Skilled Trades Ontario | Métiers spécialisés Ontario

Apprenticeship Curriculum Standard

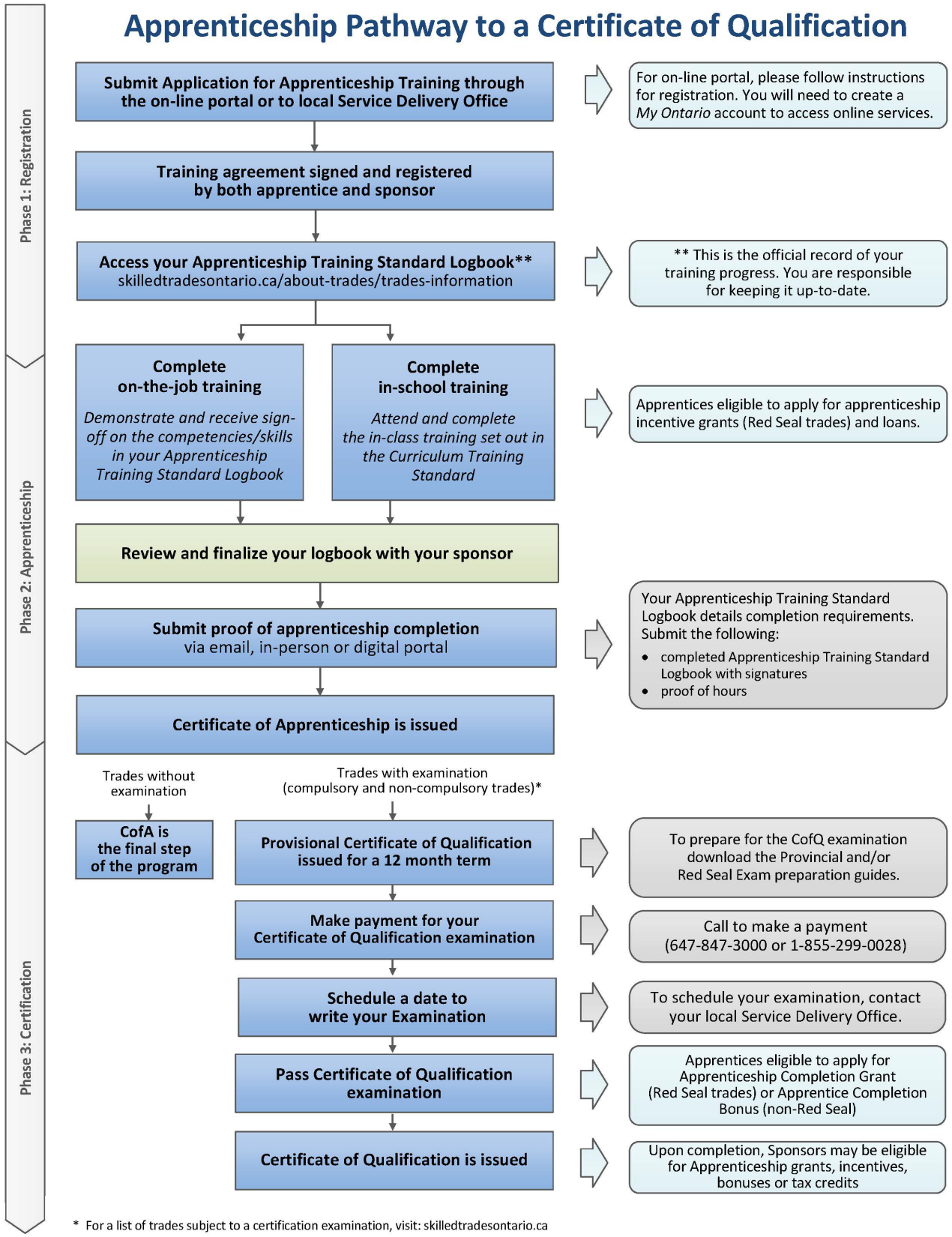
Architectural Glass and Metal Technician

Levels 1, 2 & 3

424A

2009

Apprenticeship Pathway to a Certificate of Qualification



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

Draft version: 2022-03-16

Table of Contents

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

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

Any updates to this publication are available on-line; to download this document in PDF format, please follow the link: Skilled Trades Ontario.ca.

Maintained with transfer to Skilled Trades Ontario 2004 (V100)

Preface

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

The curriculum is organized into 3 levels of training. The Reportable Subjects Summary chart (located on page 3) summarizes the training hours for each reportable subject.

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

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

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

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

Pre-requisites

In order to advance to Level 2 of the apprenticeship program, an individual must have completed all of the units outlined in Level 1. Similarly, in order to advance to Level 3 of the program, an individual must have completed all of the units outlined in Level 1 and 2.

Hours Disclaimer (if applicable)

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

Suggested Equipment for Training Delivery Agencies

The listing of tools on pages 52–54 does not list minimum quantities based on the understanding that the delivering TDA is in the best position to determine the need based on its delivery methodology.

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

Introduction

This new curriculum standard for the Architectural Glass and Metal Technician trade is designed from the learning outcomes, which were in turn developed from the industry-approved training standard.

The curriculum is organized into three levels of training, each including reportable subjects containing like or similar learning outcomes to reflect the units of the training standard. The hours charts indicates how the curriculum can be delivered in the current block release format, and summarizes the hours of training for each reportable level.

Additional learning outcomes, foundational for learning the trade, have been added to those found in the training standard: calculations, drawings, communications and computers. The safety content has been enhanced to provide apprentices the ability to work safely and to assist employers in maintaining accident-free workplaces. The reportable subjects are cross- referenced to the training standard for ease of comparison.

Each reportable subject and learning outcome identifies a recommended number of training hours. This hour allotment is broken into hours for instruction in theory and practical application. The division of the curriculum into reportable subjects that follow a natural progression of learning through the levels and branches of training will allow training centres and apprentice flexibility in program delivery, while still observing the importance of sequencing learning in a logical progression.

The curriculum is framed by and includes specific references to terminal performance objectives in the Apprenticeship Training Standards for Architectural Glass and Metal Technician. However, it identifies only the learning which takes place off-the-job in a training centre. The in-school program focuses primarily on the theoretical knowledge required to master the performance objectives of the Training Standards. Employers are expected to extend the apprentice’s knowledge and skills through appropriate practical training on the work site.

Regular evaluations of the apprentice’s knowledge and skills is conducted throughout training to assure that all apprentices have achieved the learning outcomes identified in the curriculum standard. The balance between theoretical and practical evaluation is identified for each unit of learning outcomes.

Program Summary of Hours - Glaziers

Reportable Subjects	Level 1		Level 2		Level 3		Hrs.
	T	P	T	P	T	P	
Practice Health and Safety	16	7					23
Safe Work Practices			13	8	10	10	41
Trade Tools and Equipment	28	12	34	14	23	13	124
Material Handling and Access Equipment	42	10					52
Cut, Shape and Install Glass	16	31					47
Glazing Systems	22	7			16	38	83
Seals, Gaskets and Caulking	16	6	18	6	13	4	63
Doors and Entrances	20	7	18	18	14	4	81
Prepare for Onsite Installation			38	14	40	15	107
Fasteners			11	4			15
Fabricate, Assemble and Install Windows			3	5	26	11	45
Curtain Wall			26	10			36
Glazing Film					2	1	3
	160	80	161	79	144	96	
	240		240		240		720

Level 1

Reportable Subject Summary – Level 1

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S1151	Practice Health and Safety	23	16	7
S1152	Trade Tools and Equipment	40	28	12
S1153	Material Handling and Access Equipment	52	42	10
S1154	Cut, Shape and Install Glass	47	16	31
S1155	Glazing Systems	29	22	7
S1156	Seals, Gaskets and Caulking	22	16	6
S1157	Doors and Entrances	27	20	7
	Total	**240**	**160**	**80**

Number:	S1151		
Title:	**Practice Health & Safety**		
Duration:	Total Hours: 23	Theory: 16	Practical: 7
Prerequisites:	None		
Co-requisites:	None		
Cross Reference to Training Standards: 1576.01, 1576.02, 1576.03, 1576.04			

General Learning Outcomes

On successful completion the apprentice is able to demonstrate health and safety practices by complying with all safety legislation, report all hazards and accidents, wear and maintain all personal protective equipment (PPE) as required and apply correct body mechanics.

Learning Outcomes

S1151.01 OHSA

Select, inspect, use and maintain PPE as required by Occupational Health and Safety Act (OHSA).

- List PPE required by Architectural Glass and Metal Technicians.
- Select and use PPE as required to cut and shape glass.
- Select and use PPE to transport and store glass and metal.
- Select and use PPE to install glass.
- Maintain and store PPE when not in use.

S1151.02 Hazards

Identify hazards in the workplace to comply with OSHA and safe work practices.

- Inspect workplace to identify site-specific hazards.
- Describe procedures to avoid or control hazards.
- Identify hazardous material used in the workplace.

S1151.03 Personal Protective Equipment

Demonstrate the use of appropriate PPE for the task at hand.

- Wear glasses or facemask when grinding glass or metal.
- Wear foot and head protection as required.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1152		
Title:	**Trade Tools and Equipment**		
Duration:	Total Hours: 40	Theory: 28	Practical: 12
Prerequisites:	S1151		
Co-requisites:	None		

Cross Reference to Training Standards: 1576, 1577.01, 1577.02, 1577.03, 1577.04, 1580.01

General Learning Outcomes

On successful completion the apprentice is able to select, use and maintain hand and power tools used in the fabrication of glass using measuring tools and devices, select and install fasteners in accordance with shop drawings and manufacturer's recommendations.

Learning Outcomes

S1152.01 Hand Tools

Select, use and maintain trade specific hand tools safely and according to specifications and manufacturer's instructions.

- Read and interpret shop drawings and manufacturer's instructions as required to accurately fabricate glass to specifications.
- Accurately measure and lay out projects using measuring devices and simple math such as addition, subtraction, multiplication and division.
- Select, inspect and use the appropriate measuring and fabrication tools and accessories to complete the assigned task.
- Wear appropriate PPE.
- Use glass cutters, glass drill bits, (spade and tube drill) notching saw to fabricate glass to specifications.
- Use glass fabrication tools such as straight edge, tape measure, square, patterns, production cutter, and glass and run pliers to cut and shape glass.
- Identify types of glass to meet requirements.
- Select and use the appropriate fasteners and associated components to assemble projects.
- Identify screw characteristics such as type of head, type of thread, and use for each.
- Correctly size fasteners.
- Correctly size pilot hole.
- Tap a hole to suit fastener.

- Identify chemical anchors.
- Describe the types of chemical fasteners and where they are used.
- Demonstrate the knowledge and use of hacksaws and files to accurately cut and join metal to specifications.
- Clean, maintain and store tools properly.

S1152.02 Power Tools

Use and maintain trade specific electrical and pneumatic power tools and equipment safely and according to manufacturer's instructions.

- Read and interpret shop drawings and manufacturer's instructions as required to accurately fabricate glass to specifications.
- Wear appropriate PPE.
- Use glass fabrication tools such as baby belt sanders, upright belt sanders, drills, screw guns, grinders and notching saws.
- Clean, maintain and store tools properly.

S1152.03 Confirm Material and Site Dimensions

Confirm material and site dimensions by using precision measuring devices such as rules, tapes, squares, straight edges and levels.

- Accurately measure and lay out projects using measuring devices and simple math such as addition, subtraction, multiplication and division.
- Select, inspect and use the appropriate measuring and fabrication tools and accessories to complete the assigned task.
- Lay out a mirror wall using levels and transits.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1153		
Title:	**Use and Maintain Material Handling and Site Access Equipment**		
Duration:	Total Hours: 52	Theory: 42	Practical: 10
Prerequisites:	S1151		
Co-requisites:	None		
Cross Reference to Training Standards: 1576, 1577.04, 1578.01, 1578.02			

General Learning Outcomes

On successful completion the apprentice is able to select the appropriate rigging equipment, inspect equipment for defects, position and use hoisting and rigging so the lift is correctly carried out and the loading and unloading and storage procedures are in accordance with applicable regulations, safe work practices and store the equipment correctly.

Learning Outcomes

S1153.01 Select and Inspect Rigging Equipment

Identify, select, inspect and maintain hoisting and rigging equipment such as fibre and wire rope, slings, shackles, pins, spreader bars, hooks, hoists, blocks, winches and jacks as required by manufacturers' instructions, OHSA, and safe work practices.

- Explain the importance of determining load weight.
- Explain how to cordon off the area to protect the public and employees.
- Explain how to determine the center of gravity of a load.
- List possible obstacles and dangers to be encountered when hoisting.
- Describe when a signaller is required for on-site traffic.
- Describe proper loading and unloading procedures.
- Describe proper storage areas for glass and aluminum.
- Describe how to sort material in preparation for assembly and installation so materials are securely and efficiently stored
- Explain the importance of determining the capacity of floor and roof slabs.
- Explain the importance of determining the capacity of loading ramps.
- Explain the role of the engineer and engineered drawings when determining capacities.
- Explain the use of floor jacks.
- Explain the use of tiebacks, the number of tiebacks required and how to apply them.
- Explain proper storage requirements for rigging equipment.

S1153.02 Position and Employ Rigging Equipment

Select and use moving and positioning equipment such as dollies, clamps, slings and suction cups (hand and power).

- List tools and equipment, including suction cups, slings, webs, and gloves.
- Inspect equipment to ensure safe operation.
- Load, unload, remove or install glass, panels or associated material by selecting, inspecting and using the required equipment to complete the project.
- Identify tasks which require the use of specific tools and equipment to ensure the safe movement of glass.
- Position glass and other materials to ensure safety of self and others and protection of materials.

S1153.03 Utilize Hoisting and Rigging Equipment

Utilize hoisting and rigging equipment as required by manufacturer's instructions, OHSA, and safe work practices.

- Perform calculations to determine load weight.
- Select appropriate rigging hardware for the task.
- Demonstrate how to tie a knot appropriate for the task.
- Demonstrate International Hand Signals.

S1153.04 Access Work Area

Using equipment such as ladders, scaffolds, scissor lifts, and boom lifts to access work area

- Identify different types of ladders.
- Describe the safe use of ladders.
- Identify the various types of scaffold systems.
- Inspect scaffold system to ensure it is in good condition and has all required components.
- Identify safe working procedures for erecting ,working on and dismantling scaffolds.
- Identify hazards associated with scaffolds.
- Inspect PEWP to ensure it is in good condition and has all required components prior to use.
- Demonstrate use of PEWP to access work at heights.
- Demonstrate safe work practices in accordance with industry regulations.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1154		
Title:	**Cut, Shape and Install Glass**		
Duration:	Total Hours: 47	Theory: 16	Practical: 31
Prerequisites:	S1151		
Co-requisites:	None		
Cross Reference to Training Standards: 1582.04, 1584.01, 1584.06, 1584.07			

General Learning Outcomes

On successful completion the apprentice is able to cut shape and install glass including clear, laminated, mirror, wire, low-E coated and patterned glass and finish glass by polishing, drilling, notching and edging in accordance with industry specifications, fabricate and assemble bug screens in accordance with shop drawings or manufacturer's instructions.

Learning Outcomes

S1154.01 Material Handling

Cut, shape and install glass to specifications and industry standards, including 3mm, 4mm, 5mm, 6mm, float and laminated.

- Demonstrate the knowledge of glass manufacturing process.
- Demonstrate the knowledge of the history of glass.
- Explain specific applications of different types of glass.
- Describe the properties of glass such as fire resistant, heat strengthened, tempered, laminated, rolled or pattern, low-E, and leaded.
- Read and interpret shop drawings and manufacturer's instructions as required to measure layout and cut glass to specifications.
- Select and use the appropriate PPE.
- Cut straight lines on glass.
- Cut glass size to meet accepted industry tolerances.
- Cut circles in glass.
- Cut notches in glass.
- Cut patterns in glass.

S1154.02 Cut, Shape and Install

Cut shape and install mirrors.

- Demonstrate the knowledge of mirror manufacturing process.
- Explain the knowledge of mirror installation methods such as mirror clips or J moulding, mastics or mirror mounting tape.
- Select and install mirror clips and J mould in accordance with shop drawings, industry and manufacturer's specifications.
- Accurately measure for installation.
- Cut and polish mirrors in accordance with industry standards.
- Install mirrors in accordance with industry standards.

S1154.03 Finish Glass

Finish glass by polishing and edging (Flat, Arris, Bevel, Mitre, and Chamfer) in accordance with industry specifications.

- Select the correct grit of belt to achieve the desired result.
- Demonstrate knowledge of various types of edgework.
- Demonstrate the ability to polish and edge glass to conform to shop drawings and industry standards.

S1154.04 Bug Screens

Fabricate bug screens.

- Cut and assemble screen frame material to specifications.
- Cut and install bug screen to specifications using fibreglass and aluminum screening.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1155		
Title:	**Install Glazing Systems**		
Duration:	Total Hours: 29	Theory: 22	Practical: 7
Prerequisites:	S1151, S1152.04		
Co-requisites:	None		
Cross Reference to Training Standards: 1580.02, 1583.05			

General Learning Outcomes

On successful completion the apprentice is able to install glazing systems such as suspended glazing and Spider Wall to meet manufacturer's specifications.

Learning Outcomes

S1155.01 Suspended Glass

Assemble and install suspended glass systems.

- Read and interpret shop drawings and manufacturer's instructions as required to lay out suspended glass systems.
- Perform calculations to establish cut sizes of material, measure and establish anchor and frame locations.
- Identify torque fasteners and describe where/why they are used.
- Demonstrate the use of torque wrenches.
- Identify fittings and hardware to complete the task.
- Install fittings and hardware to specifications.
- Install gaskets to specifications.
- Install glass to specifications including stabilizer fins and panel stiffeners.
- Apply sealants as required to specifications.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1156		
Title:	**Install Seals, Gaskets and Caulking**		
Duration:	Total Hours: 22	Theory: 16	Practical: 6
Prerequisites:	S1151		
Co-requisites:	None		
Cross Reference to Training Standards: 1585.01, 1585.02, 1585.03, 1585.04			

General Learning Outcomes

On successful completion the apprentice is able to select and install the appropriate seal according to manufacturer's recommendations and job specifications.

Learning Outcomes

S1156.01 Caulking Methods

Select the correct method to seal a variety of joints.

- Identify the properties of different types of sealant.
- Interpret manufacturer's instructions.
- Explain the compatibility issues of silicones and caulks.
- Explain the use of primers, cleaners and bond breakers and backer rods.
- Describe the purpose of expansion joints, air seals, water seals, fire stops, acoustical sealants and structural glazing.
- Identify the tools required to install seals and gaskets including power, manual, bulk, cartridge and sausage guns.
- Explain the purpose and methods of tooling.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1157		
Title:	**Install Doors and Entrances**		
Duration:	Total Hours: 27	Theory: 20	Practical: 7
Prerequisites:	None		
Co-requisites:	None		
Cross Reference to Training Standards: 1586.01, 1586.02, 1586.06			

General Learning Outcomes

On successful completion the apprentice is able to identify doors such as swing, sliding, folding, all- glass, manual, automatic and revolving and explain their various applications.

Learning Outcomes

S1157.01 Pivots and Hinges

Describe various pivots, hinges, and types of sliding doors.

- Identify pivots such as offset, intermediate offset and center hung.
- Identify hinges such as security, continuous and electric.

S1157.02 Doors

Describe swinging and sliding doors and the applications for each.

- Identify swing doors such as offset, center hung, side load, end load and patch fittings and describe their application.
- Identify sliding doors such as patio, mall sliding, stacking, folding and describe their application.
- Describe proper method of blocking and reverse blocking of a door glass.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Level 2

Reportable Subject Summary – Level 2

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S1158	Safe Work Practices	21	13	8
S1159	Trade Tools and Equipment	48	34	14
S1160	Prepare for Onsite Installation	52	38	14
S1161	Fasteners	15	11	4
S1162	Fabricate, Assemble and Install Windows	8	3	5
S1163	Curtain Wall	36	26	10
S1164	Seals, Gaskets and Caulking	24	18	6
S1165	Doors and Entrances	36	18	18
	Total	**240**	**161**	**79**

Number:	S1158		
Title:	**Safe Work Practices**		
Duration:	Total Hours: 21	Theory: 13	Practical: 8
Prerequisites:	None		
Co-requisites:	None		
Cross Reference to Training Standards: 1576.01, 1576.02, 1576.03, 1576.04			

General Learning Outcomes

On successful completion the apprentice is able to follow safe work practices by performing a worksite inspection and hazard assessment, list equipment and safety devices required and demonstrate safe work practices by complying with all safety regulations and legislation.

Learning Outcomes

S1158.01 Safety Legislation

Comply with all safety legislation.

- Perform a site inspection to determine equipment requirements.
- Follow procedures to protect self and others when using platforms, staging and suspended access.
- Describe the procedures used in emergency rescue.
- List regulations pertaining to hoisting loads.

S1158.02 Hazards

Report all hazards.

- Explain how to communicate effectively with co-workers, other trades, employers, and emergency personnel.
- Demonstrate international hand signals.
- Describe the procedures to avoid or control hazards.
- List hazards in hoisting.
- Inspect the workplace to identify site specific hazards.

S1158.03 Personal Protective Equipment

Wear and maintain PPE.

- Use PPE appropriate to the task at hand.
- List PPE specific to working at heights.

S1158.04 Body Mechanics

Apply correct body mechanics.

- Demonstrate the correct body mechanics when lifting.
- Communicate with others prior to and during a lift.
- Seek assistance from others when required.
- Recognize loads which should be lifted mechanically.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1159		
Title:	**Trade Tools and Equipment**		
Duration:	Total Hours: 48	Theory: 34	Practical: 14
Prerequisites:	S1158		
Co-requisites:	None		
Cross Reference to Training Standards: 1577.01, 1577.02, 1577.03			

General Learning Outcomes

On successful completion the apprentice is able to select the correct hand or power tool appropriate for the task, use and maintain it according to manufacturer's instructions.

Learning **Outcomes**

S1159.01 Hand Tools

Select and use the appropriate hand tool for the task.

- Read and interpret shop drawings and manufacturer's instructions as required to accurately fabricate frames and associated material.
- Accurately measure and lay out projects using measuring devices and simple math such as addition, subtraction, multiplication and division.
- Select, inspect and use the appropriate measuring and fabrication tools and accessories to complete the assigned task.
- Wear appropriate PPE.
- Use hand tools such as hacksaws, clamps, files, hammers, pry bar, putty knife, rivet tools, side cutters, screwdrivers, wrenches, ratchets, utility knife, and vinyl roller to complete the project.
- Clean and store tools correctly.

S1159.02 Power Tools

Select and use the appropriate power tool for the task.

- Read and interpret shop drawings and manufacturer's instructions as required to accurately fabricate frames and associated material.
- Accurately measure and lay out projects using measuring devices and simple math such as addition, subtraction, multiplication and division.
- Select, inspect and use the appropriate measuring and fabrication tools and accessories to complete the assigned task.
- Wear appropriate PPE.

- Select the most appropriate power tools such as drills, screw guns, shears, table saw, compound mitre saw, milling machine, or router and use according to the manufacturer's instructions to complete project.
- Size drill bits, taps and countersinks to match correct fasteners.
- Explain the maintenance and user-replaceable parts required on most portable power tools.
- Clean and store tools correctly.

S1159.03 Confirm Material and Site Dimensions

Layout and compare to drawings.

- Read and understand shop and architectural drawings to determine location, dimension of openings and type of material to be used.
- Identify the methods and techniques for layout.
- Interpret specifications to ensure material and dimensions conform.
- Explain the uses and limitations of levelling devices such as plumb bob, spirit level, builder's level, transit, laser level, and theodolite.
- Describe the purpose of benchmarks.
- Perform complex mathematical equations using fractions and decimals to determine the exact locations of benchmarks and frames.
- Set bench marks where required to facilitate the installation of material.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1160		
Title:	**Prepare for On-Site Installation**		
Duration:	Total Hours: 52	Theory: 38	Practical: 14
Prerequisites:	S1158		
Co-requisites:	None		
Cross Reference to Training Standards: 1579.06, 1579.08			

General Learning Outcomes

On successful completion the apprentice is able to provide material and cutting lists, set up and lay out grid and base lines using measuring devices such as transits and levels.

Learning Outcomes

S1160.01 Transits and Levels

Set up and use transits and levels.

- Read and understand shop and architectural drawings to determine location of gridlines and benchmarks.
- Describe the purpose of gridlines and benchmarks.
- Use the Pythagorean Theorem to lay out gridlines.

S1160.02 Assemble Components

Assemble components to final assembly.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings, to identify material and related components.
- Calculate quantity take-offs for material.
- Prepare and optimize cutting list.
- Describe how CAD and BIM assist in preparing take offs and cutting lists.
- Identify the appropriate sequence for fabrication.
- Identify and describe layout and fabrication tools such as rules, squares, bevel squares, angle finder, scribes and straight edges.
- Demonstrate the safety procedures and knowledge of manufacturer's instructions, when using power tools such as drills, saws, milling machines, routers.
- Wear the appropriate PPE when using hand and power tools.
- Cut the material to size within accepted tolerance.

- Layout and install spigots or shear blocks using measuring tools and jigs in accordance with shop drawings, industry and manufacturer's specifications.
- Select and use fasteners according to manufacturer's instructions.
- Align and assemble components according to specifications and drawings and acceptable tolerances.
- Maintain hand and power tools through correct handling and storage.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1161		
Title:	**Select and Install Fasteners**		
Duration:	Total Hours: 15	Theory: 11	Practical: 4
Prerequisites:	S1158		
Co-requisites:	None		
Cross Reference to Training Standards: 1580.01, 1580.02, 1580.05			

General Learning Outcomes

On successful completion the apprentice is able to select and use fasteners to meet specifications and manufacturer's recommendations including chemical fasteners, adhesives and expanding cement.

Learning Outcomes

S1161.01 Identify Fasteners

Identify the fastener required.

- Describe the properties of fasteners such as wood screws, metal screws, machine screws, fine or course thread, concrete screws.
- Describe properties of nuts and bolts and their uses.
- Explain the uses of a variety of fasteners.
- Identify sizes of fasteners and describe knowledge of clearance requirements
- Drill and tap holes to match fastener required.
- Demonstrate use of rivets and rivnuts.
- Describe properties of drywall and concrete anchors.
- Describe applications and procedures for chemical adhesives.
- Select and use fasteners appropriate to the task and in compliance with manufacturer's instructions, shop and architectural drawings.

S1161.02 Torque Fasteners

Identify systems which require the use and installation of torque fasteners.

- Describe torque fasteners and patch fittings.
- List applications of torque fasteners and patch fittings.
- Demonstrate knowledge of different grades of bolts.
- Demonstrate knowledge of types of nuts and washers.
- Demonstrate knowledge of torque wrenches.
- Describe installation methods required for systems.
- Demonstrate the ability to set torque to specifications.

S1161.03 Expanding Cement

Select and apply expanding cement.

- Demonstrate knowledge of properties of expanding cement.
- Describe precautions to be taken when using expanding cement.
- Identify the tools required for the application of expanding cement.
- Demonstrate knowledge of applications of expanding cement such as suspended glass, balustrade and floor closers.
- Describe clean-up procedures required for expanding cement.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1162		
Title:	**Fabricate, Assemble and Install Windows**		
Duration:	Total Hours: 8	Theory: 3	Practical: 5
Prerequisites:	S1158		
Co-requisites:	None		
Cross Reference to Training Standards: 1582.01			

General Learning Outcomes

On successful completion the apprentice is able to install windows such as fixed lite, hoper, awning, casement, slider, and hung to manufacturer's specifications.

Learning Outcomes

S1162.01 Install Windows

Identify and install windows as required.

- Describe windows such as fixed lite, hopper, awning, casement, sliding, single hung, and double hung.
- List applications where each type of window is used.
- Identify window hardware, including cam locks Andenburg arms, rotor operated, latch lock, sash balance, remote and temperature controlled.
- Identify tools required for installation.
- Complete a window installation, including adjustment of operating hardware.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1163		
Title:	**Install Unitized and Stick Curtain Wall**		
Duration:	Total Hours: 36	Theory: 26	Practical: 10
Prerequisites:	S1158		
Co-requisites:	None		

Cross Reference to Training Standards: 1581.01, 1581.02, 1581.03, 1581.05, 1581.09, 1583.03

General Learning Outcomes

On successful completion the apprentice is able to install curtain wall systems including cast in anchors, on or under slab anchors, vision and spandrel areas, back pans, seals, flashing, pressure plate and caps, fire stops, specialty coverings, air barrier systems, and two/four sided structural glazing to meet specifications and manufacturer's recommendations.

Learning Outcomes

S1163.01 Anchors

Describe the application of anchors to meet specifications, architectural and shop drawings.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings to layout and install cast in anchors.
- Describe the properties of cast in anchors.
- Describe the properties of on or under slab anchors.
- Describe layout methods required to accurately place cast in anchors.
- Describe layout methods required for on or under slab anchors.
- Explain tolerances when installing curtain wall.
- Describe the installation method for cast in anchors.
- Describe the installation method for on or under slab anchors.
- Identify welding requirements for anchors.
- List probable results when cast in anchors are installed incorrectly.
- Describe the purpose of wind load and dead load anchors.
- Describe procedures used to allow for expansion and contraction when installing window systems.
- Describe procedures used to minimize building noises when connecting anchors.

S1163.02 Vision and Spandrel

Install vision and spandrel areas to meet manufacturer's instructions, specifications and architectural and shop drawings.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings to layout and install curtain wall framing including vision and spandrel areas.
- List the tools required for layout.
- Explain layout methods using gridlines and benchmarks.
- Identify tolerances when installing curtain wall.
- Describe types of curtain wall systems including modular unitized and stick.
- Explain the rain screen principle.
- Describe wet and dry curtain wall systems and the benefits of each.
- Explain specific applications for types of curtain walls.
- Outline installation procedures.
- Describe safety precautions required when installing curtain wall.
- List PPE recommended when installing curtain wall.
- Describe the purpose and installation of mullion plugs.
- Describe the purpose and installation of dam blocks.
- Explain weeping and vent systems for curtain wall vision and spandrel areas. (Pressure equalization)
- Describe proper procedure to install backpans.
- List tools and equipment required to install glass in curtain wall.
- Clean and prepare work.
- Choose the correct glazing tape or gasket and install according to manufacturer's instructions and industry standards.
- Explain the procedures for preparing gaskets for installation.
- Explain the effects of temperature change on gaskets.
- Identify types and locations of setting blocks.
- Install glass and complete the installation.
- List safety procedures recommended when installing glass in curtain wall.
- Describe procedures for installing glass and spandrel, including temporary glass retainers, pressure plates and caps ensuring proper water management and plate compression.
- Describe the proper method to vertically splice pressure plates and caps.

S1163.03 Seals and Air Barriers

Install seals and air barriers on curtain wall systems as per manufacturer's instructions, specifications, architectural and shop drawings.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings to install curtain wall air barriers and seals.
- Identify material used to connect curtain wall framing to substrates such as peel and stick, blue skin, silicones, caulks, and metal flashings.
- Explain compatibility in relationship to seals and substrates.
- List applications and procedures for bond breakers.
- Explain the use of primers with air barriers and seals.
- Explain procedures for vertical splices and expansion, contraction areas when installing seals.

S1163.04 Fire Stops

Install fire stops as per manufacturer's instructions, specifications, architectural and shop drawings.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings to install fire stops.
- Identify material used when installing fire stop.
- Explain the purpose of fire stops.
- Describe the procedure to install fire stops.

S1163.05 Structural Glazing

Install two and four sided structural glazing systems.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings to install structural glazing.
- Identify components used in structural glazing.
- Explain compatibility in relation to tapes, gaskets, setting blocks and sealants.
- Explain water seal, structural bead and tensile bead.
- Explain the importance of using the two rag method when preparing glass for structural glazing.
- Explain the importance of following sealant manufacturer's instructions when installing structural glazing.
- Describe the procedures used to install two and four sided structural glazing.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1164		
Title:	**Install Seals, Gaskets and Caulking**		
Duration:	Total Hours: 24	Theory: 18	Practical: 6
Prerequisites:	S1158		
Co-requisites:	None		
Cross Reference to Training Standards: 1585.03			

General Learning Outcomes

On successful completion the apprentice is able to select and install the appropriate seal and gaskets according to manufacturer's recommendations and job specifications.

Learning Outcomes

S1164.01 Select and Apply Seals

Select and apply the correct sealant or gasket and choose the best method to seal a variety of joints.

- Identify the properties of different types of sealant.
- Interpret manufacturer's instructions.
- Identify job specific requirements.
- Explain the compatibility issues of silicones and caulks.
- Describe the use of primers, cleaners and bond breakers and backer rods.
- Describe the purpose of expansion joints, air seals, water seals, fire stops, acoustical sealants and structural glazing.
- Demonstrate the use of tools required to install seals and gaskets such as power, manual, bulk, cartridge and sausage guns.
- Demonstrate the proper methods of tooling.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1165		
Title:	**Install Doors and Entrances**		
Duration:	Total Hours: 36	Theory: 18	Practical: 18
Prerequisites:	S1158		
Co-requisites:	None		

Cross Reference to Training Standards: 1586.01, 1586.02, 1586.03, 1587.01, 1587.02, 1587.04, 1587.06, 1587.07

General Learning Outcomes

On successful completion the apprentice is able to install operating hardware such as locks and bolts, closers, door holders, door stops, thresholds, weather strips and protective hardware in accordance with manufacturers' instructions and specifications and install doors such as swinging, sliding, aluminum and all- glass doors in accordance with manufacturers' instructions and specifications.

Learning Outcomes

S1165.01 Hinges and Pivots

Install doors in accordance with manufacturers' instructions and specifications.

- Read and understand manufacturers' instructions, job specifications, shop and architectural drawings and schedules to indentify the correct swing, type and location of door for installation.
- Select the tools and fasteners required to install doors.
- Explain knowledge of door stiles and rails, such as different widths, heights and manufactures.
- Describe applications for specific doors.
- Block or reverse block glass in doors.
- Demonstrate the knowledge of hinges and pivots, such as offset, center hung, butt and continuous hinge.
- Identify types of pivots and hinges.
- List applications for various pivots and hinges.
- Install pivots and hinges.
- Describe how to troubleshoot installed pivots.
- Demonstrate the knowledge of replaceable parts due to wear.
- Layout and prepare jamb for installation of back up plates and hinges.
- Layout and prepare jambs and headers for pivot installation.
- Describe methods to troubleshoot door installations.

S1165.02 Install Doors

Install doors such as swing, sliding and all-glass.

- Read and understand manufacturers' instructions, job specifications, shop and architectural drawings and schedules to indentify the correct swing, type and location of door for installation.
- Select the tools and fasteners required to install doors.
- Describe how to measure an opening for an all glass door.
- Describe closer applications for top and bottom rail doors.
- Explain patch fitting and closer installation and adjustment for all glass doors.
- Describe troubleshooting for top/bottom rail and all glass doors.

S1165.03 Automatic Doors

Install and adjust manual and automatic sliding doors.

- Describe types and applications for sliding doors.
- List service requirements for various types of doors.
- Explain the need for egress doors installed in sliding doors.
- Identify lock hardware including security, latch bolt, hook bolt, dead bolt, electric strike, flush bolts, passage set, cylinders, cylinder rings, thumb turn, latch handle, paddle handle, panic and magnetic and ensure functionality in accordance with manufacturers' instructions and specifications.
- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings and schedules to indentify hardware required and compatibility issues with the type of door.
- List typical applications for a variety of locks.
- Demonstrate the knowledge of replaceable parts due to wear or security issues.
- Select the tools required for installation, repair or maintenance.
- Lay out and install hardware such as security, latch bolt, hook bolt, dead bolt, electric strike, flush bolts, passage set, cylinders, cylinder rings, thumb turn, latch handle, paddle handle, panic and magnetic.
- Describe electrical requirements for hardware including electric strike, electric hinge, and magnetic locks.
- Describe troubleshooting methods for lock application.

S1165.04 Panic Hardware

Install panic hardware and push bars.

- Explain the history of panic hardware.
- Demonstrate the knowledge of types of panic hardware.
- Explain the dogging function of different types of panic hardware and explain why it is done.
- List regulatory requirements for panic hardware.
- Describe testing procedures for panic hardware.

S1165.05 Door Hardware

Install door hardware such as exposed and concealed door holders, door sweeps, shock absorbers, floor and wall stops, kick plates, thresholds and weather strips and ensure functionality of hardware in accordance with specifications and manufacturer's instructions.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings and schedules to indentify hardware required and compatibility issues with the type of door.
- Identify hardware such as exposed and concealed door holders, door sweeps, shock absorbers, floor and wall stops, kick plates, thresholds and weather strips.
- Describe the use of various hardware items.
- Select appropriate hardware for the application.
- Select tools and fasteners required for the task.
- Layout and install hardware such as exposed and concealed door holders, door sweeps, shock absorbers, floor and wall stops, kick plates, thresholds and weather strips.
- Troubleshoot the installation.

S1165.06 Doors Closers

Install closers including concealed overhead and floor types, semi-concealed and surface mounted.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings and schedules to indentify hardware required and compatibility issues with the type of door.
- Identify door closers such as concealed overhead and floor types, semi-concealed and surface mounted, pneumatic, hydraulic, or electric.
- Describe applications for various types of closers.
- Identify tools required for installation.
- Describe the procedures executed in the installation of a surface mounted closer.
- Describe the methods used to adjust a closer to suit the application.

S1165.07 Astragals, Buggy Bumpers

Install removable and fixed astragals, buggy bumpers, finger guards, and guardrails.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings and schedules to indentify hardware required and compatibility issues with the type of door and location of installation.
- Identify removable and fixed astragals, buggy bumpers, finger guards, and guardrails explain their function.
- Identify tools required for installation.
- Describe the procedure used for installation.

S1165.08 Locks

Identify lock hardware including security, latch bolt, hook bolt, dead bolt, electric strike, flush bolts, passage set, cylinders, cylinder rings, thumb turn, latch handle, paddle handle, panic and magnetic and ensure functionality in accordance with manufacturers' instructions and specifications.

- Read and understand manufacturers' instructions, job specifications, shop and architectural drawings and schedules to indentify hardware required and compatibility issues with the type of door.
- Identify lock hardware, including security, latch bolt, hook bolt, dead bolt, electric strike, flush bolts, passage set, cylinders, cylinder rings, thumb turn, latch handle, paddle handle, panic and magnetic.
- List typical applications for a variety of locks.
- Demonstrate the knowledge of replaceable parts due to wear or security issues.
- Select the tools required for installation, repair or maintenance.
- Lay out and install hardware such as security, latch bolt, hook bolt, dead bolt, electric strike, flush bolts, passage set, cylinders, cylinder rings, thumb turn, latch handle, paddle handle, panic and magnetic.
- Describe electrical requirements for hardware including electric strike, electric hinge, and magnetic locks.
- Describe troubleshooting methods for lock application.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Level 3

Reportable Subject Summary – Level 3

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
S1166	Safe Work Practices	20	10	10
S1167	Trade Tools and Equipment	36	23	13
S1168	Prepare for Onsite Installation	55	40	15
S1169	Glazing Systems	54	16	38
S1170	Fabricate, Assemble and Install Windows	37	26	11
S1171	Seals, Gaskets and Caulking	17	13	4
S1172	Doors and Entrances	16	12	4
S1173	Glazing Film	3	2	1
	Total	**240**	**144**	**96**

Number:	S1166		
Title:	**Safe Work Practices**		
Duration:	Total Hours: 20	Theory: 10	Practical: 10
Prerequisites:	None		
Co-requisites:	None		
Cross Reference to Training Standards: 1576.01, 1576.02			

General Learning Outcomes

On successful completion the apprentice is able to demonstrate safe work practices by complying with all safety legislation, report all hazards and accidents, wear and maintain all personal protective equipment (PPE) as required by OHSA.

Learning Outcomes

S1166.01 Legislation

Comply with all safety regulations and legislation.

- Wear PPE appropriate to the task at hand.
- Explain the responsibilities of stakeholders according to OHSA.

S1166.02 Hazards

Report hazards to co-workers and supervisors.

- Demonstrate hazard recognition and communicate hazards to coworkers.
- Explain the responsibilities of the foreman to protect others on-site.
- Explain the responsibilities of a foreman to complete all necessary paperwork to report accidents in accordance with company and WSIB requirements.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1167		
Title:	**Trade Tools and Equipment**		
Duration:	Total Hours: 36	Theory: 23	Practical: 13
Prerequisites:	S1166		
Co-requisites:	None		
Cross Reference to Training Standards: 1577.01, 1577.02, 1577.03			

General Learning Outcomes

On successful completion the apprentice is able to employ trade tools and equipment by using and maintaining hand, power tools and equipment to confirm site dimensions and select positioning equipment for installation.

Learning Outcomes

S1167.01 Hand Tools

Use trade specific hand tools and associated equipment.

- Read and interpret shop drawings and manufacturer's instructions as required to accurately fabricate frames and associated material.
- Accurately measure and lay out projects using measuring devices such as protractors and T bevels and simple math such as addition, subtraction, multiplication and division.
- Select the correct tools and accessories to perform tasks.
- Demonstrate proper maintenance and storage.
- Wear appropriate PPE.
- Clean and store tools correctly.

S1167.02 Power Tools

Use and maintain electric, pneumatic, hydraulic tools and equipment.

- Wear appropriate PPE.
- Read and interpret shop drawings and manufacturer's instructions as required to accurately fabricate frames and associated material.
- Repair or replace user-maintainable parts so tools are maintained at a standard of repair that is safe and functionally effective.
- Clean and store tools correctly.

S1167.03 Material and Site Dimensions

Measure and confirm site dimensions using measuring instruments such as lasers, levels, squares and tapes, and select the appropriate equipment to position manpower and material.

- Read and understand manufacturer's instructions, job specifications, shop and architectural drawings and schedules to determine dimensions and locations for installations.
- Use measuring tools such as transits, levels, squares, tapes, to determine opening sizes and confirm sizes on drawings.
- Accurately measure and lay out projects using measuring devices and simple math such as addition, subtraction, multiplication and division.
- Identify methods and techniques for layout.
- Identify equipment required to position frames and glass such as hand or power cups, hoist, or crane.
- Identify equipment required to install frames and glass such as scissor lift, boom lift, swing stage, mast climber.
- Maintain equipment as required.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1168		
Title:	**Prepare for On-Site Installation**		
Duration:	Total Hours: 55	Theory: 40	Practical: 15
Prerequisites:	S1166		
Co-requisites:	None		

Cross Reference to Training Standards: 1579.01, 1579.02, 1579.03, 1579.04, 1579.05, 1579.07, 1579.08

General Learning Outcomes

On successful completion the apprentice is able to prepare for on-site installation by setting up on site requirements, liaising, communicating, and sequencing work, as well as organizing work requirements, planning, preparing and scheduling activities, setting up and laying out grid and base lines in accordance with job specifications, shop and architectural drawings.

Learning Outcomes

S1168.01 Site Set-up

Set on-site requirements including electrical, traffic management, site safety and security, accessibility for auxiliary and emergency equipment, job sequences and timing so that all requirements are accommodated on-site in accordance with applicable regulations.

- Read and understand manufacturers' instructions, job specifications, shop and architectural drawings and schedules to determine equipment requirements and power requirements for equipment.
- Identify elements of a drawing to review when preparing a job site.
- Identify variances to look for between job site conditions and architectural and shop drawings including dimensions, location of anchors and windows and identify the importance of documentation.
- Demonstrate knowledge of auxiliary equipment, advantages and limitations to determine the most suitable for the task including cost, ease of use, applicable regulations and availability.
- Inspect site to determine accessibility for auxiliary equipment and emergency equipment for emergency response planning.
- Inspect site to determine site specific safety procedures and plans.
- Determine safety and security requirements for public protection and material storage.
- Determine job sequence using computer programs such as Microsoft Project so all requirements are accommodated.

S1168.02 Communications

Liaise, communicate, and sequence work.

- Explain effective communication to sequence work with coworkers and other trades.
- Read and understand manufacturers' instructions, job specifications, shop and architectural drawings and schedules to sequence work.
- Liaise with other trades to sequence deliveries and equipment use such as crane, hoist or elevators, overhead work, or specific areas of work (other trades working in area or sequence of finish).
- Read, understand and act on documents including change notice, purposed change notice, site instruction, request for information and request for quotation.
- Accurately maintain log book including, manpower, hours, tasks, weather, equipment, delays, accidents, deliveries and damage.

S1168.03 Organize Work

Organize work so the material and manpower is utilized to full potential.

- Read and understand manufacturers' instructions, job specifications, shop and architectural drawings and schedules to identify assembly and installation sequences.
- Develop a plan for performing work outlined in the specifications and drawings.
- Develop a schedule for work based on job specifications and plans.
- Use computers and understand computer related plans such as CAD, BIM and Project.

S1168.04 Material Handling

Load and unload material so it is sorted in preparation for assembly and installation.

- Describe the loading or unloading procedures to use to ensure material is stored safely and securely in an arrangement suitable for installation.
- Hoist material following all regulations and safe work practices.

S1168.05 Schedule Work

Plan, prepare and schedule work.

- Prepare a list of the required labour force, equipment, and material to perform the work.
- Identify appropriate sequences for work and procedures on multi-trade work sites.
- Prepare a work plan by scheduling tasks and assigning labour to complete the task.
- Prepare alternate tasks to maintain schedule dealing with unexpected occurrences such as weather or manpower shortages.
- Maintain work site standards.
- Ensure safe work practices.

S1168.06 Flashings

Layout, cut, shape and install flashings.

- Layout, measure cut shape and install flashings according to job specifications, shop and architectural drawings.

S1168.07 Final Assembly

Align and assemble components to final assembly in accordance with job specifications.

- Identify assembly methods.
- Describe components required for fabrication.
- Layout materials as required.
- Drill, shape, weld, tack, and cut materials to meet specifications.
- Assemble and align components in readiness for fabrication.
- Fabricate components in readiness for installation.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1169		
Title:	**Install Glazing Systems**		
Duration:	Total Hours: 54	Theory: 16	Practical: 38
Prerequisites:	S1166		
Co-requisites:	None		
Cross Reference to Training Standards: 1582.01, 1582.02, 1582.04			

General Learning Outcomes

On successful completion the apprentice is able to assemble and install sloped glazing systems.

Learning Outcomes

S1169.01 Suspended Glass

Demonstrate proper procedures to prepare the opening for glazing a suspended glass system.

- Demonstrate proper sealant selection and cleaning methods prior to the installation of suspended glass systems.

S1169.02 Seals

Install seals, gaskets and backer rod.

- Demonstrate the correct methods of primer application.
- Install backer rod as required.
- Describe the types of membrane and installation methods.

S1169.03 Sloped Glazing

Assemble and install sloped glazing systems.

- Assemble sloped glazing systems in accordance with shop drawings and manufacturers' instructions.
- Install water and air seals to acceptable standards using compatible materials.
- Ensure continuity of water and air seals.

S1169.04 Auto Glass

Select and install tempered or laminated glass for automotive and other applications.

- Identify types of automotive glass.
- Explain the ratings of automotive glass.
- Describe the specific applications of automotive glass.
- Describe preparation procedures for installation.
- Outline removal and installation methods to maintain vehicle structural integrity.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1170		
Title:	**Fabricate, Assemble and Install Windows**		
Duration:	Total Hours: 37	Theory: 26	Practical: 11
Prerequisites:	S1166		
Co-requisites:	None		
Cross Reference to Training Standards: 1582.05			

General Learning Outcomes

On successful completion the apprentice is able to measure, cut and install flashing as required by specifications, manufacturers' recommendations, shop and architectural drawings.

Learning Outcomes

S1170.01 Break Shapes

Measure, cut and install flashings and break shapes.

- Read and understand manufacturers' instructions, job specifications, shop and architectural drawings to identify areas where flashings, break shapes, cladding and column covers are required.
- Identify material requirements by reading specifications, shop and architectural drawings.
- Explain the purpose of flashings and break shapes.
- List tools required for installation.
- Measure and fabricate shapes and angles as required.
- Identify and select appropriate fasteners and sealants required.
- Recognize materials which are dissimilar.
- Explain the use of bitumous paint.
- Describe the procedures for using membranes and adhesive.
- Explain fastening procedures for flashings.
- Install flashing and break shapes in accordance with specifications, shop and architectural drawings.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1171		
Title:	**Install Seals, Gaskets and Caulking**		
Duration:	Total Hours: 17	Theory: 13	Practical: 4
Prerequisites:	S1166		
Co-requisites:	None		
Cross Reference to Training Standards: 1585.03, 1585.04			

General Learning Outcomes

On successful completion the apprentice is able to select the appropriate sealant and properly configure a joint.

Learning Outcomes

S1171.01 Structural Sealant

Select the most appropriate sealant to install a structural seal.

- Describe the properties required for a structural sealant.
- Demonstrate the proper technique for preparing a structural joint.
- Apply sealant so the joint is weather tight and has proper adhesion.

S1171.02 Backer Rod

Select and install backer rod.

- Describe the properties of open and closed cell backer rod.
- Explain three sided adhesion.
- Select the best backer rod suited to the task.
- Install backer rod to prevent three sided adhesion and properly configure the joint.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1172		
Title:	**Install Doors and Entrances**		
Duration:	Total Hours: 16	Theory: 12	Practical: 4
Prerequisites:	S1166		
Co-requisites:	None		
Cross Reference to Training Standards: 1586.04, 1586.05			

General Learning Outcomes

On successful completion the apprentice is able to describe the uses, installation and service requirements of automatic and revolving doors.

Learning Outcomes

S1172.01 Automatic Doors

Identify a variety of automatic doors and explain their functions.

- List types of automatic doors and explain applications for each.
- Explain methods of operation.
- Describe safety features for automatics.
- Describe regulations pertaining to automatics.

S1172.02 Revolving Doors

Identify manual and automatic revolving doors and explain functions.

- Describe applications for revolving doors.
- Describe the safety functions for revolving doors.
- List individual parts that make up a revolving door.
- Explain adjustments required to change speeds of a revolving door.
- Describe maintenance requirements for revolving doors.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Number:	S1173		
Title:	**Install Glazing Film**		
Duration:	Total Hours: 3	Theory: 2	Practical: 1
Prerequisites:	S1151		
Co-requisites:	None		
Cross Reference to Training Standards: 1588.01, 1588.02, 1588.03			

General Learning Outcomes

On successful completion the apprentice is able to apply glazing film.

Learning Outcomes

S1173.01 Inspection

Verify existing conditions are adequate for installation.

- Describe methods of inspection of glass and frames before installation.

S1173.02 Preparation

Prepare glazing system for film.

- Describe preparation required prior to the installation of film.

S1173.03 Glazing Film

Install film, ensuring good adhesion and lack of bubbles.

- List various types of film and explain the applications for each.
- Describe application methods for various types of film including correct method of seaming film.

Evaluation Structure		
Theory Testing	Practical Application Testing	Final Assessment
30%	40%	30%

Tools and Equipment

Hand Tools

Allen keys (metric and imperial)
Bar clamp
Caulking gun
C-clamp
Centre punch
Chalk line
Chisel – cold
Chisel – wood
Cold knife
Core tool
Countersinks
Dead-blow hammer
Drill bits – high speed steel
Fibre stick
Files – bastard
Files – half moon
Files – round
Glass cutter
Glass pliers
Glass wedge
Glazing bar
Hacksaw
Hammer – claw
Hand pump suction cups
Locking pliers – duck-billed
Mallet (plastic, rubber)
Nail set
Nut driver set (imperial and metric)
Open end wrenches (imperial and metric)
Paint brush
Protractor (degree finder)
Pry bars
Putty knife – bent, straight
Ratchet set
Rivet tool
Running glass pliers
Scoring tool
Screwdrivers – flat
Screwdrivers – Philips
Screwdrivers – Robertson
Side cutters
Standard pliers
String line
Tin snips – straight, left, right
Utility knife
Vinyl glazing roller
Wrench – adjustable

Portable Power Tools

Air nibbler
Belt sander
Chop saw
Circular saw grinders
Compound mitre saw
Cordless drill
Electric drill
Electric nibbler (shears)
Electric router
Glass drilling machine and drill bits
Hammer drill
Heat gun
Jig saw
Portable glass notching saw
Power suction cups
Reciprocating saw
Rotary tool (dremel)
Screw gun
Wet sander

Stationary Power Tools

Air router
Air table
Air tools (router, drill, pop rivet gun)
Applicator table saw
Argon
Automatic bevelling machine
Automatic cutting table
Automatic diamond wheel
Automatic glass washing machine
Automatic vertical edging machine
Band saw
Bench grinder
Benders
Bulk foam insulation
Bulk sealant applicator
Copy router
Drill press
Edger
Edger milling machine (aluminium)
Flashing brake
Flashing shear
Gas pressure system
Glass cutting table
Polishing machine
Punch press
Radial arm saw
Sandblaster
Sealed unit press
Upright belt sanders

Layout and Measuring Equipment

Builder's level
Calculator
Laser distance measurer
Laser level
Level squares – steel
Measuring tape
Meter stick
Plumb bob
Site level
Sliding T bevel
Squares – combination
Theodolite
Transit level

Specialty Tools

Channel and vent tool
Door handle release tool
Door panel pry bar
Glass clamp
Lace tool
Moulding release tool
Offset drill
Offset hook tool
Plate running pliers
Point driver
Retaining nut removal tool
Rubber insert tool
Self-locking rubber tool
Standard suction cups
Torque wrench
Tripod glass drill
Windshield extraction tool
Windshield suction cups
Windshield wiper removal tool

Scaffolding and Access Equipment

Aerial work platforms
Articulated boom lift
Crane
Hydro lifts
Ladder jacks
Ladders (extension and step)
Platform lift
Scaffolding (baker, frame, sectional, tubular)
Swing stage (suspended scaffolds)

Rigging, Hoisting and Lifting Equipment

Chain falls
Chains
Crane
Fork lift
Gator dolly
Glass dolly
Pallet jacks
Power cups
Ropes (fibre and synthetic)
Shackles
Skip (elevator)
Slings
Suction cups
Winches

Personal Protective Equipment

Aprons
Chaps
Ear protection
Eye wash station
Fall arrest equipment
Fire extinguishers
First Aid kit
Gauntlets
Hard hat
Knee pads
Respirator
Rubber gloves
Safety footwear
Safety glasses
Safety vest

Skilled Trades Ontario | Métiers spécialisés Ontario

skilledtradesontario.ca

Glazier