of smart glass systems, such as electrochromic (dynamic) and photovoltaic. Electrochromic glass is used more where sunlight control and privacy may be required. Photovoltaic glass, such as solar, is used to capture energy.

In the residential sector, there is an increase in the use of window walls and full-vision doors for unobstructed outside viewing. There is also more use of commercial glazing products and systems in the residential sector.

There is an increase in automated doors and windows controlled by handheld remote or automation system apps.

Other products with specific purposes include ballistic/bomb-resistant, fire-rated and bird-friendly glass.

Codes, Regulations and Safety

New energy step codes in place in some jurisdictions require better thermal performance from their glazing systems and will become dramatically more demanding in the future.

Older buildings often have outdated materials that no longer comply with established industry standards. During renovation projects, replacing old windows, doors and specialized glass products requires glaziers to retrofit modern glazing methods and adhere to codes to suit existing structures and maintain the integrity of the building.

The safety of workers and the public is becoming a more important issue, resulting in increased safety training and more emphasis on personal protective equipment (PPE).

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: <https://www.canada.ca/en/employment-social-development/programs/essential-skills/profiles.html>.

The application of these skills may be described throughout this document within the skills and knowledge, which support each sub-task of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at <http://www.red-seal.ca/>.

READING

Glaziers require reading skills to gather information from forms and labels. They also need to read to understand more complex texts such as equipment and policy and procedure manuals, specifications, codes, standards, and safety regulations. They read bulletins and brochures from suppliers describing new products, parts and prices. They also refer to project specifications and work orders when planning a job.

DOCUMENT USE

Glaziers need to be able to locate and interpret information in several types of documents such as labels/stickers, posted signs, forms, lists, tables, and installation and delivery schedules. They also refer to a wide array of complex assembly drawings integrating text, drawings and actual components. This also includes creating sketches and drawings.

WRITING

Writing skills are used by glaziers to write notes to themselves regarding work orders and customer requests. They may also write notes to request supplies and materials or write memos and letters to suppliers and manufacturers to request information on prices, equipment, parts or procedures. They may also write a quote or estimate that includes costs of labour to remove existing materials and install the new product, as well as costs of all materials. They also need to complete documents such as time sheets, shipping documents, purchase orders, invoices, job sheets and city permits.

ORAL COMMUNICATION

Some tasks performed by glaziers require oral communication skills, including discussing safety issues, work schedules, materials and equipment with supervisors, contractors, building managers, customers, suppliers and other tradespeople. Glaziers may explain the fabrication, construction, installation and repair procedures to customers as well. They may also instruct others, such as an apprentice or a work crew, explaining and demonstrating procedures.

NUMERACY

Numeracy skills are extremely important in the everyday work of glaziers. Substantial mathematical skills are used in taking measurements, doing material layout, using formulas and performing trade calculations such as geometry and trigonometry to calculate distances and angles. Glaziers may create project timelines, calculating time requirements for tasks in the project. They may also calculate amounts for supplies, estimates and overall costs.

THINKING

Glaziers solve problems in situations where work may be delayed due to equipment breakdowns, shortages of materials and work of other trades. They may perform modifications to project designs to correct flaws. They need the ability to think spatially and visualize in three dimensions. Problem solving and thinking sequentially are important skills in service, fabrication and installation activities. Glaziers need to be able to plan their work and organize tasks and materials.

WORKING WITH OTHERS

Glaziers may work independently or with partners or apprentices depending on the type of work they are performing. For example, frame fabricators often work alone while constructing frames, while installers will usually work with a partner or apprentice while installing windows. Glaziers must coordinate their work with many other co-workers, trades and suppliers. They see themselves as members of a team who work together to provide a quality service and product. Some glaziers supervise the work of apprentices and other journeypersons on larger jobs.

DIGITAL TECHNOLOGY

Glaziers use digital devices such as laptops, tablets, smartphones and two-way radios to communicate with others, record job changes and daily activities, track job progress, order materials, perform Internet research and perform word processing. They also use design software in their work. Highly technical layout devices such as laser 3D scanners and total stations require advanced digital skills.

CONTINUOUS LEARNING

Glaziers are required to stay current with new products and materials. They refer to brochures or manuals from suppliers and apply the information on the job. They attend training by the manufacturer on how to use or install a new product. Glaziers also attend courses and orientations on safety procedures and the operation of equipment such as aerial work platforms and swing stages. They must also attend upgrading on topics such as layout, safety and rigging. On-the-job learning takes place continuously using methods such as safety meetings, toolbox talks and mentoring.

Roles and Opportunities for Skilled Trades in a Sustainable Future

Climate change affects all of us. Trades play a large role in implementing solutions and adjusting to changes in the world.

Throughout this standard, there may be specific references to tasks, skills and knowledge that clearly show this trade's role in a more sustainable future. Each trade has different roles to play and contributions to make in their own way.

For example:

- Construction tradespeople need to consider the materials they are using, building methods, and improvements to mechanical and electrical installations. There are important changes to codes and standards to help meet the climate change goals and commitments set for 2030 and 2050. Retrofits and new construction of low-energy buildings provide enormous opportunities for workers in this sector. Concepts, such as energy efficiency and regarding buildings as systems are foundational.
- Automotive and mechanical trades are seeing a shift towards the electrification of vehicles and equipment. As a result, new skills and knowledge will be required for tradespeople working in this sector. There are mandates for sales of new light-duty zero-emission vehicles (ZEV) in Canada, with the goal of achieving 100% ZEV sales by 2035. Due to this mandate, the demand for these vehicles is growing quickly among consumers and fleets. With this escalating demand, the need for skilled workers to maintain and repair these vehicles is also increasing.
- In industrial and resource sectors, there is pressure to move towards increased electrification of industrial processes. Many industrial and commercial facilities are also being upgraded to improve energy efficiency in areas such as lighting systems, and new production processes and technologies. There are also opportunities in carbon capture, utilization and storage (CCUS), as well as the production and export of low-carbon hydrogen.
- Trades in the service sector may also need to be aware of responsible sourcing, as well as efficient use of products and materials. New ways of working better are always a part of the job.

There are fast-moving changes in guidelines, codes, regulations and specifications. Many are being implemented for the purpose of energy efficiency and climate change. Those that affect specific trades may be mentioned within the standard. Examples of these guidelines and legislation include:

- The National Energy Code of Canada for Buildings (NECB).
- The Canadian Net-Zero Emissions Accountability Act (CNZEAA).
- programs that encourage sustainable building design and construction such as Leadership in Energy and Environmental Design (LEED) and the Zero Carbon Building (ZCB) standards.

- the Montreal Protocol for phasing out R22 refrigerants.
- energy efficiency programs such as ENERGY STAR.
- principles of the United Nations Declaration for the Rights of Indigenous Peoples pertaining to energy sector development.

Apprentices and tradespeople need to increase their climate literacy and reinforce their own understanding of energy issues and environmental practices. It is important for them to understand why these changes are happening and their effect on trades' work. While individual tradespeople and apprentices may not be able to choose certain elements like; the architectural design of buildings, building material selection, regulatory requirements, use of electric vehicles and technologies, they must understand the impact of using these elements in their work. Impacts include using environmentally friendly products and following requirements related to the disposal and recycling of materials.

In apprenticeship, as well as in ongoing professional development, employers and instructors should encourage learning about these concepts, why they are important, how they are implemented, and the overarching targets they are aiming to achieve.

All in all, it's about doing the work better and building a better world.

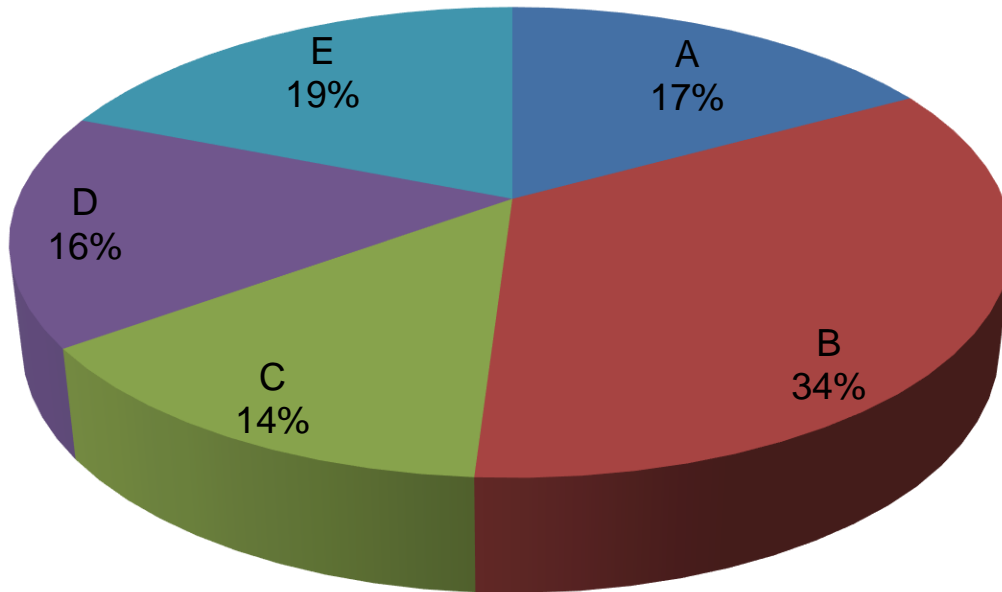
INDUSTRY EXPECTED PERFORMANCE

All tasks must be performed according to the applicable jurisdictional codes, regulations and standards. All health and safety standards must be respected and observed. Work should be done efficiently and to a high quality with minimal material waste or environmental damage. All requirements of employers, engineers, designers, manufacturers, clients and quality control policies must be met. At a journeyperson level of performance, tasks should be done with minimal supervision. As a journeyperson progresses in their career, there is an expectation they continue to upgrade their skills and knowledge to maintain pace with industry and promote continuous learning in their trade through mentoring of apprentices.

LANGUAGE REQUIREMENTS

It is expected that journeypersons are able to understand and communicate in either English or French, which are Canada's official languages. English or French are the common languages of business as well as languages of instruction in apprenticeship programs.

PIE CHART OF RED SEAL EXAMINATION WEIGHTINGS



MWA A	Performs common occupational skills	17%
MWA B	Fabricates and installs commercial window and door systems	34%
MWA C	Installs residential window and door systems	14%
MWA D	Fabricates and installs specialty glass, products and glass systems	16%
MWA E	Performs servicing	19%

This pie chart represents a breakdown of the interprovincial Red Seal examination. Percentages are based on the collective input from workers from the trade from across Canada. The Task Matrix on the next pages indicates the breakdown of tasks and sub-tasks within each Major Work Activity and the breakdown of questions assigned to the Tasks. The Interprovincial examination for this trade has 120 questions.

GLAZIER

TASK MATRIX

A – Performs common occupational skills

17%

Task A-1 Performs safety-related functions 12%	A-1.01 Maintains a safe work environment	A-1.02 Uses personal protective equipment (PPE) and safety equipment	
Task A-2 Uses tools and equipment 22%	A-2.01 Uses hand tools	A-2.02 Uses portable and stationary power tools	A-2.03 Uses layout and measuring equipment
	A-2.04 Uses access equipment		
Task A-3 Uses rigging, hoisting and lifting equipment 13%	A-3.01 Uses rigging equipment	A-3.02 Uses hoisting and lifting equipment	
Task A-4 Organizes work 15%	A-4.01 Uses documentation and reference material	A-4.02 Interprets plans, drawings and specifications	A-4.03 Prepares list of materials and supplies
	A-4.04 Plans project tasks		

Task A-5
Performs routine trade activities
29%

A-5.01 Prepares worksite	A-5.02 Handles glass and other materials	A-5.03 Prepares materials for installation
A-5.04 Stores glass and other materials	A-5.05 Performs glass cutting and edge treatment	A-5.06 Installs building envelope membranes
A-5.07 Installs flashing	A-5.08 Applies sealants	
A-6.01 Uses communication techniques	A-6.02 Uses mentoring techniques	

Task A-6
Uses communication and mentoring techniques
9%

B – Fabricates and installs commercial window and door systems

34%

Task B-7
Fabricates commercial window and door systems
35%

B-7.01 Fabricates curtain walls	B-7.02 Fabricates storefronts	B-7.03 Fabricates window systems
B-7.04 Fabricates skylights and sloped glazing systems	B-7.05 Fabricates entrance systems	

Task B-8
Installs commercial window and door systems
65%

B-8.01 Lays out commercial window and door systems	B-8.02 Installs curtain wall systems	B-8.03 Installs storefront systems
B-8.04 Installs window systems	B-8.05 Installs skylights and sloped glazing systems	B-8.06 Installs entrance systems

C – Installs residential window and door systems

14%

<p>Task C-9 Installs residential window systems 61%</p>	<p>C-9.01 Lays out residential window systems</p>	<p>C-9.02 Sets windows in openings</p>	<p>C-9.03 Glazes windows</p>
<p>Task C-10 Installs residential door systems 39%</p>	<p>C-10.01 Lays out residential door systems</p>	<p>C-10.02 Assembles residential door frames</p>	<p>C-10.03 Sets residential doors and frames</p>
	<p>C-10.04 Installs residential door hardware</p>	<p>C-10.05 Glazes residential doors</p>	

D – Fabricates and installs specialty glass, products and glass systems

16%

<p>Task D-11 Fabricates and installs commercial specialty glass and products 69%</p>	<p>D-11.01 Lays out commercial specialty glass and products</p>	<p>D-11.02 Assembles commercial specialty glass, products and hardware</p>	<p>D-11.03 Installs commercial specialty glass, products and hardware</p>
<p>Task D-12 Fabricates and installs residential specialty glass and products 31%</p>	<p>D-12.01 Lays out residential specialty glass and products</p>	<p>D-12.02 Assembles residential specialty glass, products and hardware</p>	<p>D-12.03 Installs residential specialty glass, products and hardware</p>

E – Performs servicing

19%

Task E-13 Services commercial window and door systems 58%	E-13.01 Assesses service requirements for commercial window and door systems	E-13.02 Repairs commercial window and door systems
Task E-14 Services residential window and door systems 24%	E-14.01 Assesses service requirements for residential window and door systems	E-14.02 Repairs residential window and door systems
Task E-15 Services specialty glass and products 18%	E-15.01 Assesses service requirements for specialty glass and products	E-15.02 Repairs specialty glass and products

HARMONIZATION OF APPRENTICESHIP TRAINING

Provincial and territorial apprenticeship authorities are each responsible for their respective apprenticeship programs. In the spirit of continual improvement, and to facilitate mobility among apprentices in Canada, participating authorities have agreed to work towards harmonizing certain aspects of their programs where possible. After consulting with their stakeholders in the trade, they have reached consensus on the following elements. Note that implementation of these elements may vary from jurisdiction to jurisdiction, depending on their own circumstances. For more information on the implementation in any province and territory, please contact that jurisdiction’s apprenticeship authority.

1. Trade name

The official Red Seal name for this trade is Glazier.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for this trade is 3.

3. Total Training Hours During Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for this trade is 7200.

4. Sequencing Topics and Related Subtasks

These topic titles in the table below are placed in a column for each apprenticeship level for technical training. Each topic is accompanied by the subtasks and their reference number. The topics in the grey shaded cells represent those that are covered “in context” with other training in these subsequent years.

Level 1	Level 2	Level 3
	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment
<p style="text-align: center;">Safety-Related Functions</p> <p>1.01 Maintains safe work environment</p> <p>1.02 Uses personal protective equipment (PPE) and safety equipment</p>		
<p style="text-align: center;">Tools and Equipment</p> <p>2.01 Uses hand tools</p> <p>2.02 Uses portable and stationary power tools</p> <p>2.03 Uses layout and measuring equipment</p> <p>2.04 Uses access equipment</p>		

Level 1	Level 2	Level 3
<p>Rigging, Hoisting and Lifting Equipment 3.01 Uses rigging equipment 3.02 Uses hoisting and lifting equipment</p>		<p>Rigging, Hoisting and Lifting Equipment 3.01 Uses rigging equipment 3.02 Uses hoisting and lifting equipment</p>
<p>Organizes Work 4.01 Uses documentation and reference material 4.02 Interprets plans, drawings and specifications</p>	<p>Organizes Work 4.03 Prepares list of materials and supplies</p>	<p>Organizes Work 4.01 Uses documentation and reference material 4.02 Interprets plans, drawings and specifications 4.04 Plans project tasks</p>
<p>Trade Activities 5.02 Handles glass and other materials 5.04 Stores glass and other materials 5.05 Performs glass cutting and edge treatment 5.06 Installs building envelope membranes 5.08 Applies sealants</p>	<p>Trade Activities 5.03 Prepares materials for installation 5.06 Installs building envelope membranes 5.07 Installs flashing 5.08 Applies sealants</p>	<p>Trade Activities 5.01 Prepares worksite 5.03 Prepares materials for installation 5.06 Installs building envelope membranes 5.07 Installs flashing 5.08 Applies sealants</p>
<p>Communication 6.01 Uses communication techniques</p>		<p>Mentoring 6.02 Uses mentoring techniques</p>
<p>Commercial Window and Door Systems (Fabricates) 7.02 Fabricates storefronts 7.03 Fabricates window systems</p>	<p>Commercial Window and Door Systems (Fabricates) 7.01 Fabricates curtain walls 7.05 Fabricates entrance systems</p>	<p>Commercial Window and Door Systems (Fabricates) 7.01 Fabricates curtain walls 7.04 Fabricates skylights and sloped glazing systems 7.05 Fabricates entrance systems</p>
<p>Commercial Window and Door Systems (Installs) 8.02 Installs curtain wall systems 8.03 Installs storefront systems 8.04 Installs window systems</p>	<p>Commercial Window and Door Systems (Installs) 8.01 Lays out commercial window and door systems 8.02 Installs curtain wall systems</p>	<p>Commercial Window and Door Systems (Installs) 8.02 Installs curtain wall systems 8.05 Installs skylights and sloped glazing systems 8.06 Installs entrance systems</p>
	<p>Residential Window Systems (Installs) 9.01 Lays out residential window systems 9.02 Sets windows in openings 9.03 Glazes windows</p>	

Level 1

Level 2

Level 3

Residential Door Frames (Installs)
10.01 Lays out residential door systems
10.02 Assembles residential door frames
10.03 Sets residential doors and frames
10.04 Installs residential door hardware
10.05 Glazes residential doors

Commercial Specialty Glass and Products (Fabricates and Installs)
11.01 Lays out commercial specialty glass and products
11.02 Assembles commercial specialty glass, products and hardware
11.03 Installs commercial specialty glass, products and hardware

Commercial Specialty Glass and Products (Fabricates and Installs)
11.01 Lays out commercial specialty glass and products
11.02 Assembles commercial specialty glass, products and hardware
11.03 Installs commercial specialty glass, products and hardware

Residential Specialty Glass and Products (Fabricates and Installs)
12.02 Assembles residential specialty glass, products and hardware
12.03 Installs residential specialty glass, products and hardware

Residential Specialty Glass and Products (Fabricates and Installs)
12.01 Lays out residential specialty glass and products
12.02 Assembles residential specialty glass, products and hardware
12.03 Installs residential specialty glass, products and hardware

Commercial Window and Door Systems (Services)
13.01 Assesses service requirements for commercial window and door systems
13.02 Repairs commercial window and door systems

Level 1

Level 2

Level 3

**Residential Window and Door
Systems (Services)**

- 14.01** Assesses service requirements for residential window and door systems
- 14.02** Repairs residential window and door systems

**Specialty Glass and Products
(Services)**

- 15.01** Assesses service requirements for specialty glass and products
- 15.02** Repairs specialty glass and products

MAJOR WORK ACTIVITY A

Performs common occupational skills

TASK A-1 Performs safety-related functions

TASK DESCRIPTOR

Glaziers are responsible for ensuring the safety of themselves and others in the work environment. Therefore, they must comply with company, contractor, site and jurisdictional regulations. It is critical that they be constantly aware of their surroundings and the hazards they may encounter.

A-1.01 Maintains a safe work environment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-1.01.01P	perform preliminary site inspection	preliminary site inspection is performed according to site-specific practices to identify potential hazards
A-1.01.02P	recognize and report potential hazards	potential hazards are recognized and reported
A-1.01.03P	perform task and equipment-specific hazard assessments	task and equipment-specific hazard assessments are performed according to task and equipment to be used
A-1.01.04P	identify warning signals	warning signals are identified
A-1.01.05P	locate, interpret and complete safety documentation	safety documentation is located, interpreted and completed
A-1.01.06P	locate on-site first aid stations and equipment	on-site first aid stations and equipment are located
A-1.01.07P	locate storage areas for tools and materials	storage areas are located
A-1.01.08P	perform housekeeping tasks	housekeeping tasks are performed according to site requirements

RANGE OF VARIABLES

hazards include: site conditions, fall hazards, tripping hazards, work being performed

warning signals include: air horns, fire alarms, radio systems, beacon lights

safety documentation includes: safety data sheets (SDS), Workplace Hazardous Materials Information System (WHMIS) labels, safety reports, inspection reports

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
A-1.01.01L	demonstrate knowledge of safe work practices and procedures	describe workers' rights and responsibilities
		describe safety policies, procedures and requirements
		describe site-specific work permit procedures
		identify potential hazards and ways to control them
		describe emergency procedures
		describe first aid practices
A-1.01.02L	demonstrate knowledge of regulatory requirements pertaining to safety	identify and interpret workplace health and safety regulations

RANGE OF VARIABLES

hazards include: site conditions, fall hazards, tripping hazards, work being performed

regulations include: WHMIS, Occupational Health and Safety (OH&S)

A-1.02 Uses personal protective equipment (PPE) and safety equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS		
	Performance Criteria	Evidence of Attainment
A-1.02.01P	select and use PPE and safety equipment	PPE and safety equipment are selected and used according to task and regulations
A-1.02.02P	inspect PPE and safety equipment	PPE and safety equipment are inspected before each use to verify operating condition and that they are free from damage

A-1.02.03P	identify and remove from service all worn, damaged and defective PPE and safety equipment	PPE and safety equipment are removed from service according to manufacturers' specifications
A-1.02.04P	maintain and store PPE and safety equipment	PPE and safety equipment are maintained and stored according to manufacturers' specifications

RANGE OF VARIABLES

PPE includes: hard hats, safety glasses, safety footwear, hearing protection, fall arrest equipment, respirators, face shields, high-visibility vest

safety equipment includes: first aid kits, fire extinguishers, eye wash stations

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-1.02.01L	demonstrate knowledge of PPE and safety equipment , their applications, limitations, maintenance, storage and procedures for use	identify types of PPE and safety equipment and describe their applications, limitations, maintenance, storage and procedures for use
		describe importance of expiry dates on PPE and safety equipment
		describe importance of locating PPE and safety equipment
A-1.02.02L	demonstrate knowledge of regulatory requirements pertaining to PPE and safety equipment	describe workplace health and safety regulations pertaining to the use of PPE and safety equipment
		describe certification and training requirements for PPE and safety equipment

RANGE OF VARIABLES

PPE includes: hard hats, safety glasses, safety footwear, hearing protection, fall arrest equipment, respirators, face shields, high-visibility vest

safety equipment includes: first aid kits, fire extinguishers, eye wash stations

regulations include: WHMIS, OH&S

TASK A-2 Uses tools and equipment

TASK DESCRIPTOR

This task describes the use and maintenance of tools and equipment that glaziers use to perform tasks in their trade. It also describes the use of access equipment.

A-2.01 Uses hand tools

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.01.01P	select and use hand tools	hand tools are selected and used according to task
A-2.01.02P	clean and maintain hand tools	hand tools are cleaned and maintained according to industry standards
A-2.01.03P	store hand tools	hand tools are stored according to manufacturers' specifications
A-2.01.04P	identify worn, damaged and defective hand tools , and remove from service	worn, damaged and defective hand tools are identified and removed from service

RANGE OF VARIABLES

hand tools include: see Appendix B (Tools and Equipment)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.01.01L	demonstrate knowledge of hand tools , their applications, limitations and maintenance	describe terminology associated with hand tools
		identify types of hand tools and describe their applications, limitations and maintenance
A-2.01.02L	demonstrate knowledge of procedures for use of hand tools	describe procedures for use of hand tools
		identify hazards and describe safe work practices and procedures pertaining to use of hand tools
		describe procedures used to maintain hand tools

RANGE OF VARIABLES

hand tools include: see Appendix B (Tools and Equipment)

A-2.02 Uses portable and stationary power tools

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.02.01P	select and use portable and stationary power tools	portable and stationary power tools are selected and used according to task and manufacturers' specifications
A-2.02.02P	clean portable and stationary power tools	portable and stationary power tools are cleaned according to manufacturers' specifications
A-2.02.03P	change components	components are changed according to manufacturers' specifications
A-2.02.04P	lubricate components	components are lubricated according to manufacturers' specifications
A-2.02.05P	store portable power tools	portable power tools are stored according to manufacturers' specifications
A-2.02.06P	adjust portable and stationary power tools	portable and stationary power tools are adjusted according to task
A-2.02.07P	identify worn, damaged and defective portable and stationary power tools , and remove from service	worn, damaged and defective portable and stationary power tools are identified and removed from service
A-2.02.08P	identify when calibration of stationary power tools is required	calibration of stationary power tools is identified according to task

RANGE OF VARIABLES

portable power tools include: see Appendix B (Tools and Equipment)

stationary power tools include: see Appendix B (Tools and Equipment)

components include: blades, driver tips, drill bits

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.02.01L	demonstrate knowledge of portable and stationary power tools and their components , their applications, limitations and maintenance	describe terminology associated with portable and stationary power tools and their components
		identify hazards and describe safe work practices and procedures pertaining to use of portable and stationary power tools
A-2.02.02L	demonstrate knowledge of procedures for use of portable and stationary power tools	describe procedures for use of portable and stationary power tools
		identify types of portable and stationary power tools and their components , and describe their applications, limitations and maintenance
		describe procedures used to maintain portable and stationary power tools

RANGE OF VARIABLES

portable power tools include: see Appendix B (Tools and Equipment)

stationary power tools include: see Appendix B (Tools and Equipment)

components include: blades, driver tips, drill bits

A-2.03 Uses layout and measuring equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.03.01P	select and use layout and measuring equipment	layout and measuring equipment is selected and used according to task and manufacturers' specifications
A-2.03.02P	clean and maintain layout and measuring equipment	layout and measuring equipment is cleaned and maintained according to manufacturers' specifications
A-2.03.03P	store layout and measuring equipment	layout and measuring equipment is stored according to manufacturers' specifications

A-2.03.04P	identify when calibration of layout and measuring equipment is required	calibration of layout and measuring equipment is identified by manufacturers' recommendations
A-2.03.05P	identify worn, damaged and defective layout and measuring equipment , and remove from service	worn, damaged and defective layout and measuring equipment are identified and removed from service

RANGE OF VARIABLES

layout and measuring equipment includes: see Appendix B (Tools and Equipment)

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
A-2.03.01L	demonstrate knowledge of layout and measuring equipment , their applications, limitations and maintenance	describe terminology associated with layout and measuring equipment
		identify types of layout and measuring equipment , and describe their applications, limitations and maintenance
A-2.03.02L	demonstrate knowledge of procedures for use of layout and measuring equipment	describe procedures for use of layout and measuring equipment
		identify hazards and describe safe work practices and procedures pertaining to use of layout and measuring equipment
		describe procedures used to maintain layout and measuring equipment

RANGE OF VARIABLES

layout and measuring equipment includes: see Appendix B (Tools and Equipment)

A-2.04 Uses access equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS		
	Performance Criteria	Evidence of Attainment
A-2.04.01P	select and use access equipment	access equipment is selected and used according to jurisdictional, site and company-specific regulations
A-2.04.02P	inspect, identify and remove from service unsafe, worn, damaged and defective access equipment	access equipment is inspected for damage and removed from service according to manufacturers' specifications and jurisdictional regulations

A-2.04.03P	identify hazards when erecting access equipment	hazards are identified according to site conditions
A-2.04.04P	secure access equipment	access equipment is secured according to jurisdictional, site and company-specific regulations, and manufacturers' specifications

RANGE OF VARIABLES

access equipment includes: see Appendix B (Tools and Equipment)

hazards include: power lines, uneven surfaces, pinch points, falls

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
A-2.04.01L	demonstrate knowledge of access equipment , its applications, limitations and maintenance	describe terminology associated with access equipment
		identify types of access equipment , and describe their applications, limitations and maintenance
A-2.04.02L	demonstrate knowledge of procedures for use of access equipment	identify hazards and describe safe work practices and procedures pertaining to use of access equipment
		identify fall protection requirements
		describe safe angles of ladders
		describe three-point contact rule
		describe importance of being aware of worksite surroundings
A-2.04.03L	demonstrate knowledge of regulatory requirements pertaining to use of access equipment	identify and interpret regulations and certification requirements pertaining to use of access equipment

RANGE OF VARIABLES

access equipment includes: see Appendix B (Tools and Equipment)

hazards include: power lines, uneven surfaces, pinch points, falls

worksite surroundings include: trenching, pits, overhead hazards, drop-offs

TASK A-3 Uses rigging, hoisting and lifting equipment

TASK DESCRIPTOR

Glaziers are responsible for using rigging, hoisting and lifting equipment to move materials that cannot be accommodated manually. Glaziers must comply with company and site standards as well as jurisdictional regulations. It is critical that they be constantly aware of their surroundings, the hazards they may encounter, and be in communication with workers involved with the lift.

A-3.01 Uses rigging equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.01.01P	select and use <i>rigging equipment and attachments</i>	<i>rigging equipment and attachments</i> are selected and used according to task and manufacturers' specifications
A-3.01.02P	inspect <i>rigging equipment and attachments</i> before and after use	<i>rigging equipment and attachments</i> are inspected before and after use according to manufacturers' specifications and regulations
A-3.01.03P	perform hazard assessment related to rigging	hazard assessment is performed according to site requirements
A-3.01.04P	secure load to <i>rigging equipment</i>	load is secured to <i>rigging equipment</i> according to task, manufacturers' specifications and jurisdictional regulations
A-3.01.05P	identify centre of gravity of load	centre of gravity of load is identified according to pre-lift checks
A-3.01.06P	clean, lubricate and store <i>rigging equipment and attachments</i>	<i>rigging equipment and attachments</i> are cleaned, lubricated and stored according to manufacturers' specifications
A-3.01.07P	identify worn, damaged and defective <i>rigging equipment and attachments</i> , and remove from service	worn, damaged and defective <i>rigging equipment and attachments</i> are identified, tagged and removed from service according to manufacturers' specifications and regulations

A-3.01.08P	communicate with workers involved in lift	workers involved in lift use site-specific communications
A-3.01.09P	restrict access to lift area	access to lift area is restricted using barriers

RANGE OF VARIABLES

rigging equipment and attachments include: See Appendix B (Tool and Equipment)

communications include: hand signals, electronic communications, audible/visual

barriers include: signs, barricades, danger/caution tape

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
A-3.01.01L	demonstrate knowledge of rigging equipment and attachments , their applications, limitations and maintenance	describe terminology associated with rigging equipment and attachments
		identify types of rigging equipment and attachments , and describe their applications, limitations and maintenance
A-3.01.02L	demonstrate knowledge of procedures for use of rigging equipment and attachments	describe communication procedures with workers while using rigging equipment and attachments
		describe anchor points
		describe lifting capacity and load ratings
		explain importance of determining capacity of floor and roof slabs, and loading ramps
		explain how to determine centre of gravity of a load
		identify types of barriers used to protect public and workers
		describe proper loading and unloading procedures
		describe correct body mechanics when lifting
		describe loads which should be lifted mechanically
		list possible obstacles and dangers to be encountered
A-3.01.03L	demonstrate knowledge of regulatory requirements pertaining to use of rigging equipment and attachments	identify and interpret regulations and certification requirements pertaining to use of rigging equipment and attachments

RANGE OF VARIABLES

rigging equipment and attachments include: See Appendix B (Tool and Equipment)

communications include: hand signals, electronic communications, audible/visual

barriers include: signs, barricades, danger/caution tape

A-3.02 Uses hoisting and lifting equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.02.01P	select and use hoisting and lifting equipment and attachments	hoisting and lifting equipment and attachments are selected and used according to task and manufacturers' specifications
A-3.02.02P	inspect hoisting and lifting equipment before and after use	hoisting and lifting equipment is inspected before and after use according to manufacturers' specifications and jurisdictional regulations
A-3.02.03P	perform hazard assessment related to hoisting and lifting	hazard assessment is performed according to site requirements
A-3.02.04P	identify centre of gravity of load	centre of gravity of load is identified according to pre-lift checks
A-3.02.05P	clean, lubricate and store hoisting and lifting equipment	hoisting and lifting equipment are cleaned, lubricated and stored according to manufacturers' specifications
A-3.02.06P	identify worn, damaged and defective hoisting and lifting equipment , and remove from service	hoisting and lifting equipment is identified, tagged and removed from service according to manufacturers' specifications and jurisdictional regulations
A-3.02.07P	communicate with workers involved in lift	workers involved in lift use site specific communications
A-3.02.08P	restrict access to lift area	access to lift area is restricted using barriers

RANGE OF VARIABLES

hoisting and lifting equipment includes: see Appendix B (Tools and Equipment)

attachments include: power cups, chains, slings

communications include: hand signals, electronic communications, audible/visual

barriers include: signs, barricades, danger/caution tape

KNOWLEDGE

Learning Outcomes	Learning Objectives	
A-3.02.01L	demonstrate knowledge of hoisting and lifting equipment , their attachments , applications, limitations and maintenance	describe terminology associated with hoisting and lifting equipment and their attachments
		identify types of hoisting and lifting equipment and their attachments , and describe their applications, limitations and maintenance
A-3.02.02L	demonstrate knowledge of procedures for use of hoisting and lifting equipment	describe site-specific communications with workers while using hoisting and lifting equipment
		describe anchor points
		describe lifting capacity and load ratings
		explain the importance of determining the capacity of floor and roof slabs, and loading ramps
		explain how to determine centre of gravity of load
		identify types of barriers used to protect public and workers
		describe proper loading and unloading procedures
		describe correct body mechanics when lifting
		describe loads which should be lifted mechanically
		list possible obstacles and dangers to be encountered when hoisting
A-3.02.03L	demonstrate knowledge of regulatory requirements pertaining to use of hoisting and lifting equipment	identify and interpret jurisdictional regulations and certification requirements pertaining to use of hoisting and lifting equipment

RANGE OF VARIABLES

hoisting and lifting equipment includes: see Appendix B (Tools and Equipment)

attachments include: power cups, chains, slings

communications include: hand signals, electronic communications, audible/visual

barriers include: signs, barricades, danger/caution tape

TASK A-4 Organizes work

TASK DESCRIPTOR

In order to organize their work, glaziers must be able to use documents and drawings, plan their project tasks, and obtain and organize required materials. A well-organized job reduces costs, minimizes mistakes and ensures a productive and safe workplace.

A-4.01 Uses documentation and reference material

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-4.01.01P	complete work-related documentation	work-related documentation is completed according to workplace policies, procedures and jurisdictional regulations
A-4.01.02P	fill out safety-related documentation	safety-related documentation is filled out according to workplace policies, procedures and jurisdictional regulations
A-4.01.03P	interpret reference materials	reference materials are interpreted according to industry standards

RANGE OF VARIABLES

work-related documentation includes: cut lists, work orders, log books, time sheets

safety-related documentation includes: job hazard assessments, toolbox meeting records, first aid logs, WHMIS symbols, SDS, equipment inspection logs

reference materials include: manuals, manufacturers' specifications, architectural drawings, shop drawings, catalogues

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-4.01.01L	demonstrate knowledge of work-related and safety-related documentation , and reference materials , and their applications	define terminology associated with work-related and safety-related documentation , and reference materials
		identify types of work-related and safety-related documentation , and reference materials , and describe their applications
A-4.01.02L	demonstrate knowledge of procedures used to prepare work-related and safety-related documentation	explain responsibilities associated with completing and signing work-related and safety-related documentation

		describe procedures used to complete work-related and safety-related documentation
A-4.01.03L	demonstrate knowledge of reference materials and their applications	identify types of reference materials and describe their applications
A-4.01.04L	demonstrate knowledge of regulatory requirements pertaining to safety-related documentation	identify codes, standards, rules and regulations pertaining to safety-related documentation

RANGE OF VARIABLES

work-related documentation includes: cut lists, work orders, log books, time sheets

safety-related documentation includes: job hazard assessments, toolbox meeting records, first aid logs, WHMIS symbols, SDS, equipment inspection logs

reference materials include: manuals, manufacturers' specifications, architectural drawings, shop drawings, catalogues

rules and regulations include: site-specific requirements, OH&S

A-4.02 Interprets plans, drawings and specifications

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-4.02.01P	cross-reference and verify plans, drawings and specifications	plans, drawings and specifications are cross-referenced and verified
A-4.02.02P	interpret information on plans, drawings and specifications	information on plans, drawings and specifications are interpreted
A-4.02.03P	interpret sizing of actual dimensions	sizing of actual dimensions is interpreted according to drawing
A-4.02.04P	visualize finished product	finished product is visualized
A-4.02.05P	perform calculations	calculations are performed according to drawings

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-4.02.01L	demonstrate knowledge of plans, drawings and specifications, their components , purposes and applications	define terminology associated with plans, drawings and specifications, and their components
		identify types of plans, drawings and specifications and their components , and describe their purposes and applications

		describe metric and imperial systems of measurement
A-4.02.02L	demonstrate knowledge of procedures used to interpret and extract information from plans, drawings and specifications	interpret and extract information from plans, drawings and specifications
		describe how to use scale rulers

RANGE OF VARIABLES

components include: scale, legend, details, symbols

A-4.03 Prepares list of materials and supplies

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-4.03.01P	determine required materials and supplies	materials and supplies are determined according to plans and specifications
A-4.03.02P	perform calculations	calculations are performed to verify measurements and dimensions
A-4.03.03P	interpret site measurements and instructions	site measurements and instructions are interpreted according to drawings and specifications
A-4.03.04P	complete material take-off lists	material take-off lists are completed with information according to drawings and specifications
A-4.03.05P	manage inventory of materials and supplies	inventory is managed according to shop standards

RANGE OF VARIABLES

information includes: supplies, materials, equipment

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-4.03.01L	demonstrate knowledge of procedures used to prepare lists of materials and supplies	identify types of materials and supplies
		describe resources and variables for determining material and supply requirements and availability

		describe procedures to organize, store and maintain inventory
A-4.03.02L	demonstrate knowledge of mathematical principles used to verify measurements and dimensions	identify mathematical principles used to verify measurements and dimensions
		describe metric and imperial systems of measurement
A-4.03.03L	demonstrate knowledge of safe handling practices for materials and supplies	describe safety requirements for handling materials and supplies

RANGE OF VARIABLES

resources and variables include: plans, specifications, drawings, environment

A-4.04 Plans project tasks

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-4.04.01P	establish and maintain schedules	schedules are established and maintained according to contractual obligations
A-4.04.02P	determine labour and equipment requirements	labour and equipment requirements are determined by schedule, site conditions, supplies and materials
A-4.04.03P	coordinate tasks	tasks are coordinated according to work plan and work site conditions
A-4.04.04P	draw and sketch layout	layout is drawn and sketched according to site requirements
A-4.04.05P	estimate time required to accomplish tasks	time required to accomplish tasks is estimated according to industry standard and site conditions
A-4.04.06P	coordinate delivery dates and availability of materials	delivery dates and availability of materials are coordinated according to work plan and site conditions
A-4.04.07P	determine sequence of operations	sequence of operations is determined

RANGE OF VARIABLES

labour includes: other trades' work requirements, workers

tasks include: shutdown requirements, preparation, installation, completion, work sequence

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-4.04.01L	demonstrate knowledge of procedures used to plan project tasks	identify factors that affect scheduling of work
		identify impact of factors on timing and work sequence
		describe sequence of operations and timing of procedures

RANGE OF VARIABLES

tasks include: shutdown requirements, preparation, installation, completion, work sequence

factors include: site, weather and environmental conditions, work of other trades, material properties, public safety, accessibility to work area for conveyance of materials and equipment, pre-construction meetings

TASK A-5 Performs routine trade activities

TASK DESCRIPTOR

Glaziers are expected to perform the following activities throughout all major work activities of the trade.

A-5.01 Prepares worksite

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.01.01P	perform hazard assessment	hazard assessment is performed according to jurisdictional regulations, site-specific requirements, and company policies and procedures
A-5.01.02P	determine set-up areas for access equipment	set-up areas for access equipment are determined according to site conditions
A-5.01.03P	control work area access	work area access is controlled by using barriers according to site conditions
A-5.01.04P	determine utility requirements	utility requirements are determined according to site conditions and task
A-5.01.05P	identify and prepare storage areas for materials and equipment	storage areas for materials and equipment are identified and prepared according to site conditions

RANGE OF VARIABLES

hazard assessments include: access/egress, job site cleanliness, trip hazards, potential risks (hot work, electrical, public), areas for access equipment, machinery and equipment

barriers include: hazard/caution tape, barricades, pylons, delineators

utility requirements include: washroom facilities, power, water, heat

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-5.01.01L	demonstrate knowledge of procedures used to prepare a worksite	describe procedures used to perform a hazard assessment
		describe procedures used to control work area access
A-5.01.02L	demonstrate knowledge of regulatory requirements pertaining to safety on a worksite	identify and interpret codes and regulations pertaining to safety on a worksite

RANGE OF VARIABLES

hazard assessments include: access/egress, job site cleanliness, trip hazards, potential risks (hot work, electrical, public), areas for access equipment, machinery and equipment

codes and regulations include: jurisdictional codes and regulations, site-specific regulations, company regulations

A-5.02 Handles glass and other materials

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and company safety policies
A-5.02.02P	un-crate glass	glass is uncrated using methods
A-5.02.03P	detect flaws in glass	flaws in glass are detected
A-5.02.04P	load and transport glass and other materials	glass and other materials are loaded and transported using tools and equipment

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

glass includes: fire-resistant, heat strengthened, tempered, annealed, laminated, rolled or pattern, low-E, leaded, spandrel

methods include: ensuring proper lean, wedging safely, opening correct side, checking for broken glass, using correct handling techniques

materials include: framing, pressure plates and caps, brackets, tapes, caulking

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
A-5.02.01L	demonstrate knowledge of glass and other materials and describe their characteristics, properties and applications	identify types of glass and describe their characteristics, properties and applications
		identify types of materials and describe their characteristics, properties and applications
A-5.02.02L	demonstrate knowledge of procedures used to handle glass and other materials	identify types of tools and equipment used to handle glass and other materials
		describe proper lifting and handling techniques
		identify types of product protection devices and materials
A-5.02.03L	demonstrate knowledge of safe work practices pertaining to handling of glass and other materials	identify hazards associated with handling glass and other materials

RANGE OF VARIABLES

glass includes: fire-resistant, heat strengthened, tempered, annealed, laminated, rolled or pattern, low-E, leaded, spandrel

materials include: framing, pressure plates and caps, brackets, tapes, caulking

tools and equipment include: see Appendix B (Tools and Equipment)

product protection devices and materials include: crates, cardboard, ratchet straps, rope, plywood, racks, A-frames, L-frames, low tack tape

hazards include: strains, weight limits, obstacles, improper techniques, inadequate communication, pinch points

A-5.03 Prepares materials for installation

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.03.01P	select and use <i>tools and equipment</i>	<i>tools and equipment</i> are selected and used according to task and manufacturers' specifications
A-5.03.02P	identify defects in materials	defects in materials are identified
A-5.03.03P	measure, level and shim rough openings prior to installation	rough openings are measured, levelled and shimmed prior to installation according to site conditions and shop drawings
A-5.03.04P	identify <i>dissimilar materials</i> and substrates	<i>dissimilar materials</i> and substrates are identified

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

dissimilar materials include: ferrous and non-ferrous metals, concrete and aluminum, fibreglass and polyvinyl chloride (PVC)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-5.03.01L	demonstrate knowledge of procedures used to prepare materials for installation	identify <i>tools and equipment</i> used to prepare materials for installation, and describe their applications and procedures for use
		identify types of materials and describe their purpose and application
		describe methods used to detect defects in materials
		describe procedures used to prepare materials for installation

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

A-5.04 Stores glass and other materials

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.04.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
A-5.04.02P	select storage location	storage location is selected according to site conditions
A-5.04.03P	organize glass and other materials	glass and other materials are organized according to when they will be used
A-5.04.04P	protect glass and other materials from elements and damage	glass and other materials are protected from elements and damage using products
A-5.04.05P	secure glass and other materials using methods	glass and other materials are secured using methods according to site conditions

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

glass includes: fire-resistant, heat strengthened, tempered, annealed, laminated, rolled or pattern, low-E, leaded, spandrel

materials include: framing, pressure plates and caps, brackets, sealants, air vapour barriers (AVB)

products include: racks, bearing walls, glass cases, tarps, plywood, poly

methods include: tying knots, banding, strapping

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-5.04.01L	demonstrate knowledge of procedures used to store glass and other materials	identify tools and equipment used to store glass and other materials , and describe their applications and procedures for use
		identify types of products used to protect glass and other materials from elements and damage
		describe methods used to secure glass and other materials

RANGE OF VARIABLES

glass includes: fire-resistant, heat strengthened, tempered, annealed, laminated, rolled or pattern, low-E, leaded, spandrel

materials include: framing, pressure plates and caps, brackets, sealants, air vapour barriers (AVB)

tools and equipment include: see Appendix B (Tools and Equipment)

products include: racks, bearing walls, glass cases, tarps, plywood, poly

methods include: tying knots, banding, strapping

A-5.05 Performs glass cutting and edge treatment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

Performance Criteria		Evidence of Attainment
A-5.05.01P	inspect glass	glass is inspected to detect flaws
A-5.05.02P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
A-5.05.03P	measure glass	glass is measured according to shop drawings, templates and site conditions
A-5.05.04P	lay out cutting sizes on a sheet of glass	cutting sizes are laid out on a sheet of glass to minimize waste
A-5.05.05P	clean glass	glass is cleaned
A-5.05.06P	drill, polish, arris and bevel glass	glass is drilled, polished, arrised and bevelled according to industry standards and task

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

KNOWLEDGE

Learning Outcomes		Learning Objectives
A-5.05.01L	demonstrate knowledge of procedures used to cut glass and perform edge treatments	identify tools and equipment used to cut glass and perform edge treatments, and describe their applications and procedures for use
		identify types of glass and describe their characteristics
		describe glass cutting techniques
		describe edging techniques
		describe polishing techniques

	identify types of chemicals and solvents for cleaning glass and aluminum
	describe WHMIS and SDS pertaining to chemicals and solvents
	identify limitations of working with glass
	identify size tolerances prior to cutting or edging glass

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

edging techniques include: arris, bevel, flat polish, pencil, bullnose

chemicals and solvents include: methyl-ethyl ketone (MEK), xylene, isopropyl, methyl hydrate

limitations of working with glass include: where to drill holes, sanding depth, keeping glass cool

A-5.06 Installs building envelope membranes

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.06.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
A-5.06.02P	clean and prepare surface	surface is cleaned and prepared according to manufacturers' specifications and site conditions
A-5.06.03P	apply building envelope membrane	building envelope membrane is applied according to manufacturers' specifications, site conditions and shop drawings
A-5.06.04P	perform pull test	pull test is performed to ensure adhesion

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

building envelope membranes include: self-adhere membrane, ethylene propylene diene monomer (EPDM) rubber, liquid applied

KNOWLEDGE

Learning Outcomes	Learning Objectives	
A-5.06.01L	demonstrate knowledge of building envelope membranes , their characteristics and applications	identify types of building envelope membranes and describe their characteristics and applications
		identify types of sealants and primers and describe their characteristics and applications
		describe WHMIS and SDS pertaining to sealants and primers
A-5.06.02L	demonstrate knowledge of procedures used to install building envelope membranes	identify tools and equipment used to install building envelope membranes and describe their applications and procedures for use
		describe procedures used to install building envelope membranes
		describe installation sequencing of building envelope membranes for watershed
		identify types of substrates
		identify types of surface preparation products and describe their purpose and applications
		identify types of anti-rotation products and describe their purpose and applications
		describe importance of recognizing product incompatibilities

RANGE OF VARIABLES

building envelope membranes include: self-adhere membrane, ethylene propylene diene monomer (EPDM) rubber, liquid applied

tools and equipment include: see Appendix B (Tools and Equipment)

types of substrates include: concrete, wood, steel, masonry

product incompatibilities include: poly-bitumen and silicone

A-5.07 Installs flashing

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.07.01P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications, site conditions and shop drawings
A-5.07.02P	select type of flashing	type of flashing is selected according to architectural and shop drawings
A-5.07.03P	lay out flashing	flashing is laid out according to architectural and shop drawings
A-5.07.04P	measure flashing	flashing is measured according to site conditions
A-5.07.05P	shear and bend flashing	flashing is sheared and bent
A-5.07.06P	determine slope and drainage requirements	slope and drainage requirements are determined according to shop drawings and site conditions
A-5.07.07P	fasten flashing	flashing is fastened using fasteners and compression fit in framing

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

types of flashing include: drip, sill, parapet, jamb

fasteners include: rivets, screws, silicone, tape, pressure plate system

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-5.07.01L	demonstrate knowledge of flashing, their characteristics and applications	identify types of flashing and describe their characteristics and applications
A-5.07.02L	demonstrate knowledge of procedures used to install flashing	identify tools and equipment used to install flashing and describe their applications and procedures for use
		describe procedures used to install flashing
		describe the considerations taken when installing flashing

RANGE OF VARIABLES

types of flashing include: drip, sill, parapet, jamb

tools and equipment include: see Appendix B (Tools and Equipment)

considerations include: overlap requirements, expansion and contraction allowances, sealant location, positive slope

A-5.08 Applies sealants

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.08.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
A-5.08.02P	prepare surface	surface is prepared using preparation methods according to site conditions
A-5.08.03P	select type of sealant and backing rods	type of sealant and backing rods are selected according to job specifications
A-5.08.04P	tool sealant	sealant is tooled according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

preparation methods include: two-rag wiping, wire brushing, dry brushing, vacuuming

types of sealants include: silicone, oil base, butyl, polysulfide, urethane (one part, two part), fire stop caulking

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-5.08.01L	demonstrate knowledge of sealants, their characteristics, properties and applications	identify types of sealants and describe their characteristics, properties and applications
		identify types of primers
		describe use of primers, cleaners, bond breakers and backing rods
		explain compatibility issues of sealants
		describe purpose of expansion joints, air seals, water seals, fire stops, acoustical sealants and structural glazing

A-5.08.02L	demonstrate knowledge of procedures used to install sealants	identify tools and equipment used to install sealants and describe their applications and procedures for use
		describe procedures used to install sealants
		describe sealing methods
		identify types of substrates
		describe amount of sealant required to ensure that joint is weather tight and has proper adhesion
A-5.08.03L	demonstrate knowledge of regulatory requirements pertaining to sealants	interpret and identify codes and regulations pertaining to sealants

RANGE OF VARIABLES

types of sealants include: silicone, oil base, butyl, polysulfide, urethane (one part, two part), fire stop caulking

tools and equipment include: see Appendix B (Tools and Equipment)

sealing methods include: dry, wet, wet/dry

substrates include: wood, concrete, steel, glass

TASK A-6 Uses communication and mentoring techniques

TASK DESCRIPTOR

Learning in the trades is done primarily in the workplace with tradespeople passing on their skills and knowledge to apprentices, as well as sharing knowledge among themselves. Apprenticeship is, and always has been about mentoring – learning workplace skills and passing them on. Because of the importance of this to the trade, this task covers the activities related to communication in the workplace and mentoring skills.

A-6.01 Uses communication techniques

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-6.01.01P	demonstrate communication practices with individuals or in a group	instructions and messages are interpreted by all parties involved in communication
A-6.01.02P	listen using active listening practices	active listening practices are utilized
A-6.01.03P	speak clearly using correct industry terminology to ensure understanding	understanding of message is confirmed by both parties

A-6.01.04P	receive and respond to feedback on work	response to feedback indicates understanding and corrective measures are taken
A-6.01.05P	explain and provide feedback	explanation and feedback is provided and task is carried out as directed
A-6.01.06P	use questioning to improve communication	questions enhance understanding, on-the-job training and goal setting
A-6.01.07P	participate in safety and information meetings	meetings are attended, information is relayed to the workforce, and is applied

RANGE OF VARIABLES

active listening includes: hearing, interpreting, reflecting, responding, paraphrasing

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
A-6.01.01L	demonstrate knowledge of trade terminology	define terminology used in trade
A-6.01.02L	demonstrate knowledge of effective communication practices	describe importance of using effective verbal and non-verbal communication with people in the workplace
		identify sources of information to effectively communicate
		identify communication and learning styles
		describe effective listening and speaking skills
		identify personal responsibilities and attitudes that contribute to on-the-job success
		identify value of diversity in workplace
		identify communication that constitutes harassment and discrimination

RANGE OF VARIABLES

people in the workplace include: other tradespeople, colleagues, apprentices, supervisors, clients, inspectors, prime contractors, site managers, owners, manufacturers

sources of information include: regulations, codes, occupational health and safety requirements, drawings, manufacturers' specifications, client and site specifications, company documentation

learning styles include: seeing it, hearing it, trying it

personal responsibilities and attitudes include: asking questions, working safely, accepting constructive feedback, time management and punctuality, respect for authority, good stewardship of materials, tools and property, efficient work practice, being accountable for work

harassment includes: objectionable conduct, comment or display made either on a one-time or continuous basis that threatens, demeans, belittles, or causes personal humiliation or embarrassment to the recipient

discrimination is prohibited based on: race, national or ethnic origin, colour, religion, age, sex, sexual orientation, gender identity or expression, marital status, family status, disability, genetic characteristics, pardoned conviction

A-6.02 Uses mentoring techniques

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-6.02.01P	identify and communicate learning objective and point of lesson	apprentice or learner can explain objective and point of lesson
A-6.02.02P	link lesson to other lessons and job	lesson order and unplanned learning opportunities are defined
A-6.02.03P	demonstrate performance of a skill to an apprentice or learner	steps required to demonstrate a skill are performed
A-6.02.04P	set up conditions required for an apprentice or learner to practice a skill	practice conditions are set up so that skill can be practiced safely by apprentice or learner
A-6.02.05P	assess apprentice or learner's ability to perform tasks with increasing independence	performance of apprentice or learner improves with practice to a point where skill can be done with little supervision
A-6.02.06P	give supportive and corrective feedback	apprentice or learner adopts best practice after having been given supportive or corrective feedback
A-6.02.07P	support apprentices or learners in pursuing technical training opportunities	technical training is completed within timeframe prescribed by apprenticeship authority

A-6.02.08P	support anti- harassment and violence prevention in workplace	workplace is harassment, discrimination and violence-free
A-6.02.09P	assess apprentice or learner suitability to trade during probationary period	apprentice or learner is given feedback that helps them identify their own strengths and weaknesses and suitability for trade

RANGE OF VARIABLES

steps required to demonstrate a skill include: understanding the who, what, where, when, why, and how, explaining, showing, giving encouragement, following up to ensure skill is performed correctly

practice conditions means: guided, limited independence, full independence

harassment includes: objectionable conduct, comment or display made either on a one-time or continuous basis that threatens, demeans, belittles, or causes personal humiliation or embarrassment to recipient

discrimination is prohibited based on: race, national or ethnic origin, colour, religion, age, sex, sexual orientation, gender identity or expression, marital status, family status, disability, genetic characteristics, pardoned conviction

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
A-6.02.01L	demonstrate knowledge of strategies for learning skills in workplace	describe importance of individual experience
		describe shared responsibilities for workplace learning
		determine one's own learning preferences and explain how these relate to learning new skills
		describe importance of different types of skills in workplace
		describe importance of essential skills in workplace
		identify different learning styles
		identify different learning needs and strategies to meet them
A-6.02.02L	demonstrate knowledge of strategies for teaching workplace skills	identify strategies to assist in learning a skill
		identify different roles played by a workplace mentor
		describe teaching skills
		explain importance of identifying point of a lesson
		identify how to choose a good time to present a lesson
		explain importance of linking lessons
		identify components of skill (context)

	describe considerations in setting up opportunities for skill practice
	explain importance of providing feedback
	recognize importance of promoting healthy workplaces (physical and mental)
	identify techniques for giving effective feedback
	describe a skills assessment
	identify methods of assessing progress
	describe importance of using effective verbal and non-verbal communication with people in the workplace
	explain how to adjust a lesson to different situations

RANGE OF VARIABLES

essential skills are: reading, document use, writing, oral communication, numeracy, thinking, working with others, digital technology, continuous learning

learning styles include: seeing it, hearing it, trying it

learning needs include: learning disabilities, learning preferences, language proficiency

strategies to assist in learning a skill include: understanding basic principles of instruction, developing coaching skills, being mature, calm, professional and patient, providing feedback

teaching skills include: identifying point of lesson, linking lesson, demonstrating the skill, providing practice, giving feedback, assessing skills and progress

people in the workplace include: other tradespeople, colleagues, apprentices, supervisors, clients, inspectors, prime contractors, site managers, owners, manufacturers

MAJOR WORK ACTIVITY B

Fabricates and installs commercial window and door systems

TASK B-7 Fabricates commercial window and door systems

TASK DESCRIPTOR

Glaziers are responsible for the fabrication of window and door systems for commercial projects. Fabrication takes place in the fabrication shop or on site prior to installation.

B-7.01 Fabricates curtain walls

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.01.01P	select and use <i>tools and equipment</i>	<i>tools and equipment</i> are selected and used according to task, manufacturers' specifications and <i>system requirements</i>
B-7.01.02P	create and use jigs and templates	jigs and templates are created and used according to manufacturers' specifications and <i>system requirements</i>
B-7.01.03P	measure frame <i>components</i>	frame <i>components</i> are measured according to shop drawings
B-7.01.04P	cut curtain wall <i>components</i>	curtain wall <i>components</i> are cut from stock length extrusions and materials according to <i>system requirements</i>
B-7.01.05P	<i>lay out</i> mullions	mullions are laid out according to shop drawings
B-7.01.06P	assemble frames and <i>components</i>	frames and <i>components</i> are assembled according to specifications
B-7.01.07P	install setting and dam blocks for stick built and pre-glazed unitized units	setting blocks for stick built and pre-glazed unitized units are installed according to <i>system requirements</i>
B-7.01.08P	install back pans	back pans are installed according to <i>system requirements</i>

B-7.01.09P	make vent and drain holes in pressure plates	vent and drain holes in pressure plates are made according to manufacturers' specifications
B-7.01.10P	install vinyl and tape	vinyl and tape are installed according to manufacturers' specifications
B-7.01.11P	install glass into frames	glass is installed into frames according to manufacturers' specifications
B-7.01.12P	install pressure plates, sealants and screws	pressure plates, sealants and screws are installed to secure glass to frames according to manufacturers' specifications and system requirements
B-7.01.13P	prepare products for shipping	products are prepared for shipping according to industry standards

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

system requirements include: shop drawings, envelope consultants

components include: spigots, stops, mullions, muntins, glass, flashing, tapes, rubbers

lay out includes: spigot locations, pilot holes, horizontal locations

vinyl and tape include: back vinyl, thermal break, vinyl pressure plates, glazing tape, foam tape

sealants include: structural silicone glazing (SSG), caulking

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-7.01.01L	demonstrate knowledge of curtain walls, their components , characteristics and applications	identify types of curtain walls and their components , and describe their characteristics and applications
		describe manufacturers' specifications related to expansion and contraction
		describe location of weep holes, vent ports and anchors, and describe their characteristics and applications
		identify types of operable windows and describe their characteristics and applications
B-7.01.02L	demonstrate knowledge of procedures used to fabricate curtain walls	identify tools and equipment used to fabricate curtain walls, and describe their applications and procedures for use
		interpret instructions used to assemble curtain walls
		describe procedures used to fabricate curtain walls
		describe fabrication sheets and describe their characteristics and applications

		identify types of sealants , gaskets and tapes and describe their characteristics and applications
B-7.01.03L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

components include: spigots, stops, mullions, muntins, glass, flashing, tapes, rubbers

types of curtain walls include: two-sided, four-sided SSG, stick-built, pre-glazed unitized systems

types of operable windows include: casement, awning, hopper

tools and equipment include: see Appendix B (Tools and Equipment)

sealants include: structural silicone glazing (SSG), caulking

codes and regulations include: National Building Code of Canada (NBC), National Energy Code for Buildings (NECB), jurisdictional codes and regulations

B-7.02 Fabricates storefronts

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and system requirements
B-7.02.02P	create and use jigs and templates	jigs and templates are created and used according to manufacturers' specifications and system requirements
B-7.02.03P	measure storefront components	storefront components are measured according to shop drawings
B-7.02.04P	cut storefront components	storefront components are cut from stock extrusions and materials according to manufacturers' specifications and system requirements
B-7.02.05P	lay out mullions	mullions are laid out according to shop drawings
B-7.02.06P	assemble frames and components	frames and components are assembled according to manufacturers' specifications
B-7.02.07P	prepare products for shipping	products are prepared for shipping according to industry standards

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

system requirements include: shop drawings, envelope consultants

components include: mullions, muntins, rain deflectors, glazing stops, gaskets, sill, flashing, spigots

lay out includes: spigot locations, pilot holes, horizontal locations

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
B-7.02.01L	demonstrate knowledge of storefronts, their characteristics and applications	identify types of storefronts and describe their characteristics and applications describe amount of pre-assembly done in shop
B-7.02.02L	demonstrate knowledge of procedures used to fabricate storefronts	identify tools and equipment used to fabricate storefronts and describe their applications and procedures for use describe procedures used to fabricate storefronts identify types of materials used in fabrication of storefronts describe fasteners used in fabrication of storefronts
B-7.02.03L	demonstrate knowledge of regulatory requirements pertaining to storefronts	interpret and identify codes and regulations pertaining to storefronts

RANGE OF VARIABLES

applications include: interior, exterior

types of storefronts include: thermally broken, non-thermally broken, flush-glazed

tools and equipment include: see Appendix B (Tools and Equipment)

materials include: extrusion, vinyl, sealants, sheet metal

fasteners include: screws, nuts and bolts, pop rivets

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

B-7.03**Fabricates window systems**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.03.01P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and system requirements
B-7.03.02P	create and use jigs and templates	jigs and templates are created and used according to manufacturers' specifications and system requirements
B-7.03.03P	measure window system components	window system components are measured according to shop drawings
B-7.03.04P	cut window system components	window system components are cut from stock length extrusions and materials according to manufacturers' specifications and system requirements
B-7.03.05P	lay out mullions	mullions are laid out according to shop drawings
B-7.03.06P	assemble frames and window system components	frames and window system components are assembled according to manufacturers' specifications and shop drawings
B-7.03.07P	prepare products for shipping	products are prepared for shipping according to industry standards

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

system requirements include: shop drawings, envelope consultants

window system components include: jambs, headers, sills, spigots, hardware, glazing, stops

lay out includes: spigot locations, pilot holes, horizontal locations

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-7.03.01L	demonstrate knowledge of window systems, their components , characteristics and applications	identify types of window systems and their components , and describe their characteristics and applications
		identify types of operable windows and describe their characteristics and applications

B-7.03.02L	demonstrate knowledge of procedures used to fabricate window systems	identify tools and equipment used to fabricate window systems and describe their applications and procedures for use
		describe procedures used to fabricate window systems
		describe amount of pre-assembly done in shop
		identify types of weather seal materials and describe their characteristics and applications
		identify types of sealants and describe their characteristics and applications
		identify types of finishes and describe their characteristics and applications
		identify types of fasteners and describe their characteristics and applications
		describe thermal breaks
B-7.03.03L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

window system components include: jambs, headers, sills, spigots, hardware, glazing, stops

types of window systems include: strip (ribbon), window wall, punched opening

types of operable windows include: casement, awning, hopper

tools and equipment include: see Appendix B (Tools and Equipment)

types of weather seal materials include: tapes, sealants, gaskets

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

B-7.04 Fabricates skylights and sloped glazing systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.04.01P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and system requirements
B-7.04.02P	create and use jigs and templates	jigs and templates are created and used according to manufacturers' specifications and system requirements
B-7.04.03P	measure frame components	frame components are measured according to shop drawings

B-7.04.04P	cut and notch skylights and sloped glazing systems components	skylights and sloped glazing components are cut and notched from stock length extrusions and materials according to system requirements
B-7.04.05P	lay out rafters and purlins	rafters and purlins are laid out according to shop drawings
B-7.04.06P	prepare products for shipping	products are prepared for shipping according to industry standards

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

system requirements include: shop drawings, envelope consultants

components include: rafters, purlins, spigots, splice plates, pressure plates, gutters, sleeve anchors, condensation gutters, compression rings, fasteners, flashings, gaskets

lay out includes: spigot locations, pilot holes, horizontal locations

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-7.04.01L	demonstrate knowledge of skylights, sloped glazing systems and their components , characteristics and applications	identify types of skylights and sloped glazing systems and their components , and describe their characteristics and applications
B-7.04.02L	demonstrate knowledge of procedures used to fabricate skylights and sloped glazing systems	identify tools and equipment used to fabricate skylights and sloped glazing systems and describe their applications and procedures for use
		describe procedures used to fabricate skylights and sloped glazing systems
		describe amount of pre-assembly done in shop
		identify types of weather seal materials and describe their characteristics and applications
		identify types of flashings and describe their characteristics and applications
		identify types of anchors and describe their characteristics and applications
		identify types of membranes and describe their characteristics and applications
		identify types of sealants and describe their characteristics and applications
		describe skylight and sloped glazing construction techniques

		describe requirements for substrate to aluminum separation
B-7.04.03L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

types of skylights and sloped glazing systems include: ridge, hip, pyramid, barrel vault, T-bar, pressure cap

components include: rafters, purlins, spigots, splice plates, pressure plates, gutters, sleeve anchors, condensation gutters, compression rings, fasteners, flashings, gaskets

tools and equipment include: see Appendix B (Tools and Equipment)

types of weather seal materials include: tapes, sealants, flashings, gaskets, self-adhered membrane

types of flashings include: primary, secondary

types of anchors include: sleeve, welded, bolted

requirements for substrate to aluminum separation include: shims, bituminous paint, membrane, slip pads

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

B-7.05 Fabricates entrance systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.05.01P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and system requirements
B-7.05.02P	create and use jigs and templates	jigs and templates are created and used according to manufacturers' specifications and system requirements
B-7.05.03P	measure entrance system components	entrance system components are measured according to shop drawings and site conditions
B-7.05.04P	cut and mortice entrance system components	entrance system components are cut from stock length extrusions and materials according to manufacturers' specifications and system requirements
B-7.05.05P	lay out entrance system components	entrance system components are laid out according to shop drawings

B-7.05.06P	assemble entrance system components	entrance system components are assembled according to manufacturers' specifications
B-7.05.07P	prepare products for shipping	products are prepared for shipping according to industry standards

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

system requirements include: shop drawings, envelope consultants

components include: handles, closers, thresholds, bolts, maximum security (MS) locks, locksets, electric strikes, panic hardware (exit devices), mullions, muntins, glass, pivots, hinges

lay out includes: spigot locations, pilot holes, horizontal locations, rail locations, hardware locations

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-7.05.01L	demonstrate knowledge of entrance systems, their components , characteristics and applications	identify types of entrance systems and their components , and describe their characteristics and applications
		identify types of automatic door operators and describe their characteristics and applications
B-7.05.02L	demonstrate knowledge of procedures used to fabricate entrance systems	interpret instructions, templates, manufacturers' specifications and drawings
		identify tools and equipment used to fabricate entrance systems and describe their applications and procedures for use
		describe procedures used to fabricate entrance systems
		identify types of framing materials and describe their characteristics and applications
		identify types of hardware and describe their characteristics and applications
		explain compatibility and performance for types of specified hardware for aluminum doors
		identify types of gaskets and describe their characteristics and applications
B-7.05.03L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

components include: handles, closers, thresholds, bolts, maximum security (MS) locks, locksets, electric strikes, panic hardware (exit devices), mullions, muntins, glass, pivots, hinges

types of entrance systems include: swing, bifold, revolving, sliding, portals, vestibule, total vision system (TVS)

types of automatic door operators include: electric, pneumatic, hydraulic

tools and equipment include: see Appendix B (Tools and Equipment)

types of framing materials include: flush glaze, curtain wall with door adapter, storefront

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

TASK B-8 Installs commercial window and door systems

TASK DESCRIPTOR

Glaziers are responsible for the installation of window and door systems for commercial projects. This could include new construction or retrofit projects.

B-8.01 Lays out commercial window and door systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.01.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
B-8.01.02P	measure rough openings and confirm sizing	rough openings are measured according to site conditions and sizing is confirmed according to shop drawings
B-8.01.03P	locate benchmarks and gridlines	benchmarks and gridlines are located according to architectural drawings and general contractor
B-8.01.04P	lay out window and door systems	window and door systems are laid out according to architectural drawings

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-8.01.01L	demonstrate knowledge of procedures used to lay out commercial window and door systems	identify tools and equipment used to lay out commercial window and door systems, and describe their applications and procedures for use
		identify types of window systems , and describe their characteristics and applications
		describe procedures used to measure and assess rough openings
		describe procedures used to transfer lines from floor to ceiling and roof
		describe procedures used to create offset lines
		describe procedures used to transfer benchmarks

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

types of window systems include: strip (ribbon), curtain wall, storefront, TVS

B-8.02

Installs curtain wall systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
B-8.02.02P	install starter tracks and anchors	starter tracks and anchors are installed according to layout
B-8.02.03P	install curtain walls	curtain walls are installed according to shop drawings and manufacturers' specifications
B-8.02.04P	air seal perimeter	perimeter is air sealed according to shop drawings, jurisdictional codes and regulations, and manufacturers' specifications
B-8.02.05P	install corner blocks for horizontally drained stick-built systems	corner blocks for horizontally drained stick-built systems are installed according to manufacturers' specifications

B-8.02.06P	install gasket (wet or dry) in stick-built systems	gasket (wet or dry) is installed according to manufacturers' specifications
B-8.02.07P	install glass in stick-built systems	glass is installed according to shop drawings
B-8.02.08P	finish frames and glass with pressure plates, caps and sealants	frames and glass are finished with pressure plates, caps and sealants according to shop drawings

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

gaskets include: vinyl, shim tape, high-density foam tape

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
B-8.02.01L	demonstrate knowledge of curtain wall systems, their components , characteristics and applications	identify types of curtain wall systems and their components , and describe their characteristics and applications
		identify types of substrates
		identify types of gaskets
		explain rain screen principle
		describe wet and dry curtain wall systems and benefits of each
		identify types of anchoring systems and describe their characteristics and applications
B-8.02.02L	demonstrate knowledge of procedures used to install curtain wall systems and their components	describe purpose of wind (live) load and dead load anchors
		identify tools and equipment used to install curtain wall systems and their components , and describe their applications and procedures for use
		describe procedures used to install curtain wall systems and their components
		explain tolerances when installing curtain walls
		describe procedures used to allow for expansion and contraction when installing window systems
		describe procedures used to assemble curtain wall systems on-site

identify types of primers used for self-adhered membrane, polyurethane and silicone

identify **types of sealants** and describe their characteristics, compatibility and applications

RANGE OF VARIABLES

components include: pressure plates, caps, anchors, shear blocks, dam blocks, back pans, gaskets, fasteners, glass

types of curtain wall systems include: captured, two-sided, four-sided SSG, stick-built, pre-glazed unitized

types of substrates include: concrete, wood, steel, masonry

gaskets include: vinyl, shim tape, high-density foam tape

types of anchoring systems include: starter tracks, welded anchors, slip anchors, embeds, bolster blocks/anchor backup assembly, sill/perimeter angle

tools and equipment include: see Appendix B (Tools and Equipment)

types of sealants include: butyl, silicone, polyurethane

B-8.03 Installs storefront systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.03.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
B-8.03.02P	install components	components are installed according to manufacturers' specifications and shop drawings
B-8.03.03P	plumb, level and square frames	frames are plumbed, levelled and squared using shims
B-8.03.04P	secure frames in place	frames are secured in place using fasteners
B-8.03.05P	perform on-site glazing	glazing is performed on-site
B-8.03.06P	install glass stops and gaskets	glass stops and gaskets are installed according to shop drawings
B-8.03.07P	apply perimeter sealants	perimeter sealants are applied according to shop drawings

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

components (storefront systems) include: deflection header, sills, sub-sills, rain deflectors, back-up plates, stops, verticals, horizontals

fasteners include: screws, plugs

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
B-8.03.01L	demonstrate knowledge of storefront systems, their components , characteristics and applications	identify types of storefront systems , their components and describe their characteristics and applications
		describe the amount of assembly done on-site
B-8.03.02L	demonstrate knowledge of entrance systems and their components	identify types of entrance systems and their components
B-8.03.03L	demonstrate knowledge of procedures used to install storefront systems	identify tools and equipment used to install storefront systems and describe their applications and procedures for use
		describe procedures used to install storefront systems
		identify types of hardware and describe their characteristics and applications
		identify types of glazing gaskets and describe their characteristics and applications
B-8.03.04L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

components (storefront systems) include: deflection header, sills, sub-sills, rain deflectors, back-up plates, stops, verticals, horizontals

applications include: interior, exterior

types of storefront systems include: single glaze, double glaze, thermally broken, non-thermally-broken

components (entrance systems) include: handles, closers, thresholds, flush bolts, locksets, electric strikes, panic hardware (exit devices), pivots, restrictors

types of entrance systems include: swing, bifold, revolving, sliding, portals, vestibule, TVS

tools and equipment include: see Appendix B (Tools and Equipment)

types of glazing gaskets include: vinyl, rubber, tapes

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

B-8.04 Installs window systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.04.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
B-8.04.02P	assemble components	components are assembled according to manufacturers' specifications
B-8.04.03P	plumb, level and square window systems	window systems are plumbed, levelled and squared using shims
B-8.04.04P	secure window systems	window systems are secured using screws, plugs or anchors
B-8.04.05P	install setting blocks when glazing windows on-site	setting blocks are installed according to manufacturers' specifications when glazing windows on-site
B-8.04.06P	perform on-site glazing	glazing is performed on-site
B-8.04.07P	secure glass	glass is secured using glass stops
B-8.04.08P	insulate and seal frame	frame is insulated and sealed according to shop drawings

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

components include: jambs, headers, sills, spigots, hardware, glazing, stops, rain screen components

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-8.04.01L	demonstrate knowledge of window systems, their components , characteristics and applications	identify types of window systems and their components , and describe their characteristics and applications
		describe procedures used to install glass stops, and describe their characteristics and applications
B-8.04.02L	demonstrate knowledge of procedures used to install window systems and their components	identify tools and equipment used to install window systems and describe their applications and procedures for use
		describe procedures used to install window systems
		identify types of weather seal materials

		identify methods of assembly of window systems
B-8.04.03L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

components include: jambs, headers, sills, spigots, hardware, glazing, stops, rain screen components

types of window systems include: strip (ribbon), window wall

tools and equipment include: see Appendix B (Tools and Equipment)

types of weather seal materials include: tapes, sealants, gaskets

methods of assembly of window systems include: pre-glazed, site-glazed

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

B-8.05 Installs skylights and sloped glazing systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.05.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
B-8.05.02P	measure opening for skylights and sloped glazing and confirm sizing	opening for skylights and sloped glazing is measured and sizing is confirmed according to shop drawings
B-8.05.03P	place and assemble condensation gutters and frame members	condensation gutters and frame members are placed and assembled according to manufacturers' specifications and shop drawings
B-8.05.04P	install components	components are installed according to manufacturers' specifications and shop drawings
B-8.05.05P	position skylights and sloped glazing	skylights and sloped glazing are positioned according to shop drawings, site conditions and manufacturers' specifications
B-8.05.06P	secure anchors	anchors are secured using fasteners according to manufacturers' specifications and shop drawings

B-8.05.07P	install insulation	insulation is installed between primary and secondary flashing according to shop drawings
B-8.05.08P	perform on-site glazing	glazing is performed on-site

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

components include: rafters, purlins, purlin bars/pressure caps, spigots, splice plates, pressure plates and caps, gutters, sleeve anchors

fasteners include: bolts, screws, rivets

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
B-8.05.01L	demonstrate knowledge of skylights and sloped glazing systems, their components , characteristics and applications	identify types of skylights and sloped glazing systems and their components , and describe their characteristics and applications
		identify types of weather seal materials and describe their characteristics and applications
		identify types of flashings and describe their characteristics and applications
		identify types of anchors and describe their characteristics and applications
		identify types of membranes and describe their characteristics and applications
		identify types of sealants and describe their characteristics and applications
		describe requirements for separation of dissimilar materials
		identify location and placement of anchors for skylights and sloped glazing systems
		identify placement of purlins
B-8.05.02L	demonstrate knowledge of procedures used to install skylights, sloped glazing systems and their components	identify tools and equipment used to install skylights, sloped glazing systems and their components , and describe their applications and procedures for use
		describe procedures used to install skylights, sloped glazing systems and their components
B-8.05.03L	demonstrate knowledge of regulatory requirements pertaining to skylights and sloped glazing systems	interpret and identify codes and regulations pertaining to skylights and sloped glazing systems

RANGE OF VARIABLES

components include: rafters, purlins, purlin bars/pressure caps, spigots, splice plates, pressure plates and caps, gutters, sleeve anchors

types of skylights and sloped glazing systems include: ridge, hip, pyramid, barrel vault, T-bar, pressure cap, point-glazed

types of weather seal materials include: tapes, sealants, flashings, gaskets

types of flashings include: primary, secondary

types of membranes include: EPDM rubber, self-adhered membrane

requirements for separation of dissimilar materials include: shims, bituminous paint

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

B-8.06 Installs entrance systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.06.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
B-8.06.02P	position entrance system	entrance system is positioned according to layout
B-8.06.03P	plumb, level and square entrance system	entrance system is plumbed, levelled and squared
B-8.06.04P	prepare frame for other trades to run electrical wiring through frame	frame is prepared for installation of electrical wiring according to task, shop drawings and manufacturers' specifications
B-8.06.05P	prepare and place components in rough opening	components are prepared and placed in rough opening
B-8.06.06P	install components	components are installed according to shop drawings

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

components include: handles, closers, thresholds, flush bolts, locksets, electric strikes, panic hardware (exit devices), pivots, restrictors

KNOWLEDGE

Learning Outcomes	Learning Objectives	
B-8.06.01L	demonstrate knowledge of entrance systems, their components , characteristics and applications	identify types of entrance systems and their components , and describe their characteristics and applications
		identify types of electronic hardware and describe their characteristics and applications
B-8.06.02L	demonstrate knowledge of procedures used to install entrance systems and their components	identify tools and equipment used to install entrance systems and their components , and describe their applications and procedures for use
		describe procedures used to install entrance systems
		identify requirements to communicate and coordinate with other trades
		identify types of framing materials and describe their characteristics and applications
B-8.06.03L	demonstrate knowledge of regulatory requirements pertaining to installation of electrical wiring in entrance systems	interpret and identify codes and regulations pertaining to installation of electrical wiring in entrance systems
B-8.06.04L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

components include: handles, closers, thresholds, flush bolts, locksets, electric strikes, panic hardware (exit devices), pivots, restrictors

types of entrance systems include: swing, bifold, revolving, sliding, portals, vestibule, TVS

types of electronic hardware include: mag locks, handicap panels, card readers, key pad operators, automatic mats, auto sensors, shear locks, electric panic hardware, power transfers

tools and equipment include: see Appendix B (Tools and Equipment)

types of framing materials include: flush glaze, curtain wall with door adapter

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

MAJOR WORK ACTIVITY C

Installs residential window and door systems

TASK C-9 Installs residential window systems

TASK DESCRIPTOR

Glaziers install window systems on residential construction sites, as well as replace or retrofit used and outdated systems. Window systems may be delivered pre-assembled. Some systems require glazing, frame and hardware assembly on-site due to size, weight, site conditions, and manufacturers' specifications. Some residences are fit with commercial window systems.

C-9.01 Lays out residential window systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-9.01.01P	select and use <i>tools and equipment</i>	<i>tools and equipment</i> are selected and used according to task and manufacturers' specifications
C-9.01.02P	measure and verify rough opening	rough opening is measured and verified according to site measurements and architectural and shop drawings
C-9.01.03P	remove window system	window system is removed according to site conditions and safe work procedures

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

KNOWLEDGE

Learning Outcomes	Learning Objectives
C-9.01.01L demonstrate knowledge of residential window systems, their characteristics and applications	identify types of residential window systems and describe their characteristics and applications
	identify types of operable windows and describe their characteristics and applications
	identify types of fixed windows and describe their characteristics and applications
C-9.01.02L demonstrate knowledge of procedures used to lay out residential window systems	identify tools and equipment used to lay out residential window systems, and describe their applications and procedures for use
	describe procedures used to measure residential window systems
	describe procedures to determine that window fits opening
	describe procedures to determine reference points, gridlines and benchmarks
C-9.01.03L demonstrate knowledge of regulatory requirements pertaining to residential window systems	interpret and identify codes and regulations pertaining to residential window systems

RANGE OF VARIABLES

types of residential window systems include: bays, bows, inserts, awning, casement, sliding, tilt turn, fixed, skylights and sloped glazing systems

types of operable windows include: casement, awning, hopper, tilt turn, single-hung/guillotine, double-hung, skylights and sloped glazing systems

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, jurisdictional codes and regulations

C-9.02 Sets windows in openings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-9.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
C-9.02.02P	plumb, level and square window and frame	window and frame are plumbed, levelled, and squared
C-9.02.03P	secure window	window is secured according to manufacturers' specifications
C-9.02.04P	verify operation of window	window is operational
C-9.02.05P	insulate and seal frame	frame is insulated and sealed according to codes and regulations

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, Canadian Standards Association (CSA) codes, jurisdictional codes and regulations

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-9.02.01L	demonstrate knowledge of residential window systems, their characteristics and applications	identify types of weather seal materials and describe their characteristics and applications
		identify types of fasteners used to secure windows
		identify types of insulation and sealants used to seal residential window systems
C-9.02.02L	demonstrate knowledge of procedures used to set residential window systems	identify tools and equipment used to set windows in openings and describe their applications and procedures for use
		describe procedures used to set windows in openings
		describe procedures to insulate and seal residential window systems
C-9.02.03L	demonstrate knowledge of regulatory requirements pertaining to residential window systems	interpret and identify codes and regulations pertaining to residential window systems

RANGE OF VARIABLES

types of weather seal materials include: tapes, sealants, gaskets, membranes

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, Canadian Standards Association (CSA) codes, jurisdictional codes and regulations

C-9.03 Glazes windows

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-9.03.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
C-9.03.02P	inspect glass and components	glass is inspected for damage and components are inspected for compatibility
C-9.03.03P	apply setting block	setting block is applied according to manufacturers' specifications
C-9.03.04P	secure glazing	glazing is secured according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

components include: gaskets, tape, sealants, adhesives, fasteners

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-9.03.01L	demonstrate knowledge of residential window systems, their characteristics and applications	identify components and describe their compatibility with various surfaces
C-9.03.02L	demonstrate knowledge of procedures used to glaze residential window systems	identify tools and equipment used to glaze windows and describe their applications and procedures for use describe procedures used to glaze windows
C-9.03.03L	demonstrate knowledge of regulatory requirements pertaining to residential window systems	interpret and identify codes and regulations pertaining to residential window systems

RANGE OF VARIABLES

components include: gaskets, tape, sealants, adhesives, fasteners

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, CSA codes, jurisdictional codes and regulations

TASK C-10 Installs residential door systems

TASK DESCRIPTOR

Glaziers install door systems on residential construction sites, as well as replace or retrofit used and outdated systems. Door systems may be delivered pre-assembled. Some systems require glazing and frame and hardware assembly on-site due to size, weight, site conditions and manufacturers' specifications. Some residences are fit with commercial door systems.

C-10.01 Lays out residential door systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

Performance Criteria		Evidence of Attainment
C-10.01.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
C-10.01.02P	measure and verify rough opening	rough opening is measured and verified according to site measurements and, architectural and shop drawings
C-10.01.03P	determine door swing	door swing is determined according to architectural drawings
C-10.01.04P	remove door system	door system is removed

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

KNOWLEDGE

Learning Outcomes		Learning Objectives
C-10.01.01L	demonstrate knowledge of residential door systems, their characteristics and applications	identify types of residential door systems and describe their characteristics and applications
		describe difference between active and inactive doors

C-10.01.02L	demonstrate knowledge of procedures used to lay out residential door systems	identify tools and equipment used to lay out residential door systems, and describe their applications and procedures for use
		describe procedures used to measure residential door systems
		describe procedures to determine that door fits opening
		describe procedures to determine reference points and benchmarks
		describe procedures to shim residential door systems
C-10.01.03L	demonstrate knowledge of regulatory requirements pertaining to residential door systems	interpret and identify codes and regulations pertaining to residential door systems

RANGE OF VARIABLES

types of residential door systems include: French, double, swing, pocket, sliding

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, CSA codes, jurisdictional codes and regulations

C-10.02 Assembles residential door frames

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
C-10.02.02P	lay out door frames	door frames are laid out according to manufacturers' specifications
C-10.02.03P	fasten and secure door frame components	door frame components are fastened and secured using fastening methods according to manufacturers' specifications and site conditions

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

components include: nailing flanges, rebates/brick moulds, thresholds, jambs, headers, sills, transoms

fastening methods include: screwing, bolting, riveting, nailing

KNOWLEDGE

Learning Outcomes	Learning Objectives
C-10.02.01L demonstrate knowledge of residential door frames, their components and hardware , their characteristics and applications	identify types of residential door frames , their components and hardware , and describe their characteristics and applications
	identify types of door frame materials and describe their characteristics and applications
	identify types of residential door systems and describe their characteristics and applications
C-10.02.02L demonstrate knowledge of procedures used to assemble residential door frames and their components	identify tools and equipment used to assemble residential door frames and their components , and describe their applications and procedures for use
	describe procedures used to assemble residential door frames, their components and hardware
	describe fastening methods to secure residential door frame components and hardware
C-10.02.03L demonstrate knowledge of regulatory requirements pertaining to residential door systems	interpret and identify codes and regulations pertaining to residential door systems

RANGE OF VARIABLES

components include: nailing flanges, rebates/brick moulds, thresholds, jambs, headers, sills, transoms

hardware includes: strike plates, hinges, locking devices, closers, rollers, handles

types of residential door frames include: equal leg, nail on flange, rebate/brick mould

types of door frame materials include: vinyl/PVC, steel, composite, fibreglass, wood

types of residential door systems include: French, double, swing, pocket, sliding

tools and equipment include: see Appendix B (Tools and Equipment)

fastening methods include: screwing, bolting, riveting, nailing

codes and regulations include: NBC, NECB, CSA codes, jurisdictional codes and regulations

C-10.03 Sets residential doors and frames

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.03.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
C-10.03.02P	plumb, level and square door and frame	door and frame are plumbed, levelled and squared
C-10.03.03P	fasten door and frame	door and frame are fastened using fasteners according to manufacturers' specifications and shop drawings
C-10.03.04P	verify operation of door	door is operational
C-10.03.05P	insulate and seal door frame	door frame is insulated and sealed according to codes and regulations

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, CSA codes, jurisdictional codes and regulations

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-10.03.01L	demonstrate knowledge of procedures used to set residential doors and frames	identify air and vapour barriers, and describe their characteristics and applications
		identify types of insulation used with residential doors and frames, and describe their characteristics and applications
		describe procedures used to set residential doors and frames
C-10.03.02L	demonstrate knowledge of regulatory requirements pertaining to residential door systems	interpret and identify codes and regulations pertaining to residential door systems

RANGE OF VARIABLES

codes and regulations include: NBC, NECB, CSA codes, jurisdictional codes and regulations

C-10.04 Installs residential door hardware

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.04.01P	select and use <i>tools and equipment</i>	<i>tools and equipment</i> are selected and used according to task and manufacturers' specifications
C-10.04.02P	use jigs and templates	jigs and templates are used according to manufacturers' specifications
C-10.04.03P	fasten <i>hardware</i>	<i>hardware</i> is fastened according to manufacturers' specifications
C-10.04.04P	verify operation of <i>hardware</i>	<i>hardware</i> is operational

RANGE OF VARIABLE

tools and equipment include: see Appendix B (Tools and Equipment)

hardware includes: strike plates, hinges, locksets, pivots, closers, handles, rollers

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-10.04.01L	demonstrate knowledge of procedures used to install residential door <i>hardware</i>	identify <i>tools and equipment</i> used to install residential door <i>hardware</i> and describe their applications and procedures for use
		describe procedures used to install residential door <i>hardware</i>
		identify types of residential door <i>hardware</i> and describe their characteristics and applications
C-10.04.02L	demonstrate knowledge of regulatory requirements pertaining to residential door systems	interpret and identify <i>codes and regulations</i> pertaining to residential door systems

RANGE OF VARIABLE

hardware includes: strike plates, hinges, locksets, pivots, closers, handles, rollers

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, CSA codes, jurisdictional codes and regulations

C-10.05 Glazes residential doors

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	no	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.05.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
C-10.05.02P	inspect glass and components	glass is inspected for damage and components are inspected for compatibility
C-10.05.03P	apply setting block	setting block is applied according to manufacturers' specifications
C-10.05.04P	secure glazing	glazing is secured according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

components include: gaskets, tape, sealants, adhesives

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-10.05.01L	demonstrate knowledge of procedures used to glaze residential doors	identify tools and equipment used to glaze residential doors and describe their applications and procedures for use
		describe procedures used to glaze residential doors
		identify types of components and describe their compatibility with various surfaces
C-10.05.02L	demonstrate knowledge of regulatory requirements pertaining to residential door systems	interpret and identify codes and regulations pertaining to residential door systems

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

components include: gaskets, tape, sealants, adhesives

codes and regulations include: NBC, NECB, CSA codes, jurisdictional codes and regulations

MAJOR WORK ACTIVITY D

Fabricates and installs specialty glass, products and glass systems

TASK D-11 Fabricates and installs commercial specialty glass and products

TASK DESCRIPTOR

Glaziers lay out, assemble and install commercial specialty glass and products that include items such as hand rails/balustrades, shower enclosures, point glazing wall systems, partition walls, smoke baffles, mirrors, display cases, sneeze guards and glass floors.

D-11.01 Lays out commercial specialty glass and products

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

Performance Criteria		Evidence of Attainment
D-11.01.01P	identify <i>type of substrate</i>	<i>type of substrate</i> is identified to determine <i>tools and equipment</i> , and fasteners required
D-11.01.02P	select and use <i>tools and equipment</i>	<i>tools and equipment</i> are selected and used according to task and manufacturers' specifications
D-11.01.03P	create and use templates	templates are created and used according to site conditions and manufacturers' specifications
D-11.01.04P	measure openings and products	openings and products are measured according to manufacturers' specifications and shop drawings to ensure proper fit
D-11.01.05P	determine angles of glass and frames	angles of glass and frames are determined according to site conditions and architectural drawings
D-11.01.06P	identify benchmarks and gridlines	benchmarks and gridlines are identified according to architectural and engineered drawings, and site conditions

RANGE OF VARIABLES

types of substrates include: concrete, wood, steel, masonry

tools and equipment include: see Appendix B (Tools and Equipment)

KNOWLEDGE		
Learning Outcomes	Learning Objectives	
D-11.01.01L	demonstrate knowledge of commercial specialty glass, products and materials, their characteristics , properties and applications	identify types of commercial specialty glass and describe their characteristics , properties and applications
		identify types of commercial specialty products and describe their characteristics, properties and applications
		identify types of commercial specialty product materials and describe their characteristics, properties and applications
		identify types of commercial anchoring systems and describe their characteristics, properties and applications
		identify types of commercial hardware and patch fittings and describe their characteristics, properties and applications
D-11.01.02L	demonstrate knowledge of procedures used to lay out commercial specialty glass and products	identify tools and equipment used to lay out commercial specialty glass and products, and describe their applications and procedures for use
		describe procedures used to measure commercial specialty glass and products
		explain layout methods using benchmarks and gridlines
		describe calculations used to determine angles of glass and frames
D-11.01.03L	demonstrate knowledge of regulatory requirements pertaining to commercial specialty glass and products	interpret and identify codes and regulations pertaining to commercial specialty glass and products

RANGE OF VARIABLES

characteristics include: insulation value, colour, ballistic/bomb-resistant, strength, aesthetics

types of commercial specialty glass includes: curved, multicoloured, multi-laminate, electrochromic, photovoltaic, textured, fire-resistant, mirror, tempered

types of commercial specialty products include: shower enclosures, point glazing wall systems, sun shades, balustrades, glass handrails/guardrails, solariums, frameless

types of commercial specialty product materials include: aluminum, stainless steel, plastic, wood, vinyl, PVC

types of commercial anchoring systems include: wedge anchors, nuts and bolts, screws, quick anchors, chemical anchors

types of commercial hardware and patch fittings include: clamps, hinges, stand-offs, point glazing, rail systems, wedge system

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, National Fire Code of Canada (NFC), jurisdictional codes and regulations

D-11.02 Assembles commercial specialty glass, products and hardware

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-11.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
D-11.02.02P	measure and cut materials	materials are measured and cut according to site conditions, manufacturers' specifications, and architectural, engineered and shop drawings
D-11.02.03P	plumb, level and square materials	materials are plumbed, levelled and squared
D-11.02.04P	fasten materials	materials are fastened using fasteners according to architectural and shop drawings, and manufacturers' specifications
D-11.02.05P	tension patch fittings and cables	patch fittings and cables are tensioned according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment includes: see Appendix B (Tools and Equipment)

materials include: glass, aluminum, stainless steel, plastic, wood, PVC

fasteners include: screws, clips, anchors, bolts

KNOWLEDGE

Learning Outcomes	Learning Objectives
D-11.02.01L	demonstrate knowledge of procedures used to assemble commercial specialty glass, products and hardware
	identify tools and equipment used to assemble commercial specialty glass, products and hardware , and describe their applications and procedures for use
	describe procedures used to assemble commercial specialty glass, products and hardware
	identify types of commercial specialty glass and describe their characteristics , properties and applications
	identify types of fasteners used to fasten materials
	identify types of extrusions and describe their characteristics, properties and applications
	identify types of sealants and adhesives
	identify types of gaskets and describe their characteristics, properties and applications
D-11.02.02L	demonstrate knowledge of regulatory requirements pertaining to commercial specialty glass and products
	interpret and identify codes and regulations pertaining to commercial specialty glass and products

RANGE OF VARIABLES

hardware includes: patch fittings, closers, pivots, extrusions

tools and equipment includes: see Appendix B (Tools and Equipment)

types of commercial specialty glass include: curved, multi-coloured, multi-laminate, electrochromic, photovoltaic, textured, fire-resistant, mirror, tempered

characteristics include: insulation value, colour, ballistic/bomb-resistant, strength, aesthetics

fasteners include: screws, clips, anchors, bolts

materials include: glass, aluminum, stainless steel, plastic, wood, PVC

types of extrusions include: base shoes, U-channels, tubing

sealants and adhesives include: structural and non-structural silicones, polyurethane, two-part epoxy, ultraviolet (UV) glue, butyl, grout

types of gaskets include: vinyl, rubber, weather stripping, butyl, nylon

codes and regulations include: NBC, NECB, NFC, jurisdictional codes and regulations

D-11.03 Installs commercial specialty glass, products and hardware

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-11.03.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
D-11.03.02P	remove existing specialty product	existing specialty product is removed and disposed of according to site requirements
D-11.03.03P	fasten specialty product to opening	specialty product is fastened to opening using fasteners
D-11.03.04P	plumb, level and square specialty product	specialty product is plumbed, levelled and squared
D-11.03.05P	install hardware	hardware is installed according to manufacturers' specifications
D-11.03.06P	install anchoring system	anchoring system is installed according to manufacturers' specifications and, engineered and shop drawings
D-11.03.07P	cut and fit materials	materials are cut and fitted according to site measurements, manufacturers' specifications and shop drawings
D-11.03.08P	clad and flash materials	materials are clad and flashed according to site conditions and shop drawings
D-11.03.09P	verify operation of specialty glass and products as required	specialty glass and products are operational according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

fasteners include: bolts, clips, anchors, screws

hardware includes: patch fittings, closers, pivots, handles, extrusions

anchoring systems include: wedge anchors, nuts and bolts, screws, quick anchors, chemical anchors

materials include: glass, aluminum, stainless steel, plastic, wood, PVC

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-11.03.01L	demonstrate knowledge of procedures used to install commercial specialty glass and products	identify tools and equipment used to install commercial specialty glass and products, and describe their applications and procedures for use
		describe procedures used to install commercial specialty glass and products, and their respective hardware
		identify types of fasteners used to fasten commercial specialty products according to substrate
		describe calculations used to determine angles of glass and frames
D-11.03.02L	demonstrate knowledge of regulatory requirements pertaining to commercial specialty glass and products	interpret and identify codes and regulations pertaining to commercial specialty glass and products

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

hardware includes: patch fittings, closers, pivots, handles, extrusions

fasteners include: bolts, clips, anchors, screws

codes and regulations include: NBC, NECB, NFC, jurisdictional codes and regulations

TASK D-12 Fabricates and installs residential specialty glass and products

TASK DESCRIPTOR

Glaziers lay out, assemble and install residential specialty glass and products that include items such as shelving, glass hand rails/balustrades, shower enclosures, point glazing systems, partition walls, mirrors and glass floors.

D-12.01 Lays out residential specialty glass and products

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

Performance Criteria		Evidence of Attainment
D-12.01.01P	identify <i>type of substrate</i>	<i>type of substrate</i> is identified to determine <i>tools and equipment</i> , and fasteners required
D-12.01.02P	select and use <i>tools and equipment</i>	<i>tools and equipment</i> are selected and used according to task and manufacturers' specifications
D-12.01.03P	create and use templates	templates are created and used according to site conditions and manufacturers' specifications
D-12.01.04P	measure openings and products	openings and products are measured according to manufacturers' specifications and shop drawings to ensure proper fit
D-12.01.05P	determine angles of glass and frames	angles of glass and frames are determined according to site conditions and architectural drawings

RANGE OF VARIABLES

types of substrates include: concrete, wood, steel, masonry

tools and equipment include: see Appendix B (Tools and Equipment)

KNOWLEDGE

Learning Outcomes	Learning Objectives
D-12.01.01L	demonstrate knowledge of residential specialty glass, products and materials, their characteristics, properties and applications
	identify types of residential specialty glass and describe their characteristics , properties and applications
	identify types of residential specialty products and describe their characteristics, properties and applications
	identify types of residential specialty product materials and describe their characteristics, properties and applications
	identify types of residential anchoring systems and describe their characteristics, properties and applications
	identify types of residential hardware and patch fittings and describe their characteristics, properties and applications
D-12.01.02L	demonstrate knowledge of procedures used to lay out residential specialty glass and products
	identify tools and equipment used to lay out residential specialty glass and products, and describe their applications and procedures for use
	describe procedures used to measure residential specialty glass and products
	describe calculations used to determine angles of glass and frames
D-12.01.03L	demonstrate knowledge of regulatory requirements pertaining to residential specialty glass and products
	interpret and identify codes and regulations pertaining to residential specialty glass and products

RANGE OF VARIABLES

types of residential specialty glass includes: curved, multi-coloured, multi-laminate, electrochromic, photovoltaic, textured, mirror, tempered, fire-rated

characteristics include: insulation value, colour, hurricane resistant, strength, aesthetics

types of residential specialty products include: shower enclosures, point glazing systems, sun shades, glass hand rails/balustrades, solariums, mirrors, shelving, glass doors

types of residential specialty product materials include: aluminum, stainless steel, plastic, wood, PVC

types of residential anchoring systems include: wedge anchors, nuts and bolts, screws, quick anchors, chemical anchors

types of residential hardware and patch fittings include: clamps, hinges, stand-offs, point glazing, rail systems, wedge system

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

D-12.02 Assembles residential specialty glass, products and hardware

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
D-12.02.02P	measure and cut materials	materials are measured and cut according to site conditions, manufacturers' specifications, and architectural and shop drawings
D-12.02.03P	plumb, level and square materials	materials are plumbed, levelled and squared
D-12.02.04P	fasten materials	materials are fastened using fasteners according to manufacturers' specifications and, architectural and shop drawings
D-12.02.05P	tension patch fittings and cables	patch fittings and cables are tensioned according to engineered and manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

materials include: glass, aluminum, stainless steel, plastic, wood, PVC

fasteners include: screws, clips, anchors, bolts, nails

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.02.01L	demonstrate knowledge of procedures used to assemble residential specialty glass, products and hardware	identify tools and equipment used to assemble residential specialty glass, products and hardware , and describe their applications and procedures for use
		describe procedures used to assemble residential specialty glass, products and hardware
		identify types of residential specialty glass and describe their characteristics , properties and applications
		identify types of fasteners used to fasten materials

		identify types of extrusions and describe their characteristics, properties and applications
		identify types of sealants and adhesives and describe their characteristics, properties and applications
		identify types of gaskets and describe their characteristics, properties and applications
D-12.02.02L	demonstrate knowledge of regulatory requirements pertaining to residential specialty glass and products	interpret and identify codes and regulations pertaining to residential specialty glass and products

RANGE OF VARIABLES

hardware includes: patch fittings, closers, pivots, extrusions

tools and equipment include: see Appendix B (Tools and Equipment)

types of residential specialty glass includes: curved, multi-coloured, multi-laminate, electrochromic, photovoltaic, textured, mirror, tempered, fire-rated

characteristics include: insulation value, colour, hurricane resistant, strength, aesthetics

fasteners include: screws, clips, anchors, bolts, nails

materials include: glass, aluminum, stainless steel, plastic, wood, PVC

types of extrusions include: base shoes, U-channels, tubing

sealants and adhesives include: structural and non-structural silicones, polyurethane, two-part epoxy, UV glue, butyl

types of gaskets include: vinyl, rubber, weather stripping, nylon

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

D-12.03 Installs residential specialty glass, products and hardware

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.03.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
D-12.03.02P	remove existing specialty product	existing specialty product is removed and disposed of according to site requirements
D-12.03.03P	fasten specialty product to opening	specialty product is fastened to opening using fasteners
D-12.03.04P	plumb, level and square specialty product	specialty product is plumbed, levelled and squared

D-12.03.05P	install hardware	hardware is installed according to manufacturers' specifications
D-12.03.06P	install anchoring system	anchoring system is installed according to manufacturers' specifications and shop drawings
D-12.03.07P	cut and fit materials	materials are cut and fit according to site measurements, manufacturers' specifications and shop drawings
D-12.03.08P	clad and flash materials	materials are clad and flashed according to site conditions and shop drawings
D-12.03.09P	select and install gaskets, sealants and adhesives	gaskets, sealants and adhesives are selected and installed according to manufacturers' specifications and shop drawings
D-12.03.10P	verify operation of specialty glass and products as required	specialty glass and products are operational according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

fasteners include: bolts, clips, anchors, screws, nails

hardware includes: patch fittings, closers, pivots, handles, U-channels

anchoring systems include: wedge anchors, nuts and bolts, screws, quick anchors, chemical anchors

materials include: glass, aluminum, stainless steel, plastic, wood, PVC

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.03.01L	demonstrate knowledge of procedures used to install residential specialty glass and products	<p>identify tools and equipment used to install residential specialty glass and products, and describe their applications and procedures for use</p> <p>describe procedures used to install residential specialty glass and products, and their respective hardware</p> <p>identify types of fasteners used to fasten residential specialty products according to substrate</p> <p>describe calculations used to determine angles of glass and frames</p>
D-12.03.02L	demonstrate knowledge of regulatory requirements pertaining to residential specialty glass and products	interpret and identify codes and regulations pertaining to residential specialty glass and products

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

hardware includes: patch fittings, closers, pivots, handles, U-channels

fasteners include: bolts, clips, anchors, screws, nails

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

MAJOR WORK ACTIVITY E

Performs servicing

TASK E-13 Services commercial window and door systems

TASK DESCRIPTOR

Glaziers service broken or damaged glass windows and doors in commercial sectors. They work on both the glass and their structure, diagnosing, repairing and replacing components as needed.

E-13.01 Assesses service requirements for commercial window and door systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

Performance Criteria		Evidence of Attainment
E-13.01.01P	identify problems	problems are identified by performing visual and physical inspection
E-13.01.02P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and site conditions
E-13.01.03P	plan sequence of repair	sequence of repair is planned according to site conditions and type of repair
E-13.01.04P	protect surrounding areas	surrounding areas are protected according to site conditions and jurisdictional regulations
E-13.01.05P	identify required upgrades	required upgrades are identified
E-13.01.06P	determine replacement components	replacement components are determined
E-13.01.07P	inspect commercial window and door systems	commercial window and door systems are inspected to identify potential issues

RANGE OF VARIABLES

problems include: broken and failed glass, damaged framing, failed hardware and materials, hazardous materials (asbestos, black mould), leaks

tools and equipment include: see Appendix B (Tools and Equipment)

site conditions include: accessibility, access equipment on site, size of material being repaired or replaced, location

upgrades include: hardware, glazing systems, sealants, building envelope, insulating values, energy efficiency, safety

components include: door hardware (hinges, pivots, locks, latches), window hardware (pressure plates, caps, vent hardware), framing

potential issues include: damaged or missing materials, failed seals, leaks, substandard building envelope

KNOWLEDGE		
	Learning Outcomes	Learning Objectives
E-13.01.01L	demonstrate knowledge of commercial window and door systems, their characteristics and applications	identify types of commercial window and door systems and their components , and describe their characteristics and applications
E-13.01.02L	demonstrate knowledge of procedures used to assess service requirements for commercial window and door systems	identify tools and equipment used to assess service requirements for commercial window and door systems, and describe their applications and procedures for use
		describe procedures used to assess service requirements for commercial window and door systems
		describe access requirements
		describe potential problems with commercial window and door systems
E-13.01.03L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

types of commercial window and door systems include: storefront, curtain wall, skylights, sloped glazing, entrance, TVS

components include: door hardware (hinges, pivots, locks, latches), window hardware (pressure plates, caps, vent hardware), framing

tools and equipment include: see Appendix B (Tools and Equipment)

problems include: broken and failed glass, damaged framing, failed hardware and materials, hazardous materials (asbestos, black mould), leaks

codes and regulations include: NBC, NECB, NFC, jurisdictional codes and regulations

E-13.02 Repairs commercial window and door systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-13.02.01P	select and use <i>tools and equipment</i>	<i>tools and equipment</i> are selected and used according to task, manufacturers' specifications and site requirements
E-13.02.02P	disassemble window and door system	window and door system is disassembled and disposed of according to sequence of disassembly and site requirements
E-13.02.03P	remove and dispose of damaged products	damaged products are removed and disposed of according to sequence of disassembly and site requirements
E-13.02.04P	determine hazards of material handling	hazards of material handling are determined according to company policies and procedures, and jurisdictional regulations
E-13.02.05P	select replacement products	replacement products are selected to match existing system or to upgrade to customer requirements
E-13.02.06P	assemble replacement parts and materials for commercial window and door systems	replacement parts and materials for commercial window and door systems are assembled according to manufacturers' specifications
E-13.02.07P	repair, replace and fasten hardware	hardware is repaired, replaced and fastened
E-13.02.08P	place and secure window and door systems	window and door systems are placed and secured according to manufacturers' specifications and site conditions
E-13.02.09P	verify operation of window vents and door system	window vents and door system are operational

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

KNOWLEDGE

Learning Outcomes	Learning Objectives
E-13.02.01L	demonstrate knowledge of commercial window and door systems, their components , characteristics and applications
	identify types of commercial window and door systems and their components , and describe their characteristics and applications
	identify types of glass products and describe their characteristics and applications
E-13.02.02L	demonstrate knowledge of procedures used to repair or replace commercial window and door systems
	identify tools and equipment used to repair commercial window and door systems, and describe their applications and procedures for use
	describe procedures used to repair or replace commercial window and door systems
	describe potential hazards of material handling during repair procedures
E-13.02.03L	demonstrate knowledge of regulatory requirements pertaining to commercial window and door systems
	interpret and identify codes and regulations pertaining to commercial window and door systems

RANGE OF VARIABLES

components include: hinges, pivots, locks, handles

types of commercial window and door systems include: storefront, curtain wall, skylights, sloped glazing, entrance, TVS

types of glass products include: tempered, annealed, high-performance, Georgian polished wire (GPW), laminated, heat-strengthened, low-E, obscure glass, fire-rated, ballistic/bomb-resistant

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, NFC, jurisdictional codes and regulations

TASK E-14 Services residential window and door systems

TASK DESCRIPTOR

Glaziers service broken or damaged glass windows and doors in residential sectors. They work on both the glass and their structure, diagnosing, repairing and replacing components as needed.

E-14.01 Assesses service requirements for residential window and door systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

Performance Criteria		Evidence of Attainment
E-14.01.01P	identify problems	problems are identified by performing visual and physical inspection
E-14.01.02P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and site conditions
E-14.01.03P	plan sequence of repair	sequence of repair is planned according to site conditions and type of repair
E-14.01.04P	protect surrounding areas	surrounding areas are protected according to site conditions and jurisdictional regulations
E-14.01.05P	identify upgrades and retrofits and advise client	upgrades and retrofits are identified and client is advised
E-14.01.06P	determine replacement window and door components	replacement window and door components are determined
E-14.01.07P	inspect residential window and door systems	residential window and door systems are inspected to identify any potential issues

RANGE OF VARIABLES

problems include: worn or damaged door sweeps, screens and thresholds; broken seals, glass and sashes; operational issues of vents or door hardware; hazardous materials (black mould, asbestos, lead paint)

tools and equipment include: see Appendix B (Tools and Equipment)

site conditions include: ground conditions, location of window or door

upgrades and retrofits include: energy efficiency (insulation value, low-e, krypton and argon gas), aesthetics

window components include: vent, sash, sash balance, hinges, operators, locks, handles

door components include: handles, locks, hinges, restrictors, rollers, tracks, latches, closers

potential issues include: air leaks, moisture leaks, insulation failures, incorrect installations, sealant failures

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-14.01.01L	demonstrate knowledge of residential window and door systems, their characteristics and applications	identify types of residential window systems and their components , and describe their characteristics and applications
		identify types of residential door systems and their components , and describe their characteristics and applications
E-14.01.02L	demonstrate knowledge of procedures used to assess service requirements for residential window and door systems	identify tools and equipment used to assess service requirements for residential window and door systems, and describe their applications and procedures for use
		describe procedures used to assess service requirements for residential window and door systems
		describe access requirements
		describe potential problems with residential window and door systems and identify potential solutions for repair
E-14.01.03L	demonstrate knowledge of regulatory requirements pertaining to residential window and door systems	interpret and identify codes and regulations pertaining to residential window and door systems

RANGE OF VARIABLES

types of residential window systems include: bays, bows, inserts, awning, single-hung, double-hung, casement, sliding, tilt turn, skylights, hopper

window components include: vent, sash, sash balance, hinges, operators, locks, handles

types of residential door systems include: double, pocket, swing, sliding

door components include: handles, locks, hinges, restrictors, rollers, tracks, latches, closers

tools and equipment include: see Appendix B (Tools and Equipment)

problems include: worn or damaged door sweeps, screens and thresholds; broken seals, glass and sashes; operational issues of vents or door hardware; hazardous materials (black mould, asbestos, lead paint)

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

E-14.02 Repairs residential window and door systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-14.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task and manufacturers' specifications
E-14.02.02P	disassemble window and door system	window and door system is disassembled and disposed of according to sequence of disassembly, site requirements and jurisdictional regulations
E-14.02.03P	remove and dispose of damaged products	damaged products are removed and disposed of according to sequence of disassembly, site requirements and jurisdictional regulations
E-14.02.04P	determine hazards of material handling	hazards of material handling are determined according to company policies and procedures, and jurisdictional regulations
E-14.02.05P	select replacement products	replacement products are selected to match existing system or to upgrade to customer requirements and codes and regulations
E-14.02.06P	assemble replacement parts and materials for residential window and door systems	replacement parts and materials for residential window and door systems are assembled according to manufacturers' specifications
E-14.02.07P	repair, replace and fasten hardware	hardware is repaired, replaced and fastened according to manufacturers' specifications
E-14.02.08P	place and secure window and door systems	window and door systems are placed and secured according to manufacturers' specifications and site conditions
E-14.02.09P	verify operation of window vents and door system	window vents and door system are operational

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

KNOWLEDGE

Learning Outcomes	Learning Objectives
E-14.02.01L demonstrate knowledge of residential window and door systems, their components , characteristics and applications	identify types of residential window systems and their components , and describe their characteristics and applications
	identify types of residential door systems and their components , and describe their characteristics and applications
	identify types of glass products and describe their characteristics and applications
E-14.02.02L demonstrate knowledge of procedures used to repair residential window and door systems	identify tools and equipment used to repair residential window and door systems, and describe their applications and procedures for use
	describe procedures used to repair residential window and door systems
	describe potential hazards of material handling during repair procedures
E-14.02.03L demonstrate knowledge of regulatory requirements pertaining to residential window and door systems	interpret and identify codes and regulations pertaining to residential window and door systems

RANGE OF VARIABLES

types of residential window systems include: bays, bows, inserts, awning, single-hung, double-hung, casement, sliding, tilt turn, skylights, hopper

window components include: vent, sash, sash balance, hinges, operators, locks, handles

types of residential door systems include: double, pocket, swing, sliding

door components include: handles, locks, hinges, restrictors, rollers, tracks, latches, closers

types of glass products include: tempered, annealed, high-performance, laminated, obscure glass, heat-strengthened

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

TASK E-15 Services specialty glass and products

TASK DESCRIPTOR

Glaziers service specialty glass and products in commercial and residential sectors. They work on both the glass and their structure, diagnosing, repairing and replacing components as needed.

E-15.01 Assesses service requirements for specialty glass and products

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

Performance Criteria		Evidence of Attainment
E-15.01.01P	identify problems	problems are identified by performing visual and physical inspection
E-15.01.02P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and site conditions
E-15.01.03P	plan sequence of repair	sequence of repair is planned according to site conditions and type of repair
E-15.01.04P	protect surrounding areas	surrounding areas are protected according to site conditions and jurisdictional regulations
E-15.01.05P	determine replacement components	replacement components are determined
E-15.01.06P	inspect specialty glass and products	specialty glass and products are inspected to identify any potential issues

RANGE OF VARIABLES

problems include: cracked stained glass, scratches, broken glass or components, incompatible parts, misalignment

tools and equipment include: see Appendix B (Tools and Equipment)

site conditions include: ground conditions, location of specialty glass

components include: point fittings, patch fittings, sill tracks, head tracks, standoffs

potential issues include: weight of components, damaged or missing materials, failed seals, substandard building envelope, improper installation, improper measurement and sizes

KNOWLEDGE

Learning Outcomes	Learning Objectives
E-15.01.01L	demonstrate knowledge of specialty glass and products, their characteristics and applications
	identify types of specialty glass and products and their components , and describe their characteristics and applications
	identify types of specialty product materials
E-15.01.02L	demonstrate knowledge of procedures used to assess service requirements for specialty glass and products
	identify tools and equipment used to assess service requirements for specialty glass and products, and describe their applications and procedures for use
	describe procedures used to assess service requirements for specialty glass and products
	describe access requirements
	describe potential problems with specialty glass and products
E-15.01.03L	demonstrate knowledge of regulatory requirements pertaining to specialty glass and products
	interpret and identify codes and regulations pertaining to specialty glass and products

RANGE OF VARIABLES

characteristics include: curved, multi-coloured, multi-laminate, insulation value, colour, tempered

applications include: public safety, smoke control, aesthetics

types of specialty glass and products include: shower enclosures, point glazed products, sun shades, balustrades, sliding glass doors, cage doors, smoke baffles, glass floors, glass bridges, canopies

types of specialty product materials include: plastic, wood, vinyl, aluminum, stainless steel, pressed steel, low-iron glass, acrylic, leaded glass

tools and equipment include: see Appendix B (Tools and Equipment)

problems include: cracked stained glass, scratches, broken glass or components, incompatible parts, misalignment

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

E-15.02 Repairs specialty glass and products

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	NV	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-15.02.01P	select and use tools and equipment	tools and equipment are selected and used according to task, manufacturers' specifications and site requirements
E-15.02.02P	disassemble specialty glass and products	specialty glass and products are disassembled and disposed of according to sequence of disassembly, site requirements and codes and regulations
E-15.02.03P	remove and dispose of damaged products	damaged products are removed and disposed of according to sequence of disassembly, site requirements and codes and regulations
E-15.02.04P	determine hazards of material handling	hazards of material handling are determined according to company policies and procedures and, codes and regulations
E-15.02.05P	select replacement products	replacement products are selected to match existing system or to customer requirements according to codes and regulations
E-15.02.06P	assemble replacement parts and materials for specialty glass and products	replacement parts and materials for specialty glass and products are assembled according to manufacturers' specifications
E-15.02.07P	repair, replace and fasten hardware	hardware is repaired, replaced and fastened
E-15.02.08P	place and secure specialty glass and products	specialty glass and products are placed and secured according to manufacturers' specifications, site conditions and customer requirements
E-15.02.09P	verify installation and operation of specialty glass and products	specialty glass and products are operational and installed according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: see Appendix B (Tools and Equipment)

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-15.02.01L	demonstrate knowledge of specialty glass and products, their characteristics and applications	identify specialty glass and products and their components, and describe their characteristics and applications
		identify types of specialty product materials
E-15.02.02L	demonstrate knowledge of procedures used to repair specialty glass and products	identify tools and equipment used to repair specialty glass and products, and describe their applications and procedures for use
		describe procedures used to repair specialty glass and products
		describe potential hazards of material handling during repair procedures
		identify types of fasteners used to fasten specialty glass and products
E-15.02.03L	demonstrate knowledge of regulatory requirements pertaining to specialty glass and products	interpret and identify codes and regulations pertaining to specialty glass and products

RANGE OF VARIABLES

characteristics include: curved, multi-coloured, multi-laminate, insulation value, colour, tempered

applications include: public safety, smoke control, aesthetics

types of specialty product materials include: plastic, wood, vinyl, aluminum, stainless steel, pressed steel, low-iron glass, acrylic, leaded glass

tools and equipment include: see Appendix B (Tools and Equipment)

types of fasteners include: screws, clips, anchors, point glazed fittings

codes and regulations include: NBC, NECB, NFC, CSA codes, jurisdictional codes and regulations

APPENDIX A

ACRONYMS

AVB	air vapour barriers
CAD	computer-aided design
CNC	Computer Numerical Control
CSA	Canadian Standards Association
EPDM	ethylene propylene diene monomer
FRP	fibreglass-reinforced plastics
GPW	Georgian polish wire
LEED	Leadership in Energy and Environmental Design
MEK	methyl-ethyl ketone
MS	maximum security
NBC	National Building Code of Canada
NECB	National Energy Code of Canada for Buildings
NFC	National Fire Code of Canada
OH&S	Occupational Health and Safety
PPE	personal protective equipment
PVC	polyvinyl chloride
SDS	safety data sheets
SRL	self-retracting lifeline
SSG	structural silicone glazing
TVS	total vision system
UV	ultraviolet
WHMIS	Workplace Hazardous Materials Information System

APPENDIX B

TOOLS AND EQUIPMENT / OUTILS ET ÉQUIPEMENT

Personal Protective Equipment and Safety Equipment / Équipement de protection individuelle et de sécurité

aprons
cut-resistant apron
cut-resistant chaps
cut-resistant/grommet jacket
cut-resistant gloves
cut-resistant neck protector
cut-resistant sleeves
cut-resistant vest
ear protection
eye wash station
face shield
fire extinguisher
fall arrest equipment (ropes, grabs, harnesses, lanyards, self-retracting lifeline [SRL], lifelines, static lines, self-rescue, suspension trauma straps)

first aid kit
gloves
hard hat
knee pads
respiratory protection
rubber gloves
safety footwear
safety glasses
safety vest (high visibility)

tabliers
tabliers résistants aux coupures
jambières résistantes aux coupures
veste à œillet résistante aux coupures
gants résistants aux coupures
protecteur pour la nuque résistant aux coupures
manches résistantes aux coupures
veste résistante aux coupures
protection de l'ouïe
douches oculaires
écran facial
extincteurs
dispositifs antichute (cordes, coulisseau de sécurité, harnais, cordon, équipement rétractable, cordage de sécurité, lignes statiques, autosauvetage, courroie contre les chocs orthostatiques par suspension)
trousses de premiers soins
gants
casques de sécurité
genouillères
protection des voies respiratoires
gants de caoutchouc
chaussures de sécurité
lunettes de sécurité
gilet de sécurité (haute visibilité)

Hand Tools / Outils à main

adjustable wrench
aviation snips – straight, left, right

caulking guns
core clip tool
countersinks
clamps
cut-out (cold) knife
center punch
chalk line
chisels (cold, wood)
drill bits
fibre stick/tooling stick
files (flat, half round, round)

clé à mâchoires mobiles
cisailles – à coupe droite, à courbe à gauche, à courbe à droite
pistolets à calfeutrer
outil pour fixations
fraise à limer
serre-joints
couteau à contourner
pointeaux centreurs
cordeau traceur
ciseaux (à froid, à bois)
forets
baguette de fibre
limes (bâtarde, demi-ronde, ronde)

glass cutter
 glass wedge (glazing shovel)
 glazing bar
 hack-out knife
 hacksaw
 hammers (standard, dead-blow, claw)
 hand pump suction cups
 hex keys (imperial and metric)
 markers
 nail set
 open end wrenches (imperial and metric)
 paint brushes
 paint scraper
 pliers (locking, locking sheet metal, glass, running
 glass, needle nose, standard)
 protractor (degree finder)
 pry bars
 putty knife (bent, straight)
 rivet tool
 rivnut tool
 mallet (plastic, rubber)
 scoring tool
 screwdrivers (star, square, torx, flat)
 side cutters
 socket set (imperial and metric)
 spanner set
 string line
 utility knife
 vinyl glazing roller

coupe-verre
 coin de verre
 grattoir levier
 passe-partout
 scies à métaux
 marteaux (ordinaire, à amortisseur, à panne fendue)
 ventouse ordinaire
 clés hexagonales (impérial et métrique)
 pointes à tracer
 chasse-clou
 clés ouvertes (impérial et métrique)
 pinceaux
 grattoir à peinture
 pinces (étaux, étaux à tôle, à rompre le verre, à
 ouvrir la coupe, à bec effilé, ordinaires)
 rapporteur d'angles
 leviers
 couteau à mastiquer (recourbé, droit)
 outil à riveter
 outil pour écrous à rivets
 maillet (en plastique, en caoutchouc)
 outil marqueur
 tournevis
 pinces coupantes de côté
 tourne-écrous (impérial et métrique)
 clé ajustable
 cordeau
 couteau tout usage
 roulette à bandes de vinyle

Portable Power Tools / Outils mécaniques portatifs

band saw
 belt sander
 chop saw
 circular saw
 compound miter saw
 cordless drill
 electric drill
 electric router
 oscillating tool
 glass drilling machine and drill bits
 grinders
 hammer drill
 heat gun
 jigsaw
 magnetic drill
 nibblers
 portable glass notching saw
 power suction cups
 reciprocating saw
 rotary tool
 screw gun
 shears

scie à ruban
 ponceuse à courroie
 scie à onglets
 scies circulaires
 scie à onglets combinée
 perceuses sans fil
 perceuses électriques
 toupie électrique
 machine oscillante
 perceuse à verre avec forets
 meules
 marteau perforateur
 pistolet à air chaud
 scies sauteuses
 perceuse magnétique
 grignoteuses
 scie à encocher portative
 ventouse électrique
 scie alternative
 outil rotatif
 pistolet à vis
 cisailles

Stationary Power Tools / Outils mécaniques stationnaires

air table	table pneumatique
argon gas pressure system	appareil de pressurisation à l'argon
automatic bevelling machine	machine automatique à biseauter
automatic cutting table	table automatique de coupe
automatic diamond wheel edger	façonneuse automatique de bords à meule diamantée
automatic glass washing machine	machine automatique à laver le verre
automatic vertical edging machine	machine automatique de dressage vertical des bords
band saw	scies à ruban
bench grinder	touret (meule d'atelier)
benders	cintreuses
bulk foam insulation applicator	applicateur de mousse isolante en vrac
bulk sealant applicator	applicateur de produit d'étanchéité en vrac
Computer Numerical Controlled (CNC) machine	machine commandée par ordinateur
copy router	toupie à copier
drill press	perceuses à colonne
edger	meule, déligneuse
exhaust fans	ventilateur d'extraction
flashing brake	plieuse à aluminium
flashing shear	coupeuse à aluminium
glass cutting table	table de coupe du verre
milling machine (aluminium)	fraiseuse (pour aluminium)
pneumatic router	toupie
pneumatic tools (drill, pop rivet gun) and compressor	outils à air comprimé (toupie, perceuse, riveteuse) et compresseur
polishing machine	polisseuse
punch press	poinçonneuse
radial arm saw	scie radiale
sandblaster	appareil à jet de sable
sealed unit press	presse pour vitrages isolants scellés
table saw	banc de scie
upright belt sanders	ponceuse à courroie vertical
vent fans	ventilateurs

Layout and Measuring Equipment / Équipement de traçage et de mesure

calculator	calculatrice
laser distance measurer	mesureur de distance au laser
levels (builder's, laser, sight, spirit, theodolite, transit)	niveaux (de construction, laser, optique, à bulle, théodolite, transition)
measuring tape	ruban à mesurer
plumb bob	fil à plomb
sliding T bevel	fausse équerre
snap line	cordeau traceur
squares (combination, steel)	équerre (combinée, en acier)
total station	station totalisatrice
three-dimensional scanner	scanner 3D

Specialty Tools / Outils spéciaux

extraction tool (designed for windshield)
glass clamp
offset drill
offset hook tool
point driver
retaining nut removal tool
torque wrench

couteau de découpe pour pare-brise
serre-joint de vitrier
perceuse coudée
outil à crochet – coudé
chasse-pointe
outil à dégager les écrous de blocage
clé dynamométrique

Access Equipment / Équipement d'accès

articulated and straight boom lift (with glazing package)
bosun's chair
crane
hydro/mast climber lift
ladder jack
ladders (extension and step)
scaffolding (baker, frame, sectional, tubular)
scissor lift
swing stage (suspended scaffolds)

nacelle élévatrice droite ou articulée (avec l'ensemble de vitrage)
chaise de gabier
grue
plateforme élévatrice hydraulique
étrier (support à madrier)
échelles (extensible et articulée)
échafaudages (baker, pliant, en section, tubulaire)
table élévatrice à ciseau
échafaudages volant (nacelle de levage suspendue)

Rigging, Hoisting and Lifting Equipment / Équipement de gréage, de hissage et de levage

block and tackle
boom attachment
chain falls
chains
come-along
cranes and mini-cranes
electric pallet jack
electric stacker
eye bolts
flying forklifts
flying forks
fork lift
grip hoist
dolly (gator, glass)
pallet jacks
power cups
ratchet straps
ropes (fibre and synthetic)
shackles
slings
spreader bar
steel baskets
suction cups
tag lines
telehandler
turnbuckles
winches

palan à moufles
éperon
moufle à chaîne
chaînes
palan manuel à levier
grues et mini-grues
transpalette électrique
gerbeur électrique
boulons à œil
chariots élévateurs volants
fourches volantes
chariots élévateurs à fourches
poignée de levage
chariots (à caisses, à vitres)
transpalette
ventouse électrique
sangles à cliquets
cordages (fibres naturelles ou synthétiques)
manilles
élingues
barre d'écartement
nacelles en acier
ventouses
câbles stabilisateurs
chariot élévateur à portée variable
tendeurs
treuils

APPENDIX C

GLOSSARY / GLOSSAIRE

adhesive	substance used to adhere one material to another	adhésif	substance utilisée pour adhérer un matériau à un autre
anchor	bracket made of aluminum or steel and used to fasten aluminum frames to an adjoining structure	ancrage	ferrure en aluminium ou en acier servant à fixer les bâtis d'aluminium à une structure contiguë
anti-rotation products	material used to prevent pressure plate from rolling	produits antirotation	matériel utilisé pour empêcher les plaques de pression de rouler
arris	type of edge work, where the edge of the glass is ground back approximately 1/16th of an inch at an angle	polis	type de dressage des bords du verre qui consiste à meuler le bord du verre sur environ 1/16 pouce suivant un angle
awning (window)	window that is hinged at the top and swings out	fenêtre à auvent	fenêtre dont les charnières sont situées sur la partie supérieure et qui s'ouvrent vers l'extérieur
bevel(led)	type of edge work, where the edge of the glass is ground at an angle and polished	biseauté	type de dressage des bords du verre qui consiste à meuler le bord du verre sur 1/2 pouce à 1 pouce suivant un angle et à le polir
bolster block/anchor backup assembly	an aluminum block with an extending bolt that goes inside the curtain wall mullion allowing the bolt to extend out of the mullion allowing it to be attached to the steel embed in the concrete floor slab	bloc de châssis / dispositif d'ancrage d'appui	bloc d'aluminium muni d'un boulon extensible pouvant pénétrer dans le meneau du mur-rideau, permettant au boulon de s'étendre à l'extérieur du meneau pour qu'il puisse être attaché à l'encastrement d'acier dans la dalle de plancher en béton
cap	outside finish of a curtain wall frame; also called a "snap cover"	habillage	élément de finition extérieure d'un bâti de mur-rideau posé à pression
casement (window)	window that is hinged at the side and swings out	fenêtre à battants	fenêtre dont les charnières sont situées sur le côté et qui s'ouvrent vers l'extérieur

curtain wall	non-load-bearing wall constructed of metal or wood, glass or other panelized material and anchored to the building structure	mur-rideau	mur non porteur construit en aluminium et en verre ou en tout autre matériau préfabriqué, qui est ancré à la structure du bâtiment
edge treatment	process of sanding or grinding the edge of glass to any of the following finishes: arris, bevel, polish, mitre and ground	dressage des bords	opération consistant à poncer ou à meuler le bord coupé d'une vitre pour lui donner l'un des finis suivants : arête abattue, biseauté, poli, taillé à l'onglet et meulé
fabricate	construct support structures commonly using aluminum extrusions both in the controlled shop environment and on site	fabriquer	construire des structures porteuses utilisant couramment des profilés d'aluminium, en atelier, dans un milieu contrôlé, et sur les lieux de travail
flashing	thin sheet of metal, formed to a specific shape used for cosmetic and watershed purposes	sofin	mince tôle façonnée à la forme désirée et servant à des fins esthétiques et pour l'écoulement des eaux
gasket	preformed rubber, silicone or vinyl used in the glazing industry	garniture d'étanchéité	substance préformée, en caoutchouc, en silicone ou en vinyle, utilisée en vitrerie
glaze	installing glass	vitrer	poser des vitres
guillotine door or window system	a large spanned manual or motorized glass vertical door or window system with retractable operation, often with multiple sections recessing into floor and/or ceiling	porte ou fenêtre à guillotine	porte ou fenêtre de grande envergure manuelle ou motorisée à mécanisme rétractable, souvent composé de plusieurs sections qui s'encastrent dans le plancher ou le plafond
hopper (window)	window that is hinged at the bottom and swings in	fenêtre à soufflet	fenêtre dont les charnières sont situées dans le bas et qui s'ouvre vers l'intérieur
laminated glass	glass that has been layered (laminated) at the factory with a synthetic material between the layers	verre feuilleté	verre constitué de deux vitres entre lesquelles est collé un intercalaire de butyral polyvinylique
plumb	adjective: perpendicular to level verb: install something perpendicular to level	aplomber	installer perpendiculairement à l'horizontale

polished	type of edge work performed after the glass is ground to smooth the edge	poli	type de dressage des bords du verre permettant d'adoucir les bords du verre après meulage
pre-glazed	window or door frame that has the glass installed in it before final installation of the frame takes place	prévitré	bâti de fenêtre ou de porte dans lequel la vitre a été posée avant que le bâti lui-même ne soit installé dans l'ouvrage
pressure plate	screw-applied glass stop on curtain wall	plaque de pression	parclose fixée par vis sur les murs-rideaux
rough opening	opening into which a window or door frame is installed (wood, masonry, steel, concrete)	ouverture brute	ouverture dans le bois, la brique ou l'acier où l'on installe le bâti de porte ou de fenêtre
sealant	substance applied to a surface to make it impervious or resistant to air, water and dirt	produit d'étanchéité	substance appliquée sur une surface pour la rendre imperméable ou résistante à l'air, à l'eau et à la saleté
setting block	block made of rubber, neoprene, EPDM, or silicone and used to position and support glass in a frame	cale d'assise	cale de caoutchouc, de néoprène, de terpolymère d'éthylènepropylène-diène (EPDM) ou de silicone utilisée pour positionner et soutenir une vitre dans un bâti
shear block	bracket made of aluminium or steel and used to fasten horizontal frame members to vertical frame members	attache d'assemblage	ferrure en aluminium ou en acier utilisée pour fixer les éléments de bâtis horizontaux aux éléments de bâtis verticaux
skylight	type of overhead sloped glazing	lanterneau	puit de lumière
spandrel	a panel that covers the floor slabs and columns on the exterior of a building between window; also known as "non-vision" windows	tympan	un panneau qui couvre les dalles de plancher et les colonnes sur l'extérieur d'un bâtiment entre les fenêtres; partie du vitrage non utilisé pour la vision
specifications	written details of project and application descriptions	spécifications	détails écrits des descriptions d'un projet et d'une application
spigot	aluminum extruded bracket used to attach frame components together	ergot	agrafe en aluminium extrudé utilisée pour attacher les composants des bâtis ensemble

stock length standard size length of an extrusion

longueur standard longueur de profilé qu'on trouve en stock

stop removable piece of material that holds glass in place

parclose pièce amovible qui maintient la vitre en place