

Class A Elevating Devices Mechanic

PROGRAM OUTLINE



SAFETY NOTICE

Disclaimer:

Please note that references to the Acts, Regulations, and Codes throughout this document may not reflect the most recent versions available.

Also, the references in this outline are by no means an exhaustive list of all the situations that may apply to a particular situation.

Therefore, the user should make sure that references are current and relevant to any particular situation that they are dealing with.



The latest version of this document is available in PDF format on the BCSA website. www.safetyauthority.ca



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Section 1:

Introduction

FOREWORD

The Elevating Devices Mechanic (Class A) Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects updated standards based on the British Columbia industry and subject matter experts.

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

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

The Program Outline was prepared with the advice and assistance of the Elevating Devices Mechanic (Class A) Review Committee and will form the basis for further updating of the British Columbia Elevating Devices Mechanic (Class A) Program and learning resources by the BC Safety Authority.

Each competency is to be evaluated through the use of written examination in which the individual must achieve a minimum of 70% in order to receive a passing grade. The types of questions used on these exams must reflect the cognitive level indicated by the learning objectives and the Learning Tasks listed in the related competencies.

Workplace Achievement Criteria are included for those competencies that require a practical component.

The Elevating Devices Mechanic Personal Skills Passport will be used to verify the successful completion of all required tasks. Some competencies have more than one Achievement Criteria. Many of the Achievement Criteria require the passport holder to demonstrate the same competency on multiple setups over a period of time. A Certified Mechanic is required to initial each of the Learning Tasks and sign the bottom of the form for each Achievement Criteria.

ACKNOWLEDGMENTS

The Program Outline was prepared with the advice and direction of an industry steering committee convened initially by the BC Safety Authority (BCSA). Members include:

Corrie Archer	Otis Elevator Company
Michael Fletcher	International Union of Elevator Constructors
Shawn Hamilton	BC Rapid Transit Company
Heiner Marnet	City Elevator Ltd.
Daniel Royston	BC Safety Authority
Don Sanchez	Garaventa Lift
Larry Schlabach	ThyssenKrupp
Nick White	Fujitec America Inc.
Vlad Zachata	Richmond Elevator Maintenance Ltd.

The BC Safety Authority would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Elevating Devices Mechanic (Class A) occupation.

HOW TO USE THIS DOCUMENT

This Program Outline has been developed for the use of individuals from several different audiences.

This table describes how each audience can use the document.

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Program Requirements	Communicate program length and structure and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program and pathway to completion	Understand challenger pathway to Certificate of Qualification
Program Assessment	Communicate program completion requirements and assessment methods	Understand the various assessment requirements for the program	Understand the various assessment requirements for the program	Understand the assessment requirements they would have to fulfill in order to challenge the program
Occupational Analysis Chart	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
Program Content	Defines the objectives, Learning Tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels
Training Provider Standards	Defines the Facility Requirements, tools and equipment, reference materials (if any), and Instructor Requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, Reference Materials they may be expected to acquire, and minimum qualification levels of program instructor	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment



Section 2:

Program Overview

PROGRAM REQUIREMENTS FOR ELEVATING DEVICE MECHANIC (CLASS A) CERTIFICATE OF QUALIFICATION

Requirement	Path 1	Path 2	Path 3	Path 4
Prerequisite Safety Training	Yes	Yes	Yes	Yes
Technical Training	Electrical Level 1 and Level 2 Millwright Level 1 and Level 2	Certified Elevator Technician (CET) Candidate Program	Canadian Elevator Industry Educational Program (CEIEP)	Recognized apprenticeship program by other Canadian jurisdictions
Supplementary Courses	BC Safety Standards Act; BC Elevating Devices Safety Regulations; and, BC Safety Standards General Regulation (4 hrs) B44 Safety Code for Elevator and Escalators; and, B355 Lifts for Persons with Physical Disabilities (4 hrs) Reference Materials from CET courses 2, 3, 5, 8, 10, 11, and 12	BC Safety Standards Act; BC Elevating Devices Safety Regulations; and, BC Safety Standards General Regulation (4 hrs) B44 Safety Code for Elevator and Escalators; and, B355 Lifts for Persons with Physical Disabilities (4 hrs) Canadian Electrical Code Section 38 (4 hrs)		BC Safety Standards Act; BC Elevating Devices Safety Regulations; and, BC Safety Standards General Regulation (4 hrs)
Documented and verifiable hands-on work experience	8000 hrs	8000 hrs	8000 hrs	8000 hrs
BCSA Certification Exam	Yes	Yes	Yes	Yes

PROGRAM ASSESSMENT

Apprentices will be assessed fairly and accurately throughout the program on the various skills required to be a professional Elevating Devices Mechanic (Class A). Assessment activities are designed to provide feedback and allow for further development of skills that have been identified as essential for on the job performance. The forms of assessment used in this program are described below.

Completion Requirement	Evidence of Achievement	Level of Achievement Required
Prerequisite Safety Training	In-school testing and practical assessment	Minimum 70%
Level 1 Technical Training	In-school testing and practical assessment	Minimum 70%
Level 2 Technical Training	In-school testing and practical assessment	Minimum 70%
Level 3 Technical Training	In-school testing and practical assessment	Minimum 70%
Level 4 Technical Training	In-school testing and practical assessment	Minimum 70%
Work-based Training Hours	Work-based training report completed by Sponsor or Employer	8000 hours completed
BCSA Certification Exam	Written exam	Minimum 70%
BCSA Certificate of Qualification	Approval or sign-off by the BCSA	Certificate of Qualification

OCCUPATIONAL ANALYSIS CHART

Occupation Description:

“Elevating Devices Mechanic (Class A)” means a person who installs, constructs, alters, repairs, maintains, commissions, tests, services, calibrates and operates related elevating devices as defined in the latest edition of the *British Columbia Elevating Devices Safety Act and Regulation*.

Use Safe Work Practices A	Control Workplace Hazards A1	Comply with the OHS Regulation and WorkSafeBC Standards A2	Use WHMIS A3	Use Personal Protective Equipment A4	Apply Fire Prevention Practices A5
	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Use Hand Tools B1	Use Power Tools B2	Use Measuring and Alignment Tools B3	Use Ladders, Scaffolding, and Platforms B5	Use Rigging and Hoisting Equipment B6
	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	P <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Use Electrical Test equipment B7	Use False Cars B8			
Use Fundamental Skills C					
	Describe the Elevating Device Industry C1	Use Mathematics and Science (Level 2) C2	Apply Mechanical Principles C3	Read Drawings and Specifications C4	Use Acts, Regulations, and Codes C5
	1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Use Manufacturer and Supplier Documentation C6				
	Plan a Project C7	Apply Troubleshooting Techniques C8			
	2 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	3 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			

Install Traction and Hydraulic Common Components D	Layout Hoistways D1 1	Install Guide Rails, Guide Rail Supports, and Fastenings D2 1	Install Car Frame and Counterweight Assemblies D3 1	Install Door Frames, Hoistway Doors, and Lock Assemblies D4 2	Install Wiring Raceways, Fixtures, and Wiring D5 2	Install Car Enclosure Assemblies D6 2
	Adjust and Commission Elevating Devices D7 4	Install Bi-Parting Freight Elevator Door Systems D9 2	Install Seismic Systems D10 2			
Install Traction Elevators E	Describe the Principles of Traction Systems E1 1	Install Pit Structures E2 1	Install Machine Room Equipment E3 1	Install Suspension Systems E4 2		
Install Hydraulic Elevators F	Describe the Principles of Hydraulic Systems F1 1	Install Pit Structures, Jacks, and Suspension Systems F2 2	Install Machine Room Equipment F3 2	Install the Hydraulic Piping System F4 2		
Apply the Principles of Electricity and Electronics G	Describe the Principles of Electricity G1 3	Read Electrical Drawings and Specifications G2 3	Describe the Operation of Motors and Generators G3 4	Describe electrical and electronic controls (Level 2) G4 3	Install Electrical Systems G5 3	Maintain Electrical and Electronic Systems (Level 2) G6 3
	Troubleshoot Electrical and Electronic Systems (Level 2) G7 3	Adjust Door Operators G8 3				

Install Escalators and Moving Walks H	Describe the Principles of Escalators and Moving Walks H1 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Install and Align Truss Assemblies H2 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Install Balustrades and Decking H3 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Adjust and Commission Escalators and Moving Walks H4 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Maintain Escalators and Moving Walks H5 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Repair Escalators and Moving Walks H6 <div><div></div><div></div><div></div><div></div><div>4</div></div>
Describe the Application of Specialty Lifts I	Describe the Application of Lifts for Persons with Physical Disabilities I1 <div><div></div><div></div><div></div><div>3</div><div></div></div>	Describe the Application of Other Specialty Lifts I2 <div><div></div><div></div><div></div><div>3</div><div></div></div>				
Maintain Elevating Systems J	Maintain Public Safety J1 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Apply Requirements for Mandatory Maintenance J2 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Evacuate Trapped Passengers J3 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Maintain Hoistways J4 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Maintain Machine Rooms or Control Spaces J5 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Maintain Car Enclosures J6 <div><div></div><div></div><div></div><div></div><div>4</div></div>
	Maintain Elevating Device Cabs, Carriages, and Platforms J7 <div><div></div><div></div><div></div><div></div><div>4</div></div>					
Repair Elevating Systems K	Re-rope Elevators K1 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Service Braking Systems K2 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Repair Machines, Motors, or Generators K3 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Repair Hydraulic Systems K4 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Repair Door Systems K5 <div><div></div><div></div><div></div><div></div><div>4</div></div>	
Alter Elevating Systems L	Upgrade Door Systems L1 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Replace Machines L2 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Upgrade Controllers and Drives L3 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Replace Governors and Safeties L4 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Perform Seismic Upgrading L5 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Upgrade Car Enclosures L6 <div><div></div><div></div><div></div><div></div><div>4</div></div>
	Upgrade Fixtures L7 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Replace Jacks L8 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Upgrade Hydraulic Systems L9 <div><div></div><div></div><div></div><div></div><div>4</div></div>	Install Emergency Braking Systems L10 <div><div></div><div></div><div></div><div></div><div>4</div></div>		

TRAINING TOPICS AND SUGGESTED TIME ALLOCATION SUMMARIZED BY GENERAL AREA OF COMPETENCY (GAC)

ELEVATING DEVICES MECHANIC (CLASS A)

Line A	Use Safe Work Practices	Hours	% of Total
A1	Control Workplace Hazards	4	
A2	Comply with the OHS Regulation and WorkSafeBC Standards	4	
A3	Use WHMIS	3	
A4	Use Personal Protective Equipment	4	
A5	Apply Fire Prevention Practices	1	
	Total Line A	16	2%

Line B	Use Tools and Equipment	Hours	% of Total
B1	Use Hand Tools	1	
B2	Use Power Tools	2	
B3	Use Measuring and Alignment Tools	1	
B5	Use Ladders, Scaffolding, and Platforms	4	
B6	Use Rigging and Hoisting Equipment	12	
B7	Use Electrical Test Equipment	4	
B8	Use False Cars	4	
	Total Line B	28	4%

Line C	Use Fundamental Skills	Hours	% of Total
C1	Describe the Elevating Industry	2	
C2	Use Mathematics and Science	12	
C3	Apply Mechanical Principles	16	
C4	Read Drawings and Specifications	8	
C5	Use Acts, Regulations, and Codes	12	
C6	Use Manufacturer and Supplier Documentation	4	
C7	Plan a Project	8	
C8	Apply Troubleshooting Techniques	8	
	Total Line C	70	9%

Line D	Install Traction and Hydraulic Common Components	Hours	% of Total
D1	Layout Hoistways	12	
D2	Install Guide Rails, Guide Rail Supports, and Fastenings	16	
D3	Install Car Frame and Counterweight Assemblies	16	
D4	Install Door Frames, Hoistway Doors, and Lock Assemblies	16	
D5	Install Wiring Raceways, Fixtures, and Wiring	16	
D6	Install Car Enclosure Assemblies	16	
D7	Adjust and Commission Elevating Devices	12	
D9	Install Bi-Parting Freight Elevator Door Systems	8	
D10	Install Seismic Systems	8	
	Total Line D	120	16%

Line E	Install Traction Elevators	Hours	% of Total
E1	Describe the Principles of Traction Systems	16	
E2	Install Pit Structures	16	
E3	Install Machine Room Equipment	24	
E4	Install Suspension Systems	24	
	Total Line E	80	10%

Line F	Install Hydraulic Elevators	Hours	% of Total
F1	Describe the Principles of Hydraulic Systems	20	
F2	Install Pit Structures, Jacks, and Suspension Systems	20	
F3	Install Machine Room Equipment	12	
F4	Install the Hydraulic Piping System	12	
	Total Line F	64	8%

Line G	Apply the Principles of Electricity and Electronics	Hours	% of Total
G1	Describe the Principles of Electricity	34	
G2	Read Electrical Drawings and Specifications	16	
G3	Describe the Operation of Motors and Generators	16	
G4	Describe Electrical and Electronic Controls (Level 2)	32	
G5	Install Electrical Systems	16	
G6	Maintain Electrical and Electronic Systems (Level 2)	16	
G7	Troubleshoot Electrical and Electronic Systems (Level 2)	16	
G8	Adjust Door Operators	16	
	Total Line G	162	21%

Line H	Install Escalators and Moving Walks	Hours	% of Total
H1	Describe the Principles of Escalators and Moving Walks	4	
H2	Install and Align Truss Assemblies	12	
H3	Install Balustrades and Decking	4	
H4	Adjust and Commission Escalators and Moving Walks	4	
H5	Maintain Escalators and Moving Walks	4	
H6	Repair Escalators and Moving Walks	4	
	Total Line H	32	4%

Line I	Describe the Application of Specialty Lifts	Hours	% of Total
I1	Describe the Application of Lifts for Persons with Physical Disabilities	8	
I2	Describe the Application of Other Specialty Lifts	8	
	Total Line I	16	2%

Line J	Maintain Elevating Systems	Hours	% of Total
J1	Maintain Public Safety	8	
J2	Apply Requirements for Mandatory Maintenance	12	
J3	Evacuate Trapped Passengers	4	
J4	Maintain Hoistways	16	
J5	Maintain Machine Rooms or Control Spaces	16	
J6	Maintain Car Enclosures	4	
J7	Maintain Elevating Device Cabs, Carriages, and Platform Cabs	4	
	Total Line J	64	8%

Line K	Repair Elevating Systems	Hours	% of Total
K1	Re-rope Elevators	12	
K2	Service Braking Systems	16	
K3	Repair Machines, Motors, or Generators	16	
K4	Repair Hydraulic Systems	12	
K5	Repair Door Systems	12	
	Total Line K	68	9%

Line L	Alter Elevating Systems	Hours	% of Total
L1	Upgrade Door Systems	4	
L2	Replace Machines	4	
L3	Upgrade Controllers and Drives	4	
L4	Replace Governors and Safeties	4	
L5	Perform Seismic Upgrading	4	
L6	Upgrade Car Enclosures	4	
L7	Upgrade Fixtures	2	
L8	Replace Jacks	8	
L9	Upgrade Hydraulic Systems	4	
L10	Install Emergency Braking Systems	4	
	Total Line L	42	6%

Grand Total	762	100%
Minus safety prerequisite	24	
Total In-Class Hours	738	



Section 3:

Program Content

Line (GAC): A Use Safe Work Practices
Competency: A1 Control Workplace Hazards

Objectives

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

- Describe workplace hazards.
- Apply strategies to minimize workplace hazards.
- Communicate workplace hazards to co-workers.

Learning Tasks		Content	
1	Describe general strategies to minimize workplace hazards and prevent workplace injuries	<ul style="list-style-type: none"> • Hazards <ul style="list-style-type: none"> - Identification - Reduction - Elimination - Isolation - Management 	<ul style="list-style-type: none"> • Horseplay • Personal protective equipment • Worker training • Housekeeping • Ergonomics • Material handling and storage • Code requirements
2	Describe strategies to help ensure the well-being of the general public	<ul style="list-style-type: none"> • Signage • Barricading access 	<ul style="list-style-type: none"> • Notification of elevating shutdown/return to service • Reasons for shutdown
3	Explain how environmental hazards pose a risk to a worker's health and safety	<ul style="list-style-type: none"> • Chemical materials • Physical materials 	<ul style="list-style-type: none"> • Biological materials • Toxic materials
4	Describe the issues relating to substance abuse	<ul style="list-style-type: none"> • Substance types • Effects • Contributing factors 	<ul style="list-style-type: none"> • Solutions • Policies
5	Describe strategies to minimize the risk of workplace accidents or illness	<ul style="list-style-type: none"> • Training • Communications • Hazard assessment • Hazard control 	<ul style="list-style-type: none"> • Site planning • Work procedures • Code requirements
6	Describe the dangers of exposure to hazardous materials	<ul style="list-style-type: none"> • Materials • Types • Hazards • Toxic effect 	<ul style="list-style-type: none"> • Types of exposure • Personal protective equipment • Responsibilities and procedures • Code requirements
7	Apply strategies to minimize workplace hazards	<ul style="list-style-type: none"> • Site orientation • Safety meetings • Worksite safety plan 	<ul style="list-style-type: none"> • Lockout procedures • Guards and barricades • Code requirements

Line (GAC): A Use Safe Work Practices
Competency: A2 Comply with the OHS Regulation and WorkSafeBC Standards

Objectives

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

- Locate the relevant parts of the Occupational Health and Safety Regulation and WorkSafeBC Standard as it applies to an Elevating Devices Mechanic's workplace.
- Integrate the Occupational Health and Safety Regulation and WorkSafeBC Standard into their day-to-day work practices.

Learning Tasks		Content	
1	Describe the general health and safety policies relevant to the elevator trade	<ul style="list-style-type: none"> • OHS Regulation • Other agencies 	<ul style="list-style-type: none"> • Company policies
2	Describe the rights and responsibilities of employers, managers, supervisors, and workers concerning health and safety in the workplace	<ul style="list-style-type: none"> • Due diligence 	<ul style="list-style-type: none"> • Code requirements
3	Describe the procedures for reporting workplace incidents and accidents	<ul style="list-style-type: none"> • WorkSafeBC requirements 	<ul style="list-style-type: none"> • Company requirements
4	Describe the core requirements of the Occupational Health and Safety Regulation.	<ul style="list-style-type: none"> • Regular inspections • Written instructions • Regular management meetings • Safety committees • Toolbox meetings 	<ul style="list-style-type: none"> • Accident/injury investigations • Records and statistics • Instruction and supervision of workers • Code requirements
5	Describe WorkSafeBC's role in promoting workplace health and safety	<ul style="list-style-type: none"> • Awareness • Education 	<ul style="list-style-type: none"> • Inspection • Enforcement
6	Apply the General Hazard Requirements of WorkSafeBC Regulations	<ul style="list-style-type: none"> • Chemical and biological substances • Substance specific requirements • Noise, vibration, radiation, and temperature • Personal protective clothing and equipment • Confined spaces • De-energizing and lockout 	<ul style="list-style-type: none"> • Fall protection • Tools, machinery and equipment • Ladders, scaffolds, and temporary work platforms • Cranes and hoists • Rigging • Mobile equipment • Electrical safety • Code requirements
7	Describe how a workplace safety policy is established	<ul style="list-style-type: none"> • Hazard assessment • Conditions • Safety meeting requirements • Reporting hazards and incidents • Reporting injuries 	<ul style="list-style-type: none"> • Accident/incident investigations • Employee orientation • First aid • Records and statistics • Non-compliance procedures

Line (GAC): A Use Safe Work Practices
Competency: A3 Use WHMIS

Objectives

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

- Describe the purpose of the Workplace Hazardous Materials Information System (WHMIS) Regulations.
- Explain the Contents of Material Safety Data Sheets (MSDS).
- Explain the Content of a WHMIS label.
- Apply WHMIS regulations in the workplace.

Learning Tasks		Content	
1	Explain the primary goals of WHMIS	<ul style="list-style-type: none"> • Reducing injuries and disease • Communicating information 	<ul style="list-style-type: none"> • Reducing exposure to hazardous materials
2	Describe the rights and responsibilities of employers, suppliers, and workers under WHMIS legislation	<ul style="list-style-type: none"> • Recognition of rights <ul style="list-style-type: none"> - Workers - Employers - Suppliers • Legislation 	<ul style="list-style-type: none"> • Availability and location of information • Updating • Code requirements
3	Describe the six hazard classes of WHMIS	<ul style="list-style-type: none"> • Hazard classes 	
4	Describe the three main elements of WHMIS	<ul style="list-style-type: none"> • Labels • Material safety data sheets (MSDS) 	<ul style="list-style-type: none"> • Education and training programs
5	Explain the requirements for WHMIS labels	<ul style="list-style-type: none"> • Supplier labels 	<ul style="list-style-type: none"> • Workplace labels
6	Describe the primary information found on a Material Safety Data Sheet	<ul style="list-style-type: none"> • Product information • Hazardous ingredients • Physical data • Fire or explosion data 	<ul style="list-style-type: none"> • Reactive data • Toxicological properties • Preventative measures • First aid measures • Preparation information

Line (GAC): A Use Safe Work Practices
Competency: A4 Use Personal Protective Equipment

Objectives

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

- Select appropriate personal protective equipment.
- Inspect and maintain personal protective equipment.
- Use personal protective equipment.

Learning Tasks		Content	
1	Select the proper personal protective equipment (PPE) for a specific task	<ul style="list-style-type: none"> • Footwear • Eye protection • Ear protection • Head protection • Respiratory protection • Protective clothing 	<ul style="list-style-type: none"> • Lifting protection • Hair and jewelery • Fall protection • Company policy • Code requirements
2	Use personal protective equipment	<ul style="list-style-type: none"> • Selection • Purpose • Fitting • Operating procedures • Training programs 	<ul style="list-style-type: none"> • Inspection • Maintenance • Storage • Code requirements
3	Use fall protection	<ul style="list-style-type: none"> • Types of equipment • Uses/purpose • Limitations 	<ul style="list-style-type: none"> • Certification • Code requirements

Line (GAC): A Use Safe Work Practices
Competency: A5 Apply Fire Prevention Practices

Objectives

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

- Describe the chemical process of a fire.
- Select and use appropriate fire suppression equipment.
- Apply fire prevention procedures.
- Report fire incidents.

Learning Tasks		Content	
1	Describe the components necessary to sustain a fire	<ul style="list-style-type: none"> • Fuel • Heat 	<ul style="list-style-type: none"> • Oxygen
2	Describe the five classes of fire extinguishers	<ul style="list-style-type: none"> • Class A • Class B • Class C 	<ul style="list-style-type: none"> • Class D • Other
3	Outline strategies to reduce the risk of fire in the workplace	<ul style="list-style-type: none"> • Housekeeping • Inspection and maintenance of fire equipment • Electrical hazards • Storage of materials 	<ul style="list-style-type: none"> • Precautions to prevent ignition • Fire/smoke alarms • Hot permit • Code requirements
4	Describe the proper use of a fire extinguisher	<ul style="list-style-type: none"> • Selecting extinguisher • Notifying occupants, co-workers, and emergency services 	<ul style="list-style-type: none"> • Egress • Procedures/process

Line (GAC): B Use Tools and Equipment
Competency: B1 Use Hand Tools

Objectives

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

- Select appropriate hand tools.
- Use hand tools.
- Inspect and maintain hand tools.

Learning Tasks		Content	
1	Describe the hand tools commonly used in the elevator trade	<ul style="list-style-type: none"> • Cutting tools • Measuring and marking tools • Bracing and clamping tools • Hammering tools • Levelling tools • Wrenches • Sockets • Pliers • Screwdrivers 	<ul style="list-style-type: none"> • Chiselling tools • Squaring tools • Threading tools • EMT benders • Crimping tools • Prying and alignment tools • Brushes • Tool box • Flashlight
2	Use Hand Tools	<ul style="list-style-type: none"> • Types • Selection <ul style="list-style-type: none"> - Use - Quality • Parts • Purpose/use • Procedures/operation 	<ul style="list-style-type: none"> • Safety • Adjustment • Inspection • Maintenance • Cleaning • Storage • Code requirements

Line (GAC): B Use Tools and Equipment
Competency: B2 Use Power Tools

Objectives

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

- Describe the power tools commonly used in the elevating industry.
- Use power tools.
- Inspect and maintain power tools.

Learning Tasks		Content	
1	Describe the power tools commonly used in the elevating industry	<ul style="list-style-type: none"> • Types <ul style="list-style-type: none"> - Electric - Pneumatic - Powder actuated • Certification requirements • Cutting tools • Grinding tools • Drilling and boring tools • Jack hammer • Stationary <ul style="list-style-type: none"> - Roll groover - Pipe threader - Tugger 	<ul style="list-style-type: none"> • Specialty tools • Accessories • Power cords • Compressors • Air lines • Generators • Vacuums/blowers/fans
2	Use Power Tools in a safe and efficient manner	<ul style="list-style-type: none"> • Types • Selection <ul style="list-style-type: none"> - Use - Quality • Parts • Purpose/uses • Procedures/operations • Safety 	<ul style="list-style-type: none"> • Adjustment • Inspection • Maintenance • Cleaning • Storage • Code requirements

Line (GAC): B Use Tools and Equipment
Competency: B3 Use Measuring and Alignment Tools

Objectives

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

- Describe the measuring and alignment tools commonly used in the elevating industry.
- Use measuring and alignment tools.
- Inspect and maintain measuring and alignment tools.

Learning Tasks		Content	
1	Describe the measuring and alignment tools commonly used in the elevating industry	<ul style="list-style-type: none"> • Measuring tools <ul style="list-style-type: none"> - Tape measure - Scales - Calipers - Rope gauges - Pressure - Rope tension tool - Tachometer - Feeler gauges <ul style="list-style-type: none"> • Step gauges • Skirt gauges • Pin gauges - Dynamometer - Stop watch 	<ul style="list-style-type: none"> • Alignment tools <ul style="list-style-type: none"> - Plumb bob - Dial gauges - Rail gauges - Lasers - Levels - Squares • Templates
2	Use measuring and alignment tools	<ul style="list-style-type: none"> • Types • Selection <ul style="list-style-type: none"> - Use - Quality • Parts • Purpose/use • Procedures/operation • Safety 	<ul style="list-style-type: none"> • Adjustment • Inspection • Maintenance • Calibration • Cleaning • Storage • Accuracy • Unit conversion

Line (GAC): B Use Tools and Equipment
Competency: B5 Use Ladders, Scaffolding, and Platforms

Objectives

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

- Describe the use of ladders, scaffolding, and platforms.
- Use ladders, scaffolding, and platforms.
- Inspect and maintain ladders, scaffolding, and platforms

Learning Tasks		Content	
1	Describe the use of ladders, scaffolding, and platforms	<ul style="list-style-type: none"> • Types • Usage • Selection • Safety 	<ul style="list-style-type: none"> • Maintenance • Storage • Transportation • Inspection
2	Use an extension ladder	<ul style="list-style-type: none"> • Uses/limitations • Setup • Safety • Inspection • Maintenance 	<ul style="list-style-type: none"> • Storage • CSA certification and duty rating • Company policy • Code requirements
3	Use a step ladder	<ul style="list-style-type: none"> • Uses/limitations • Setup • Safety • Inspection • Maintenance 	<ul style="list-style-type: none"> • Storage • CSA certification and duty rating • Company policy • Code requirements
4	Use scaffolding	<ul style="list-style-type: none"> • Assembly and disassembly • Personal protective equipment • Hazards and obstructions • Levelling • Bracing and tying off • Guarding the work area • Installing the planking and railings • Load limits 	<ul style="list-style-type: none"> • Engineering requirements • Inspection • Maintenance • Storage of scaffolding and planks • Safety • Signage • Fall protection • Code requirements
5	Use work platforms	<ul style="list-style-type: none"> • Assembly and disassembly • Load limits • Inspection • Maintenance 	<ul style="list-style-type: none"> • Storage • Safety • Code requirements

Line (GAC): B Use Tools and Equipment
Competency: B6 Use Rigging and Hoisting Equipment

Objectives

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

- Describe rigging and hoisting equipment.
- Use rigging and hoisting equipment.
- Inspect and maintain rigging and hoisting equipment.

Learning Tasks		Content	
1	Describe rigging and hoisting equipment and its' applications	<ul style="list-style-type: none"> • Types of equipment <ul style="list-style-type: none"> - Chain block - Cranes - Tugger - Slings - Beam clamps - Trolleys - Gantries - Hardware - Jacks - Blocking • Knots • Equipment assembly 	<ul style="list-style-type: none"> • Slings and sling arrangements <ul style="list-style-type: none"> - Rating - Wire rope vs. nylon rope • Securing and balancing loads • Pinch points • Estimating weights of equipment • Load capacities of lifting equipment • Inspection • Maintenance • Storage • Certification and rating of equipment • Code requirements
2	Use rigging and hoisting equipment	<ul style="list-style-type: none"> • Applications • Test lifts • Manual devices • Electrical devices • Hydraulic devices • Attachment point rating • Communication/hand signals for hoisting 	<ul style="list-style-type: none"> • Slings • Rigging • Safety • Inspection • Maintenance • Storage • Code requirements

Workplace Achievement Criteria

1. The individual will select, inspect rigging and hoisting equipment, and use proper rigging and hoisting techniques to safely lift and lower a load using three separate setups.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): B Use Tools and Equipment
Competency: B7 Use Electrical Test Equipment

Objectives

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

- Describe the types of electrical test equipment.
- Describe the use of electrical test equipment.
- Use electrical test equipment

Learning Tasks		Content	
1	Describe types of electrical test equipment	<ul style="list-style-type: none">• Types• Purpose	<ul style="list-style-type: none">• Operation• Application
2	Describe the use of electrical test equipment	<ul style="list-style-type: none">• Handling• Safety• Personal protective equipment• Equipment selection• Static electricity	<ul style="list-style-type: none">• Calibration• Inspection• Procedure• Code requirements
3	Use electrical test equipment	<ul style="list-style-type: none">• Safety• Planning• Procedure	<ul style="list-style-type: none">• Personal protective equipment• Environmental considerations• Code requirements

Workplace Achievement Criteria

1. The individual will use a multimeter to measure voltage, current, and resistance.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): **B** **Use Tools and Equipment**
Competency: **B8** **Use False Cars**

Objectives

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

- Describe the use of false cars.
- Use false cars.
- Inspect and maintain false cars.

Learning Tasks		Content	
1	Describe the use of false cars	<ul style="list-style-type: none">• Assembly and disassembly• Safety devices• Testing safeties• Capacity• Safety• Fall protection	<ul style="list-style-type: none">• Inspection• Maintenance• Operating procedures• Company policies• Certification• Code requirements
2	Use false cars	<ul style="list-style-type: none">• Assembly• Removal• Safety	<ul style="list-style-type: none">• Routine inspections• Operating procedures• Code requirements

Workplace Achievement Criteria

1. The individual will inspect, install, operate, and remove a false car.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): C Use Fundamental Skills
Competency: C1 Describe the Elevating Device Industry

Objectives

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

- Describe the history and terminology of vertical transportation.
- Describe the principles of operation of vertical transportation systems.

Learning Tasks		Content	
1	Describe the history of vertical transportation	<ul style="list-style-type: none"> • Origin of elevating devices • Early modern elevators 	<ul style="list-style-type: none"> • Modern elevators
2	Describe the types of elevating devices	<ul style="list-style-type: none"> • Traction elevators • Hydraulic elevators • Escalators and moving walks • Lifts for persons with physical disabilities • Specialty lifts 	<ul style="list-style-type: none"> • Dumbwaiters • Material lifts • Incline lifts • Manlifts • Construction hoists

Line (GAC): C Use Fundamental Skills
Competency: C2 Use Mathematics and Science (Level 2)

Objectives

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

- Use Mathematics and Science to solve problems common to the elevating industry.

Learning Tasks		Content	
1	Add, subtract, multiply and divide whole numbers, fractions, decimals, and percentages	<ul style="list-style-type: none"> • Whole numbers • Fractions 	<ul style="list-style-type: none"> • Decimals • Percentages
2	Transpose formulas	<ul style="list-style-type: none"> • Introductory algebra 	
3	Use formulas to calculate area	<ul style="list-style-type: none"> • Circles • Cylinders • Squares 	<ul style="list-style-type: none"> • Rectangles • Triangles
4	Use formulas to calculate volume	<ul style="list-style-type: none"> • Cylinders • Square tanks 	<ul style="list-style-type: none"> • Rectangular tanks
5	Use formulas to calculate capacity	<ul style="list-style-type: none"> • Imperial measure 	<ul style="list-style-type: none"> • Metric measure
6	Convert units of measure	<ul style="list-style-type: none"> • Imperial units 	<ul style="list-style-type: none"> • Metric units
7	Use basic right angle trigonometry	<ul style="list-style-type: none"> • Sine • Cosine 	<ul style="list-style-type: none"> • Tangent
8	Describe the properties of matter	<ul style="list-style-type: none"> • Density • Cohesion • Adhesion • Tensile strength 	<ul style="list-style-type: none"> • Ductility • Malleability • Elasticity • Conductivity
9	Describe mechanical advantage as it relates to fluid power	<ul style="list-style-type: none"> • Hydraulics 	<ul style="list-style-type: none"> • Hydrostatics
10	Describe the principles of heat transfer	<ul style="list-style-type: none"> • Convection • Radiation 	<ul style="list-style-type: none"> • Conduction
11	Describe the principles of hydraulics	<ul style="list-style-type: none"> • Principles of force, work and power <ul style="list-style-type: none"> - Weight and specific gravity - Pressure and force - Static pressure - Gauge pressure (Imperial and Metric) 	<ul style="list-style-type: none"> - Pascal's law - Conversion of energy and hydraulic power - Pressure losses

Line (GAC): C Use Fundamental Skills
Competency: C3 Apply Mechanical Principles

Objectives

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

- Describe mechanical principles as they relate to the elevating industry.

Learning Tasks		Content	
1	Describe the principles of power transmission components	<ul style="list-style-type: none"> V-belts Belt sheaves Taper brushings Chains and sprockets Gear and gear reducers 	<ul style="list-style-type: none"> Couplings, keys, pins and set screws Belt alignment
2	Describe the principles of bearings and seals	<ul style="list-style-type: none"> Bearing types Bearing failures Replacing bearings Lubricating bearings <ul style="list-style-type: none"> Cleaning Repacking 	<ul style="list-style-type: none"> Types of seals Installing and removing seals <ul style="list-style-type: none"> Pullers Drivers
3	Describe the properties of materials and fastening technology	<ul style="list-style-type: none"> Properties and applications <ul style="list-style-type: none"> Ferrous metals Non-ferrous metals Alloys Non-metallic materials Mechanical properties of metals and alloys <ul style="list-style-type: none"> Tensile strength Yield strength Hardness Elongation rate Conductivity 	<ul style="list-style-type: none"> Fasteners for specific applications Threads types Grades of fasteners Head marking Strength of materials Flame spread Reaction between dissimilar materials. Material profiles Gauges of material
4	Describe the principles of lubrication	<ul style="list-style-type: none"> Types and properties Use of lubricating devices 	<ul style="list-style-type: none"> Storage Disposal requirements
5	Describe the principles of mechanical advantage	<ul style="list-style-type: none"> Levers Pulleys 	<ul style="list-style-type: none"> Gear ratios

Line (GAC): C Use Fundamental Skills
Competency: C4 Read Drawings and Specifications

Objectives

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

- Describe the principles of visualization, projection, and views.
- Describe the principles of print reading.
- Describe information contained on elevating device drawings.
- Interpret information contained on drawings.

Learning Tasks		Content	
1	Describe the principles of visualization, projection and views	<ul style="list-style-type: none"> • Orientation of objects • Third vs. first angle of projection • Basic arrangement of views 	<ul style="list-style-type: none"> • Transferring dimensions • Auxiliary and section views • Isometric and exploded views
2	Describe the principles of print reading	<ul style="list-style-type: none"> • Drawing types <ul style="list-style-type: none"> - Information contained • Views <ul style="list-style-type: none"> - Plan - Elevation - Cross-section 	<ul style="list-style-type: none"> • Symbols • Scale • Specifications • Units of measure • Title blocks • Revisions • Dimensioning
3	Describe the information contained on elevating device drawings	<ul style="list-style-type: none"> • Main Layout drawings <ul style="list-style-type: none"> - Plan views - Elevation views - Specifications - Position of elevating device to grid lines 	<ul style="list-style-type: none"> • Supplemental drawings <ul style="list-style-type: none"> - Construction details
4	Interpret information with respect to the positioning of components	<ul style="list-style-type: none"> • Position of guide rails • Size and orientation of car frame • Pit equipment 	<ul style="list-style-type: none"> • Machine room/space equipment • Control room/space equipment
5	Interpret information with respect to clearances	<ul style="list-style-type: none"> • Sill to sill running clearance • Car to car counterweight clearance • Car to hoistway wall clearance • Clearances at top and bottom of hoistway 	<ul style="list-style-type: none"> • Run-by, buffer stroke, and clearances • Controller and main disconnect clearances
6	Interpret information with respect to power requirements	<ul style="list-style-type: none"> • Location of main electrical components <ul style="list-style-type: none"> - Main disconnect - Car light disconnect/power supply - Signal switches - Dispatcher disconnect switches 	<ul style="list-style-type: none"> • Elevating device power requirements <ul style="list-style-type: none"> - Voltage - Amperage

Line (GAC): C Use Fundamental Skills
Competency: C5 Use Acts, Regulations, and Codes

Objectives

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

- Explain the relationship between Acts, Regulations, and Codes.
- Describe how the various Acts, Regulations, and Codes apply to the elevating industry.
- Locate information in the Acts, Regulations, and Codes.

Learning Tasks		Content	
1	Explain the relationship between Acts, Regulations and Codes	<ul style="list-style-type: none"> • Relationship between Acts, Regulations, and Codes 	<ul style="list-style-type: none"> • Document information
2	Describe how the various Acts, Regulations, and Codes apply to the elevating industry	<ul style="list-style-type: none"> • Acts • Regulations • Codes • Scope • Reference publications • Definitions • Directives • Safety orders 	<ul style="list-style-type: none"> • Information bulletins • Legal responsibilities <ul style="list-style-type: none"> - Apprentice - Certified Elevating Devices Mechanic - Contractor - Owner • Code requirements
3	Locate information in the Acts, Regulations, and Codes	<ul style="list-style-type: none"> • Scope • Parts/sections Layout • Numbering system • Terminology • Definitions 	<ul style="list-style-type: none"> • Table of Contents • Index • Appendices • Key word search • Code requirements

Line (GAC): C Use Fundamental Skills
Competency: C6 Use Manufacturer and Supplier Documentation

Objectives

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

- Use manufacturer and supplier documentation
- Describe information contained in manufacturer and supplier documentation.
- Use the Internet to locate manufacturer's documentation.

Learning Tasks		Content	
1	Describe the purpose of documentation encountered in the elevator industry	<ul style="list-style-type: none">• Handling• Parts• Installation instructions and requirements	<ul style="list-style-type: none">• Operation and maintenance manuals• Product specifications• Warranty information
2	Use manufacturer's instructions	<ul style="list-style-type: none">• Safety• Warnings• Adjustments• Maintenance• Part identification	<ul style="list-style-type: none">• Parts replacement• Tool requirements• Procedures• Storage
3	Describe how to use the Internet to locate manufacturer's documentation	<ul style="list-style-type: none">• Manufacturer's websites	<ul style="list-style-type: none">• Search engines

Line (GAC): C Use Fundamental Skills
Competency: C7 Plan a Project

Objectives

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

- Describe how to plan and complete a small project.
- Schedule work sequence.
- Manage the basic elements of a project (time, resources, and scope).
- Plan and complete a project.

Learning Tasks		Content	
1	Describe the organization of a project	<ul style="list-style-type: none"> • Project specifications • Safety • Sequence of operations • Prioritization • Coordination with other trades • Estimating materials 	<ul style="list-style-type: none"> • Tools and equipment • Inventory requirements <ul style="list-style-type: none"> - Timing of deliveries - Storage - Labeling materials - Consumables
2	Determine the project resources	<ul style="list-style-type: none"> • People • Equipment 	<ul style="list-style-type: none"> • Materials
3	Create a detailed schedule	<ul style="list-style-type: none"> • Material delivery • Installation • Coordination with sub-trades 	<ul style="list-style-type: none"> • Time estimates • Prioritization • Assigning tasks
4	Describe considerations when planning a project	<ul style="list-style-type: none"> • Coordination of all activities • Project communications 	<ul style="list-style-type: none"> • Housekeeping • Scheduling
5	Secure approval and sign-off	<ul style="list-style-type: none"> • Inspections • Documents 	<ul style="list-style-type: none"> • Fixing deficiencies

Line (GAC): C Use Fundamental Skills
Competency: C8 Apply Troubleshooting Techniques

Objectives

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

- Describe the process of troubleshooting.
- Troubleshoot problems.

Learning Tasks		Content	
1	Describe the process of troubleshooting	<ul style="list-style-type: none"> • Personal safety • Public safety • Safe work practices <ul style="list-style-type: none"> - Jumper policy - Precautions for multiple units • Investigative techniques • Collecting information <ul style="list-style-type: none"> - Witnesses - Leaving undisturbed - Note taking - History - Compare to working system - Consult resources - Consult others 	<ul style="list-style-type: none"> • Analyze the information <ul style="list-style-type: none"> - Overall system - Mechanical or electrical • Isolating cause • Repairs • Validate the repair • Start-up procedures • Documentation
2	Troubleshoot problems	<ul style="list-style-type: none"> • Check history • Use of senses • Use of diagnostic equipment • Use of information <ul style="list-style-type: none"> - Check cause and effect relationships - Isolation 	<ul style="list-style-type: none"> • Use of procedures/ flowcharts • Consult support resources • Repair • Validate the repair • Documentation

Workplace Achievement Criteria

1. The individual will troubleshoot a system fault and document the repair.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D1 Layout Hoistways

Objectives

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

- Describe how to layout a hoistway.
- Layout a hoistway.

Learning Tasks		Content	
1	Describe how to layout a hoistway	<ul style="list-style-type: none">• Survey the hoistway• Confirm travel, pit, and overhead dimensions• Template top and bottom	<ul style="list-style-type: none">• Drop lines• Adjust top and bottom templates• Code requirements
2	Layout a hoistway	<ul style="list-style-type: none">• Planning• Tool use• Safety• Layout procedures	<ul style="list-style-type: none">• Interpreting drawings• Problem solving• Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to plan and layout a hoistway.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D2 Install Guide Rails, Guide Rail Supports, and Fastenings

Objectives

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

- Describe the components of guide rails, guide rail supports, and fastenings.
- Describe the installation of guide rails, guide rail supports, and fastenings.
- Install guide rails, guide rail supports, and fastenings.

Learning Tasks		Content	
1	Describe the components of guide rails, guide rail supports, and fastenings	<ul style="list-style-type: none"> • Rails <ul style="list-style-type: none"> - Types - Sizes • Rail clips 	<ul style="list-style-type: none"> • Fish plates • Wall and rail brackets • Saddle brackets • Hardware
2	Describe the installation of guide rails, guide rail supports, and fastenings	<ul style="list-style-type: none"> • Planning runs • Running lines • Fastening wall brackets • Installing rail brackets 	<ul style="list-style-type: none"> • Preparing rails • Installing pit steel • Installing rails • Rail alignment
3	Install guide rails, guide rail supports, and fastenings	<ul style="list-style-type: none"> • Tool use • Safety • Scaffolding 	<ul style="list-style-type: none"> • False car/temporary platform • Installation procedures • Alignment procedures

Workplace Achievement Criteria

1. The individual will install guide rails, guide rail supports, and fastenings.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D3 Install Car Frame and Counterweight Assemblies

Objectives

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

- Describe the components of car frame and counterweight assemblies.
- Describe the installation of car frame and counterweight assemblies.
- Install car frame and counterweight assemblies.

Learning Tasks		Content	
1	Describe the components of car frame and counterweight assemblies	<ul style="list-style-type: none"> • Car frame <ul style="list-style-type: none"> - Safety plank - Cross head - Styles - Car sheaves - Guides - Seismic equipment • Car platform • False platform 	<ul style="list-style-type: none"> • Counterweight assembly <ul style="list-style-type: none"> - Weight rods - Weights - Guides - Safeties - Seismic equipment • Code requirements
2	Describe the installation of car frame and counterweight assemblies	<ul style="list-style-type: none"> • Planning • Installation procedures • Counterweight assembly • Car frame assembly • Squaring and framing • Sheaves and rope hitches • Installing safety plank 	<ul style="list-style-type: none"> • Installing guide shoes and roller guides • Balance the car and counterweight • Installing aprons • Code requirements
3	Install car frames and counterweight assemblies	<ul style="list-style-type: none"> • Tool use • Safety • Scaffolding • False car/temporary platform 	<ul style="list-style-type: none"> • Installation procedures • Alignment procedures • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to build and install a car frame and counterweight assembly.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D4 Install Door Frames, Hoistway Doors, and Lock Assemblies

Objectives

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

- Describe the components of door frames, hoistway doors, and lock assemblies.
- Describe the installation of door frames, hoistway doors, and lock assemblies.
- Install door frames, hoistway doors, and lock assemblies.

Learning Tasks		Content	
1	Describe the components of door frames, hoistway doors, and lock assemblies	<ul style="list-style-type: none"> • Types • Purpose 	<ul style="list-style-type: none"> • Operation • Application
2	Describe the installation of doorframes, hoistway doors, and lock assemblies	<ul style="list-style-type: none"> • Unlocking devices • Installation procedures 	<ul style="list-style-type: none"> • Freight elevator door systems
3	Install door frames, hoistway doors, and lock assemblies	<ul style="list-style-type: none"> • Planning • Tool use • Safety • Installation procedures 	<ul style="list-style-type: none"> • Interpreting installation drawings • Alignment procedures • Testing • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install door frames, hoistway doors, and lock assemblies.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D5 Install Wiring Raceways, Fixtures, and Wiring

Objectives

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

- Describe the components of wiring raceways, fixtures, and wiring.
- Describe the installation of wiring raceways, fixtures, and wiring.
- Install wiring raceways, fixtures, and wiring.

Learning Tasks		Content	
1	Describe the components of wiring raceways, fixtures and wiring	<ul style="list-style-type: none"> • Types • Purpose 	<ul style="list-style-type: none"> • Operation • Application
2	Describe the installation of wiring raceways, fixtures, and wiring	<ul style="list-style-type: none"> • Field wiring diagrams • Wireways • Conduit Layout and fittings • Installation planning • Raceway Layout • Raceway installation • Wire 	<ul style="list-style-type: none"> • Duct sizes and number of conductors • Grounding and bonding procedures • Strain blocks and fish papers • Fixture types • Tools required • Code requirements
3	Install Wiring Raceways, Fixtures, and Wiring	<ul style="list-style-type: none"> • Planning • Tool use • Safety • Installation procedures 	<ul style="list-style-type: none"> • Interpret installation drawings • Testing • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install wiring raceways, fixtures, and wiring.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D6 Install Car Enclosure Assemblies

Objectives

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

- Describe the components of car enclosure assemblies and car door systems.
- Describe how to install car enclosure assemblies.
- Install car enclosure assemblies.

Learning Tasks		Content	
1	Describe the components of car enclosure assemblies and car door systems	<ul style="list-style-type: none"> • Types • Purpose 	<ul style="list-style-type: none"> • Operation • Application
2	Describe the installation of car enclosure assemblies	<ul style="list-style-type: none"> • Procedures • Safety • Toe guards 	<ul style="list-style-type: none"> • Static and dynamic balancing procedures • Balancing the car and counterweight
3	Describe the installation of traveling cables	<ul style="list-style-type: none"> • Types of traveling cables • Cable handling techniques 	<ul style="list-style-type: none"> • Cable installation techniques
4	Describe the installation of car door systems	<ul style="list-style-type: none"> • Types • Freight elevator door systems 	<ul style="list-style-type: none"> • Components • Procedures
5	Install car enclosure assemblies, traveling cables, and car door systems	<ul style="list-style-type: none"> • Planning • Tool use • Safety • Handling procedures 	<ul style="list-style-type: none"> • Installation procedures • Interpret installation drawings • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install car enclosure assemblies, traveling cables, and car door systems.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D7 Adjust and Commission Elevating Devices

Objectives

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

- Describe adjustments made to traction elevator systems.
- Adjust traction elevator systems.
- Describe testing and commissioning procedures.

Learning Tasks		Content	
1	Describe adjustments made to elevator systems	<ul style="list-style-type: none"> • Mechanical <ul style="list-style-type: none"> - Car - Hoistway - Machine room - Code requirements 	<ul style="list-style-type: none"> • Electrical <ul style="list-style-type: none"> - Car - Hoistway - Machine room - Controller - Code requirements
2	Adjust elevator systems	<ul style="list-style-type: none"> • Processes • Safety • Tools 	<ul style="list-style-type: none"> • Tolerances • Specifications • Code requirements
3	Describe testing and commissioning procedures	<ul style="list-style-type: none"> • Purpose of commissioning <ul style="list-style-type: none"> - Process - Pre-inspection checklist - Test runs - Documentation - Code requirements 	<ul style="list-style-type: none"> • Customer sign off

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to adjust an elevating device.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D9 Install Bi-Parting Freight Elevator Door Systems

Objectives

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

- Describe the components of freight door frames, freight gates and freight door lock assemblies.
- Describe the installation of freight door frames, freight gates and freight door lock assemblies.
- Install freight door frames, freight gates and freight door lock assemblies.

Learning Tasks		Content	
1	Describe the components of freight door frames, freight gates and freight door lock assemblies	<ul style="list-style-type: none">• Types• Purpose	<ul style="list-style-type: none">• Operation• Application
2	Describe the installation of freight door frames, freight gates and freight door lock assemblies	<ul style="list-style-type: none">• Installation procedures• Unlocking devices	<ul style="list-style-type: none">• Doors and gates
3	Install freight door frames, freight gates and freight door lock assemblies	<ul style="list-style-type: none">• Installation procedures• Unlocking devices• Freight gates• Biparting doors	<ul style="list-style-type: none">• Interpreting installation drawings• Safety• Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install freight door frames, freight gates and freight door lock assemblies.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): D Install Traction and Hydraulic Common Components
Competency: D10 Install Seismic Systems

Objectives

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

- Describe the process of installing seismic systems.
- Install seismic systems.

Learning Tasks		Content	
1	Describe the process of installing seismic systems	<ul style="list-style-type: none"> • Personal safety • Public safety • Seismic area • Housekeeping • Materials • Shut down procedures • Work procedure • Seismic sensor • Counterweight displacement sensor • Car and counterweight retainers • Additional counterweight brackets 	<ul style="list-style-type: none"> • Anti-snag gaurds • Securing of control equipment • Additional machine tie downs • Escalators • Pipe rupture valve • Adjustment procedures • Manufacturer's documentation • Engineering requirements • Verify operation • Start-up procedure • Documentation
2	Install seismic systems	<ul style="list-style-type: none"> • Procedures • Safety 	<ul style="list-style-type: none"> • Code requirements

Workplace Achievement Criteria

1. The individual will install a seismic system on and elevating device and compete the required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): E Install Traction Elevators
Competency: E1 Describe the Principles of Traction Systems

Objectives

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

- Describe the components of a traction system.
- Describe the purpose of traction system components.
- Describe the principles of a traction system.

Learning Tasks		Content	
1	Describe the major components of a traction system and their purpose	<ul style="list-style-type: none"> • Machine <ul style="list-style-type: none"> - Motor - Brakes - Gearbox • Hoist ropes • Sheaves <ul style="list-style-type: none"> - Drive - Deflector - Compensating • Safeties <ul style="list-style-type: none"> - Types 	<ul style="list-style-type: none"> • Governor • Buffers <ul style="list-style-type: none"> - Oil - Spring • Compensating chains/ropes • Car • Counterweight • Guide rails • Slipper/roller guide • Controller
2	Describe the interaction between a rope and sheave	<ul style="list-style-type: none"> • Weight of car • Weight of counterweight 	<ul style="list-style-type: none"> • Requirements for traction <ul style="list-style-type: none"> - Balance during construction - Final balance - Rope tension - Sheave types (groove/diameter) - Rope types - Sheave size with respect to rope diameter - Lubrication

Line (GAC): **E** **Install Traction Elevators**
Competency: **E2** **Install Pit Structures**

Objectives

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

- Describe the components of pit structures and their purpose.
- Describe the installation of pit structures.
- Install pit structures.

Learning Tasks		Content	
1	Describe the components of pit structures	<ul style="list-style-type: none">• Types• Purpose	<ul style="list-style-type: none">• Operation• Application
2	Describe the installation of pit structures	<ul style="list-style-type: none">• Installation procedures• Safety	<ul style="list-style-type: none">• Pit access doors• Code requirements
3	Install pit structures	<ul style="list-style-type: none">• Planning• Tool use• Safety• Handling procedures	<ul style="list-style-type: none">• Installation procedures• Interpret installation drawings• Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install a pit structure.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): E Install Traction Elevators
Competency: E3 Install Machine Room Equipment

Objectives

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

- Describe the components of machine room equipment and their purpose.
- Describe the installation of machine room equipment.
- Install machine room equipment.

Learning Tasks		Content	
1	Describe the components of machine room equipment and their purpose	<ul style="list-style-type: none"> • Types • Purpose 	<ul style="list-style-type: none"> • Operation • Application
2	Describe the installation of machine room equipment	<ul style="list-style-type: none"> • Handling and hoisting procedures • Access • Installation procedures • Positioning of secondary equipment 	<ul style="list-style-type: none"> • Governors • Safety • Rope and wireway holes • Equipment installed by others • Code requirements
3	Install machine room equipment	<ul style="list-style-type: none"> • Planning • Tool use • Safety • Handling procedures 	<ul style="list-style-type: none"> • Installation procedures <ul style="list-style-type: none"> - Machines - Controllers - Governors • Interpret installation drawings • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install machine room equipment.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): E Install Traction Elevators
Competency: E4 Install Suspension Systems

Objectives

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

- Describe the components of a suspension system.
- Describe the installation of suspension system.
- Install a suspension system.

Learning Tasks		Content	
1	Describe the components of a suspension system	<ul style="list-style-type: none">• Types• Purpose	<ul style="list-style-type: none">• Operation• Application
2	Describe the installation of a suspension system	<ul style="list-style-type: none">• Planning• Care and handling of wire rope• Inspecting rope/belt for defects• Rope types• Belt types• Characteristics of wire rope• Roping ratios	<ul style="list-style-type: none">• Installing wire rope• Installing compensating means• Rope termination• Rope equalization• Lubrication• Safety• Code requirements
3	Install suspension systems	<ul style="list-style-type: none">• Planning• Tool use• Safety• Handling procedures	<ul style="list-style-type: none">• Installation procedures• Interpret installation drawings• Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install a suspension system.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): F Install Hydraulic Elevators
Competency: F1 Describe the Principles of Hydraulic Systems

Objectives

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

- Describe the components of a hydraulic system.
- Describe the purpose of hydraulic system components.
- Describe the principles of hydraulic systems.

Learning Tasks		Content	
1	Describe the components of hydraulic systems	<ul style="list-style-type: none"> • Purpose • Pumps <ul style="list-style-type: none"> - Positive displacement screw pump • Jack assemblies 	<ul style="list-style-type: none"> • Tank • Pipes and flexible hose • Control valves • Safety devices
2	Describe the principles of operation of hydraulic systems	<ul style="list-style-type: none"> • Advantages of using hydraulics • Types of hydraulic systems 	<ul style="list-style-type: none"> • Properties of hydraulic fluids

Line (GAC): F Install Hydraulic Elevators
Competency: F2 Install Pit Structures, Jacks, and Suspension Systems

Objectives

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

- Describe the components of pit structures, jacks, and suspension systems.
- Describe the installation of pit structures, jacks, and suspension systems.
- Install pit structures, jacks, and suspension systems.

Learning Tasks		Content	
1	Describe the components of pit structures, jacks, and suspension systems	<ul style="list-style-type: none"> • Types • Purpose • Operation • Application 	<ul style="list-style-type: none"> • Protection of components <ul style="list-style-type: none"> - Passive and active cathodic protection - PVC protection
2	Describe the installation of pit structures, jacks, and suspension systems	<ul style="list-style-type: none"> • Planning • Installation procedures • Safety 	<ul style="list-style-type: none"> • Jacks <ul style="list-style-type: none"> - In-ground jack units - Above-ground jack units - Multiple jack arrangements - Roped hydraulics - Alignment procedures for jack units • Suspension systems • Code requirements
3	Install pit structures, jacks, and suspension systems	<ul style="list-style-type: none"> • Planning • Tool use • Safety • Handling procedures 	<ul style="list-style-type: none"> • Installation procedures • Interpret installation drawings • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install pit structures, jacks and suspension systems.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): F Install Hydraulic Elevators
Competency: F3 Install Machine Room Equipment

Objectives

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

- Describe the components of machine room equipment.
- Describe the installation of machine room equipment.
- Install machine room equipment.

Learning Tasks		Content	
1	Describe the components of machine room equipment	<ul style="list-style-type: none">• Types• Purpose	<ul style="list-style-type: none">• Operation• Application
2	Describe the installation of machine room equipment	<ul style="list-style-type: none">• Handling and hoisting procedures• Access• Installation procedures• Safety	<ul style="list-style-type: none">• Wireway holes• Equipment installed by others• Environmental considerations• Code requirements
3	Install machine room equipment	<ul style="list-style-type: none">• Planning• Tool use• Safety• Handling procedures	<ul style="list-style-type: none">• Installation procedures• Interpret installation drawings• Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install machine room equipment.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): F Install Hydraulic Elevators
Competency: F4 Install the Hydraulic Piping System

Objectives

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

- Describe the components of hydraulic piping systems.
- Describe the installation of hydraulic piping systems.
- Install hydraulic piping systems.

Learning Tasks		Content	
1	Describe the components of hydraulic piping systems	<ul style="list-style-type: none">• Types• Purpose	<ul style="list-style-type: none">• Operation• Application
2	Describe the installation of hydraulic piping systems	<ul style="list-style-type: none">• Planning• Installation procedures• Connections and fittings• Safety components	<ul style="list-style-type: none">• Safety• Environmental considerations• Code requirements
3	Install hydraulic piping systems	<ul style="list-style-type: none">• Planning• Tool use• Safety• Handling procedures• Installation procedures	<ul style="list-style-type: none">• Interpret installation drawings• Communication with the general contractor• Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install a hydraulic piping system.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G1 Describe the Principles of Electricity

Objectives

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

- Describe the principles of electrical safety.
- Describe the structure of matter.
- Describe the principles of DC circuits.
- Describe the principles of AC circuits.
- Describe the principles of magnetism and electromagnetism.
- Describe the principles of electrical measurement.

Learning Tasks		Content	
1	Describe the principles of electrical safety	<ul style="list-style-type: none"> • Tag and lockout procedures • Hazards from stored electrical energy and other sources 	<ul style="list-style-type: none"> • Testing for presence of electricity • Use of jumpers
2	Describe the principles of electricity in relation to the structure of matter	<ul style="list-style-type: none"> • Atomic structure of matter <ul style="list-style-type: none"> - Free electrons - Sources of electricity - Describe nature of electricity - Static electricity 	
3	Describe the principles of direct current electrical circuits	<ul style="list-style-type: none"> • Terminology <ul style="list-style-type: none"> - Direct current - Voltage <ul style="list-style-type: none"> • Electro Motive Force (EMF) • Potential Difference (PD) - Current - Resistance - Ohm's law - Power - Watt's law • Symbols • Electrical circuits <ul style="list-style-type: none"> - Series circuits - Parallel circuits - Series/parallel circuits - Kirchhoff's laws - Power and heat loss 	<ul style="list-style-type: none"> • Electrical components <ul style="list-style-type: none"> - Resistors <ul style="list-style-type: none"> • Types • Series parallel • Colour coding • Ratings - Potentiometers/rheostats - Capacitors <ul style="list-style-type: none"> • Types • Series parallel • Colour coding • Ratings • Timing circuits • Uses - Diodes <ul style="list-style-type: none"> • Types identification • Uses • Capacities • Series/parallel • Measurement

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G1 Describe the Principles of Electricity (continued)

Learning Tasks		Content	
4	Describe voltage, current and resistance measurements	<ul style="list-style-type: none"> • Precautions <ul style="list-style-type: none"> - Switching from ohmmeter to voltage and amperage scales - Moisture - Preventing electrical shock • Measure AC and DC voltage and amperage <ul style="list-style-type: none"> - Analog meters - Digital meters 	<ul style="list-style-type: none"> • Measure resistance <ul style="list-style-type: none"> - Ohmmeter - Multi-meter - Meggar
5	Describe the principles of permanent magnetism	<ul style="list-style-type: none"> • Properties of permanent magnets • Action of magnetic poles 	<ul style="list-style-type: none"> • Magnetic fields • Magnetic properties
6	Describe the principles of electromagnetism	<ul style="list-style-type: none"> • Properties of electromagnets • Action of magnetic fields around a conductor • Principles of induced voltage 	<ul style="list-style-type: none"> • Factors that affect induced voltage • Lenz's law
7	Describe the principles of alternating current electrical circuits	<ul style="list-style-type: none"> • Terminology • Symbols • RMS value of voltage and current • Inductance 	<ul style="list-style-type: none"> • Capacitance • Impedance • AC power • Rectifiers
8	Describe the operation of transformers	<ul style="list-style-type: none"> • Mutual induction • Construction • Turns ratio • Voltage changing 	<ul style="list-style-type: none"> • Ratings • Types • Autotransformer • Isolation
9	Describe three-phase systems	<ul style="list-style-type: none"> • Supplies • Transformer connections 	<ul style="list-style-type: none"> • Loads
10	Apply the principles of electricity to elevating devices	<ul style="list-style-type: none"> • Installation • Testing 	<ul style="list-style-type: none"> • Code requirements

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G2 Read Electrical Drawings and Specifications

Objectives

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

- Describe the purpose of wiring and schematic diagrams.
- Use wiring and schematic diagrams.
- Convert between wiring and schematic diagrams.

Learning Tasks		Content	
1	Identify common drawing symbols	<ul style="list-style-type: none"> • Components • Line weights 	<ul style="list-style-type: none"> • Conventions • Labels
2	Describe the conventions used for schematic diagrams	<ul style="list-style-type: none"> • Use of lines • Arrangement of components 	<ul style="list-style-type: none"> • Labels and identifications • Road map
3	Describe the conventions used for field wiring diagrams	<ul style="list-style-type: none"> • Use of lines • Arrangement of components 	<ul style="list-style-type: none"> • Labels and identifications
4	Describe the conventions used for single-line (block) diagrams	<ul style="list-style-type: none"> • Use of lines • Arrangement of components 	<ul style="list-style-type: none"> • Labels and identifications
5	Use diagrams to convey information	<ul style="list-style-type: none"> • Schematic • Wiring 	<ul style="list-style-type: none"> • Care and handling • As built drawings
6	Convert between schematic and field wiring diagrams	<ul style="list-style-type: none"> • Diagram layouts 	<ul style="list-style-type: none"> • Wiring diagrams
7	Interpret information with respect to power requirements	<ul style="list-style-type: none"> • Elevating device power requirements <ul style="list-style-type: none"> - Voltage - Amperage - Disconnect 	

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G3 Describe the Operation of Motors and Generators

Objectives

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

- Describe the operating principles of DC generators.
- Describe the operating principles of DC electric motors.
- Describe the operating principles of AC electric motors.

Learning Tasks		Content	
1	Describe the operating principles of DC generators	<ul style="list-style-type: none"> • Components • Principles of operation • Voltage output waveform 	<ul style="list-style-type: none"> • Commutation • Characteristics of DC generators
2	Describe the operating principles of DC electric motors	<ul style="list-style-type: none"> • Components • Principles of operation 	<ul style="list-style-type: none"> • Commutation • Characteristics of DC motors
3	Describe the operating principles of AC electric motors	<ul style="list-style-type: none"> • Types • Components • Principles of operation 	<ul style="list-style-type: none"> • Characteristics of AC motors • Direction of rotation

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G4 Describe Electrical and Electronic Controls (Level 2)

Objectives

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

- Describe electrical control devices.
- Describe semiconductor power devices.
- Describe the operation of rectifiers and power supplies.
- Describe operational amplifiers and their applications.
- Describe digital logic devices and applications.
- Describe the operation of programmable relays and PLC's.
- Describe the operation of motor controls.

Learning Tasks		Content	
1	Describe electrical control devices	<ul style="list-style-type: none"> • Types <ul style="list-style-type: none"> - Switches - Relays/contactors - Solenoids - Timers - Circuit protection devices 	<ul style="list-style-type: none"> • Symbols • Operation • Characteristics/ratings • Handling precautions • Testing • Applications
2	Describe semiconductor power devices	<ul style="list-style-type: none"> • Types <ul style="list-style-type: none"> - Diodes - Zener diodes - Photo diodes - Light emitting diodes - Varistors - Transistors <ul style="list-style-type: none"> • BJT's • FET's • IGBT's - Thyristors <ul style="list-style-type: none"> • SCR's • Triacs 	<ul style="list-style-type: none"> • Symbols • Operation • Characteristics/ratings • Packaging • Handling precautions • Testing • Applications
3	Describe the operation of rectifiers and power supplies	<ul style="list-style-type: none"> • Purpose • Types <ul style="list-style-type: none"> - Half-wave - Full-wave - Three-phase - Filters - Regulators 	<ul style="list-style-type: none"> • Operation • Characteristics/ratings • Packaging • Handling precautions • Testing • Applications
4	Describe operational amplifiers and their applications	<ul style="list-style-type: none"> • Purpose • Operation • Characteristics/ratings • Packaging 	<ul style="list-style-type: none"> • Handling precautions • Testing • Applications

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G4 Describe Electrical and Electronic Controls (Level 2) (continued)

Learning Tasks		Content	
5	Describe digital logic devices and their applications	<ul style="list-style-type: none"> • Numbering systems • Types <ul style="list-style-type: none"> - Gates - Flip-flops - Registers - Memory - Counters - Timers - Microprocessors 	<ul style="list-style-type: none"> • Operation • Characteristics/ratings • Packaging • Handling precautions • Testing • Applications
6	Describe the operation and programming of programmable relays and PLC's	<ul style="list-style-type: none"> • Features • Operation • Characteristics/ratings 	<ul style="list-style-type: none"> • Packaging • Handling precautions • Testing
7	Describe motor drives	<ul style="list-style-type: none"> • DC drives <ul style="list-style-type: none"> - Ward-Leonard - Pulse width modulation - SCR drives - IGBT drives • AC drives <ul style="list-style-type: none"> - Single speed AC motors - Two speed AC motors - VVVF drives - Inverter drives (open loop/closed loop) - Regenerative drives - Soft starts 	<ul style="list-style-type: none"> • Encoders • Tachometers • Features • Operation • Characteristics/ratings • Packaging • Handling precautions • Testing • Maintenance

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G5 Install Electrical Systems

Objectives

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

- Describe the installation of conductors.
- Describe the installation of raceways.
- Describe the installation of traveling cables.
- Describe the installation of elevator related circuits.
- Install raceways, conductors, and components.

Learning Tasks		Content	
1	Describe the installation of conductors	<ul style="list-style-type: none"> • Types • Materials • Gauge • Insulation (thermal rating) 	<ul style="list-style-type: none"> • Ampacity • Termination • Marking
2	Describe the installation of raceways	<ul style="list-style-type: none"> • Types • Sizes • Support • Bending 	<ul style="list-style-type: none"> • Planning runs • Raceway fill • Installation of conductors
3	Describe the installation of traveling cables	<ul style="list-style-type: none"> • Construction • Handling • Preparation 	<ul style="list-style-type: none"> • Installation • Replacement • Protection
4	Describe elevator related circuits	<ul style="list-style-type: none"> • Electrical protective devices • Operation systems <ul style="list-style-type: none"> - Door operation - Direction selection - Acceleration - Deceleration - Final stop 	<ul style="list-style-type: none"> • Safety circuit components • Interlocks • Normal terminal slow downs • Emergency terminal slow downs • Redundancy • Fire service and emergency power
5	Install raceways, conductors and components	<ul style="list-style-type: none"> • Raceway runs • Placement of boxes, fittings and supports • Number of conductors in runs • Conductor insulation rating and size 	<ul style="list-style-type: none"> • Raceway size • Box and fitting sizes • Devices and switches • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install a wiring raceway.
2. The individual will interpret drawings and specifications to install a fixture.
3. The individual will extract information from a wiring diagram to install wiring.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G6 Maintain Electrical and Electronic Systems (Level 2)

Objectives

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

- Perform maintenance checks.
- Describe the maintenance of motors and generators.
- Maintain motors and generators.

Learning Tasks		Content	
1	Perform maintenance checks	<ul style="list-style-type: none"> • Checks <ul style="list-style-type: none"> - Insulation condition - Termination tightness - Contacts - Heat - Interlocks - Verification of correct components - Brushes and commutator - Verification of voltage levels - Grounding - Verification of inspection controls - Verification of safety circuits - Emergency lights - Communication equipment - Verification of fire service and emergency power - Battery replacements 	<ul style="list-style-type: none"> • Cleaning <ul style="list-style-type: none"> - Filters - Fans • Lubrication • Maintain logs • Code requirements
2	Describe the maintenance of motors and generators	<ul style="list-style-type: none"> • Brushes • Commutator • Lubrication • Bearings • Compounding 	<ul style="list-style-type: none"> • Replacement • Testing for grounds • Cleaning • Safety practices
3	Maintain motors and generators	<ul style="list-style-type: none"> • Equipment • Procedures • Safety 	<ul style="list-style-type: none"> • Environmental considerations • Manufacturer's specifications

Workplace Achievement Criteria

1. The individual will use maintenance procedures/check sheets to maintain an electrical system.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): G Apply the Principles of Electricity and Electronics
Competency: G7 Troubleshoot Electrical and Electronic Systems (Level 2)

Objectives

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

- Describe troubleshooting of electrical and electronic systems.
- Troubleshoot Electrical and Electronic Systems.
- Describe troubleshooting techniques for DC machines.
- Describe troubleshooting techniques for AC machines.
- Troubleshoot motors and generators.

Learning Tasks		Content	
1	Describe troubleshooting of electrical and electronic systems	<ul style="list-style-type: none"> • Use of drawings and other resources • Use of test equipment • Tracing techniques • Analyzing information • Rule out possibilities to narrow the focus • Isolating the cause 	<ul style="list-style-type: none"> • Flow charts • Use of senses • History • Repair • Validate the repair
2	Troubleshoot electrical and electronic systems	<ul style="list-style-type: none"> • Procedure • Resources 	<ul style="list-style-type: none"> • Repair • Test
3	Describe troubleshooting techniques for DC machines	<ul style="list-style-type: none"> • Commutation problems • Shorted windings • Grounded windings • Wiring and connections • Contactors 	<ul style="list-style-type: none"> • Overloads • Over current devices • Field circuit faults • Loop circuit faults
4	Describe troubleshooting techniques for AC machines	<ul style="list-style-type: none"> • Loss of phase • Shorted windings • Grounded windings • Open rotor bars 	<ul style="list-style-type: none"> • Wiring and connections • Contactors • Overloads • Over current devices
5	Troubleshoot motors.	<ul style="list-style-type: none"> • Procedures • Equipment 	<ul style="list-style-type: none"> • Safety

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to troubleshoot an electrical or electronic fault and test for proper operation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): **G** **Apply the Principles of Electricity and Electronics**
Competency: **G8** **Adjust Door Operators**

Objectives

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

- Describe the operation of door operators.
- Adjust door operators.

Learning Tasks		Content	
1	Describe the types of door operators	<ul style="list-style-type: none">• Motor fields• Permanent magnet	<ul style="list-style-type: none">• Closed loop• Two-speed
2	Describe the control function of door operators	<ul style="list-style-type: none">• Open• Close	<ul style="list-style-type: none">• Timers• Door protection
3	Describe belts and mechanical advantage of operations	<ul style="list-style-type: none">• Belts• Arms	<ul style="list-style-type: none">• Skates
4	Adjust door operators	<ul style="list-style-type: none">• Manufacturer's specifications	<ul style="list-style-type: none">• Procedures

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to adjust a door operator.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): H **Install Escalators and Moving Walks**
Competency: H1 **Describe the Principles of Escalators and Moving Walks**

Objectives

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

- Describe the major components of an escalator and moving walk.
- Describe the operating principles and safety considerations of escalators and moving walks.

Learning Tasks		Content	
1	Describe the major components of an escalator and moving walk and their functions	<ul style="list-style-type: none">• Components• Purpose• Functions	<ul style="list-style-type: none">• Operation• Applications
2	Describe the operating principles and safety considerations of escalators and moving walks	<ul style="list-style-type: none">• Operating principles• Drive mechanisms• Safety considerations	<ul style="list-style-type: none">• Moving belts• Code requirements

Line (GAC): H Install Escalators and Moving Walks
Competency: H2 Install and Align Truss Assemblies

Objectives

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

- Describe how to layout an escalator and moving walk.
- Layout wellways.
- Install and align truss assemblies.

Learning Tasks		Content	
1	Describe the procedures for laying out a wellway	<ul style="list-style-type: none"> • Storage space • Equipment delivery • Plan the installation <ul style="list-style-type: none"> - Visual inspection of site area - Check <ul style="list-style-type: none"> • Location • Size of wells • Bearing surfaces • Accessibility • Readiness to receive the units • Scheduling details 	<ul style="list-style-type: none"> • Communication • Safety • Hoisting and rigging <ul style="list-style-type: none"> - Equipment - Procedures • Code requirements
2	Layout wellways; install and align truss assemblies	<ul style="list-style-type: none"> • Public safety • Rigging procedures • Layout procedures 	<ul style="list-style-type: none"> • Installation procedures • Safety • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to layout a wellway and install and align a truss assembly.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): H Install Escalators and Moving Walks
Competency: H3 Install Balustrades and Decking

Objectives

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

- Describe the installation of balustrades and decking.
- Install balustrades and decking.

Learning Tasks		Content	
1	Describe the installation of balustrades	<ul style="list-style-type: none"> • Components • Types • Handling 	<ul style="list-style-type: none"> • Procedures <ul style="list-style-type: none"> - Fitting - Securing • Alignment • Safety • Code requirements
2	Describe the installation of skirting and decking	<ul style="list-style-type: none"> • Components • Types • Handling 	<ul style="list-style-type: none"> • Procedures <ul style="list-style-type: none"> - Aligning and fastening • Butt joints and clearances • Safety • Code requirements
3	Describe the installation of newels and tracks	<ul style="list-style-type: none"> • Components • Types • Handling 	<ul style="list-style-type: none"> • Procedures <ul style="list-style-type: none"> - Fitting - Securing • Alignment • Safety • Code requirements
4	Describe the installation of handrails and guide assemblies	<ul style="list-style-type: none"> • Components • Types • Handling 	<ul style="list-style-type: none"> • Procedures <ul style="list-style-type: none"> - Fitting - Securing • Alignment • Safety • Code requirements
5	Install balustrades and decking	<ul style="list-style-type: none"> • Planning • Tool use • Safety • Handling procedures 	<ul style="list-style-type: none"> • Installation procedures • Extraction of information from documentation • Code requirements

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to install balustrades and decking.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): H Install Escalators and Moving Walks
Competency: H4 Adjust and Commission Escalators and Moving Walks

Objectives

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

- Describe the adjustments made to escalator and moving walk systems.
- Adjust escalator and moving walk systems.
- Describe testing and commissioning procedures.

Learning Tasks		Content
1	Describe the adjustments made to escalator and moving walk systems	<ul style="list-style-type: none">• Mechanical• Electrical• Safety• Safety
2	Adjust escalator and moving walk systems	<ul style="list-style-type: none">• Processes• Safety• Tools• Tolerances• Specifications• Code requirements
3	Describe testing and commissioning procedures	<ul style="list-style-type: none">• Purpose• Process<ul style="list-style-type: none">- Pre-inspection checklist- Test run- Verification of code required functions- Documentation• Customer sign off

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to adjust an escalator or moving walk system.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): H Install Escalators and Moving Walks
Competency: H5 Maintain Escalators and Moving Walks

Objectives

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

- Describe the maintenance procedures for escalators and moving walks.
- Maintain escalators and moving walks.

Learning Tasks		Content	
1	Describe the maintenance procedures for escalators and moving walks	<ul style="list-style-type: none"> • Personal safety • Public safety • Public relations • Maintenance tasks <ul style="list-style-type: none"> - Mandatory - Company specific • Housekeeping • Safeties • Step maintenance • Balustrades and decking maintenance <ul style="list-style-type: none"> - Combs 	<ul style="list-style-type: none"> • Maintenance <ul style="list-style-type: none"> - Truss - Chain - Machine - Control equipment - Handrail and drive - Tension carriage • Environmental considerations • Code requirements
2	Maintain escalators and moving walks	<ul style="list-style-type: none"> • Procedures 	<ul style="list-style-type: none"> • Safety

Workplace Achievement Criteria

1. The individual will extract information from documentation to carry out routine maintenance procedures on the specified equipment.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): H **Install Escalators and Moving Walks**
Competency: H6 **Repair Escalators and Moving Walks**

Objectives

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

- Describe procedures to repair escalators and moving walks.
- Repair escalators and moving walks.

Learning Tasks		Content	
1	Describe procedures to repair escalators and moving walks	<ul style="list-style-type: none"> • Personal safety • Public safety • Materials • Shut down procedures • Work procedures • Rigging and hoisting • Manufacturer's documentation • Repairs <ul style="list-style-type: none"> - Step and pallet - Balustrade and decking - Truss - Handrail drive - Machine - Control system 	<ul style="list-style-type: none"> • Chain replacement • Handrail replacement • Testing requirements • Clean up • Verify operation • Environmental considerations • Start-up procedures • Documentation
2	Repair escalators and moving walks	<ul style="list-style-type: none"> • Procedures 	<ul style="list-style-type: none"> • Safety

Workplace Achievement Criteria

1. The individual will interpret drawings and specifications to carry out routine repairs on the specified equipment.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): I Describe the Application of Specialty Lifts
Competency: I1 Describe the Application of Lifts for Persons with Physical Disabilities

Objectives

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

- Describe the application of lifts for persons with physical disabilities.

Learning Tasks		Content	
1	Describe the application of lifts for persons with physical disabilities	<ul style="list-style-type: none"> • Types <ul style="list-style-type: none"> - Vertical lifts - Inclined lifts - Stair lifts 	<ul style="list-style-type: none"> • Purpose • Operation • Safety • Site conditions/environment • Code requirements

Line (GAC): I Describe the Application of Specialty Lifts
Competency: I2 Describe the Application of Other Specialty Lifts

Objectives

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

- Describe the application of stage lifts.
- Describe the application of dumbwaiters and material lifts.
- Describe the application of inclined elevators.
- Describe the application of limited usage/limited application (LU/LA) elevators.

Learning Tasks		Content	
1	Describe the application of stage lifts	<ul style="list-style-type: none"> • Purpose • Types • Operation 	<ul style="list-style-type: none"> • Applications • Safety • Code requirements
2	Describe the application of dumbwaiters and material lifts	<ul style="list-style-type: none"> • Purpose • Types • Operation 	<ul style="list-style-type: none"> • Applications • Safety • Code requirements
3	Describe the application of inclined elevators	<ul style="list-style-type: none"> • Purpose • Types • Operation 	<ul style="list-style-type: none"> • Applications • Safety • Code requirements
4	Describe the application of limited usage/limited application (LU/LA) elevators	<ul style="list-style-type: none"> • Purpose • Types • Operation 	<ul style="list-style-type: none"> • Applications • Safety • Code requirements

Line (GAC): J Maintain Elevating Systems
Competency: J1 Maintain Public Safety

Objectives

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

- Describe how to maintain public safety.
- Maintain public safety.

Learning Tasks		Content	
1	Describe how to maintain public safety	<ul style="list-style-type: none"> • Notifications • Signs • Securing the work area • Tools and materials • Jumper policy • Communication • Company policies • Shutdown and start-up procedures 	<ul style="list-style-type: none"> • Incident reports • Safety <ul style="list-style-type: none"> - Accident prevention - Responsibilities <ul style="list-style-type: none"> • Owner • Contractor • Employee - Requirements <ul style="list-style-type: none"> • WorkSafeBC • BCSA
2	Maintain public safety	<ul style="list-style-type: none"> • Procedures 	<ul style="list-style-type: none"> • Safety

Line (GAC): J Maintain Elevating Systems
Competency: J2 Apply Requirements for Mandatory Maintenance

Objectives

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

- Describe mandatory maintenance requirements.
- Apply requirements for mandatory maintenance.

Learning Tasks		Content	
1	Describe mandatory maintenance requirements	<ul style="list-style-type: none">• Code requirements• Monthly requirement• Annual requirements• Relief pressure• Two year requirement (drum machines)	<ul style="list-style-type: none">• Five year requirements• Governor pull on/pull through• Procedures• Testing• Maintain log book
2	Apply requirements for mandatory maintenance	<ul style="list-style-type: none">• Code requirements	<ul style="list-style-type: none">• Log book

Workplace Achievement Criteria

1. The individual will follow code testing procedures to demonstrate how to comply with the monthly maintenance requirements for an elevating device.
2. The individual will follow code testing procedures to demonstrate how to comply with the mandatory maintenance requirements for an elevating device.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): J Maintain Elevating Systems
Competency: J3 Evacuate Trapped Passengers

Objectives

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

- Describe how to evacuate trapped passengers.
- Evacuate trapped passengers.

Learning Tasks		Content	
1	Describe how to evacuate trapped passengers	<ul style="list-style-type: none">• Work procedures• Company procedures• Personal safety• Verifying passengers are trapped• Communications with trapped passengers• Returning elevator service	<ul style="list-style-type: none">• Emergency response procedures (911)<ul style="list-style-type: none">- Fire- Medical- Police assistance- Top of car extrication procedures• Hazards when extricating passengers• Documentation procedures
2	Evacuate Trapped Passengers	<ul style="list-style-type: none">• Procedures	<ul style="list-style-type: none">• Safety

Workplace Achievement Criteria

1. The individual will follow written procedures to extricate a passenger from a simulated elevator entrapment and complete the required documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): J Maintain Elevating Systems
Competency: J4 Maintain Hoistways

Objectives

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

- Describe the maintenance of hoistways.
- Maintain hoistways.

Learning Tasks		Content	
1	Describe the maintenance of hoistways	<ul style="list-style-type: none">• Personal safety• Public safety• Hazards• Wire rope maintenance• Suspension means maintenance• Hall door maintenance• Traveling cable maintenance• Sheave maintenance	<ul style="list-style-type: none">• Counterweight• Pit equipment maintenance• Hydraulic equipment• Mandatory maintenance tasks• Company specific maintenance tasks• Housekeeping• Environmental concerns
2	Maintain hoistways	<ul style="list-style-type: none">• Procedures	<ul style="list-style-type: none">• Safety
3	Apply safe work practices	<ul style="list-style-type: none">• Car-top access• Pit access	<ul style="list-style-type: none">• Hazards

Workplace Achievement Criteria

1. The individual will follow maintenance procedures to carry out routine maintenance on a hoistway and complete the required documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): J Maintain Elevating Systems
Competency: J5 Maintain Machine Rooms or Control Spaces

Objectives

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

- Describe the maintenance of machine rooms or control spaces.
- Maintain machine rooms or control spaces.

Learning Tasks		Content	
1	Describe the maintenance of machine rooms or control spaces	<ul style="list-style-type: none"> • Personal safety • Public safety • Motor and generator maintenance • Drive machine maintenance <ul style="list-style-type: none"> - Drive sheaves - Brakes • Hydraulic equipment maintenance <ul style="list-style-type: none"> - Oil monitoring requirements • Governor maintenance 	<ul style="list-style-type: none"> • Safety device maintenance • Control equipment maintenance • Selector maintenance • Mandatory maintenance tasks • Company specific maintenance tasks • Housekeeping • Environmental concerns
2	Maintain machine rooms or control spaces	<ul style="list-style-type: none"> • Procedures • Safety 	<ul style="list-style-type: none"> • Code requirements

Workplace Achievement Criteria

1. The individual will carry out routine maintenance on a machine room or control space and complete the required documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): J Maintain Elevating Systems
Competency: J6 Maintain Car Enclosures

Objectives

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

- Describe the maintenance of car enclosures.
- Maintain car enclosures.

Learning Tasks		Content	
1	Describe the maintenance of car enclosures	<ul style="list-style-type: none">• Personal safety• Public safety• Door operation<ul style="list-style-type: none">- Safety devices• Retiring cams• Car door and gates• Car operating panel and fixtures• Car interior• Car top maintenance• Car top inspection station	<ul style="list-style-type: none">• Car guide maintenance• Mandatory maintenance tasks• Company specific maintenance tasks• Housekeeping• Levelling devices• Load weighing devices• Safeties• Traveling cable, compensating chain, and rope attachments
2	Maintain car enclosures	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will carry out routine maintenance on a car enclosure and complete the required documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): J Maintain Elevating Systems
Competency: J7 Maintain Elevating Device Cabs, Carriages, and Platforms

Objectives

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

- Describe the maintenance of elevating device cabs.
- Maintain an elevating device cab.
- Describe the maintenance of carriage and platforms.
- Maintain carriages and platforms.

Learning Tasks		Content	
1	Describe the maintenance of elevating device cabs	<ul style="list-style-type: none"> • Personal safety • Public safety • Retiring cams • Car operating panel and fixtures • Car interior • Car top maintenance • Car guide maintenance • Mandatory maintenance tasks 	<ul style="list-style-type: none"> • Company specific maintenance tasks • Housekeeping • Levelling devices • Safeties • Traveling cable • Suspension attachments
2	Maintain elevating device cabs	<ul style="list-style-type: none"> • Procedures 	<ul style="list-style-type: none"> • Safety
3	Describe the maintenance of carriages and platforms	<ul style="list-style-type: none"> • Personal safety • Public safety • Operating panel and fixtures • Platforms • Seats • Carriages • Mandatory maintenance tasks 	<ul style="list-style-type: none"> • Company specific maintenance tasks • Housekeeping • Levelling devices • Safeties • Traveling cable • Suspension attachments
4	Maintain carriages and platforms	<ul style="list-style-type: none"> • Procedures 	<ul style="list-style-type: none"> • Safety

Workplace Achievement Criteria

1. The individual will plan and carry out the routine maintenance procedures for an elevating device cab.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): K Repair Elevating Systems
Competency: K1 Re-rope Elevators

Objectives

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

- Describe the process for re-roping elevators.
- Re-rope an elevator.

Learning Tasks		Content	
1	Describe the process for re-roping elevators	<ul style="list-style-type: none">• Personal safety• Public safety• Communication procedures• Site preparation• Materials• Work procedures• Equipment rating versus load• Hoisting equipment pre-checks	<ul style="list-style-type: none">• Rope handling• Run-by considerations• Rope stretch considerations• Rope installation• Rope equalization• Clean up• Verifying installation• Code requirements
2	Re-rope elevators	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will re-rope an elevator and complete the required documentation on a minimum of three different elevators.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): K Repair Elevating Systems
Competency: K2 Service Braking Systems

Objectives

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

- Describe how to service braking systems.
- Service braking systems.

Learning Tasks		Content	
1	Describe how to service braking systems	<ul style="list-style-type: none">• Personal safety• Public safety• Material• Shut down procedures• Work procedures• Manufacturer's documentation• Main brake procedures• Emergency brake procedures	<ul style="list-style-type: none">• Testing requirements• Clean up• Verify operation• Environmental considerations• Start-up procedures• Documentation• Code requirements
2	Service Braking Systems	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will service the brakes, test and verify operation and complete required documentation on a minimum of three different elevators.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): K Repair Elevating Systems
Competency: K3 Repair Machines, Motors, or Generators

Objectives

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

- Describe the repair of machines, motors, and generators.
- Repair machines, motors, and generators.

Learning Tasks		Content	
1	Describe the repair of machines, motors, and generators	<ul style="list-style-type: none"> • Personal safety • Public safety • Materials • Shut down procedures. • Work procedures • Rigging and hoisting • Machines <ul style="list-style-type: none"> - Thrust bearing replacement - Worm removal/replacement - Ring gear removal/replacement - Ring gear bearing replacement - Drive sheave replacement 	<ul style="list-style-type: none"> • Main motor <ul style="list-style-type: none"> - Removal - Bearing replacement - Re-installation/alignment • Motor generator set <ul style="list-style-type: none"> - Removing armature - Bearing replacement • Manufacturers documentation • Clean up • Verifying operation • Environmental considerations • Start-up procedures • Documentation
2	Repair machines, motors, and generators	<ul style="list-style-type: none"> • Procedures 	<ul style="list-style-type: none"> • Safety

Workplace Achievement Criteria

1. The individual will replace a bearing on a machine, motor, or generator and complete the required documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): K Repair Elevating Systems
Competency: K4 Repair Hydraulic Systems

Objectives

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

- Describe how to repair hydraulic systems.
- Repair hydraulic systems.

Learning Tasks		Content	
1	Describe how to repair hydraulic systems	<ul style="list-style-type: none"> • Personal safety • Public safety • Barricades • Materials • Shut down procedures • Work procedures • Rigging and hoisting • Shoring • Manufacturer's documentation • Valve repair/replacement • Motor repair/replacement 	<ul style="list-style-type: none"> • Pump repair/replacement • Jack unit packing replacement • Piping seal replacement (victaulic) • Oil replacement • Testing requirements • Clean up • Verifying operation • Environmental considerations • Start-up procedures • Documentation
2	Repair hydraulic systems	<ul style="list-style-type: none"> • Procedures • Safety 	<ul style="list-style-type: none"> • Code requirements

Workplace Achievement Criteria

1. The individual will replace the packing on a hydraulic jack and complete required documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): K Repair Elevating Systems
Competency: K5 Repair Door Systems

Objectives

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

- Describe repairs to door systems.
- Repair door systems.

Learning Tasks		Content	
1	Describe repairs to door systems	<ul style="list-style-type: none"> • Personal safety • Public safety • Materials • Shut down procedures • Work procedures • Car door <ul style="list-style-type: none"> - Hanger roller replacement - Door guide replacement - Gate switch - Safety edge - Door operator - Door restrictors - Door replacement - Alignment 	<ul style="list-style-type: none"> • Hall doors <ul style="list-style-type: none"> - Hanger roller replacement - Door guide replacement - Interlock assembly - Closer replacement - Door replacement - Alignment • Freight doors • Swing doors • Manufacturer's documentation • Verify operation • Start-up procedures • Documentation
2	Repair door systems	<ul style="list-style-type: none"> • Procedures 	<ul style="list-style-type: none"> • Safety

Workplace Achievement Criteria

1. The individual will replace a hall or car door hanger roller and complete required documentation on a minimum of three different elevators.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L **Alter Elevating Systems**
Competency: L1 **Upgrade Door Systems**

Objectives

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

- Describe the process for upgrading door systems.
- Upgrade door systems.

Learning Tasks		Content	
1	Describe the process for upgrading door systems	<ul style="list-style-type: none">• Personal safety• Public safety• Housekeeping• Materials• Shut down procedures• Work procedures• Car door<ul style="list-style-type: none">- Door operator- Clutch- Car door gate switch- Safety edge- Restrictor- Door guide	<ul style="list-style-type: none">• Hall doors<ul style="list-style-type: none">- Closers- Interlock assembly- Secondary retainers- Door guide• Freight doors<ul style="list-style-type: none">- Power- Manual- Gate- Safety edges• Manufacturer's documentation• Verify operation• Start-up procedures• Documentation
2	Upgrade door systems	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will upgrade a door system and complete required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L **Alter Elevating Systems**
Competency: L2 **Replace Machines**

Objectives

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

- Describe the process for replacing machines.
- Replace machines.

Learning Tasks		Content	
1	Describe the process for replacing machines	<ul style="list-style-type: none">• Personal safety• Public safety• Housekeeping• Materials• Shut down procedures• Work procedures• Machine replacement• Motor replacement	<ul style="list-style-type: none">• Isolation• Rigging / hoisting• Alignment procedures• Manufacturer's documentation• Engineering requirements• Verify operation• Start-up procedure• Documentation
2	Replace machines	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will carry out the replacement of a machine and complete required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L Alter Elevating Systems
Competency: L3 Upgrade Controllers and Drives

Objectives

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

- Describe the process of upgrading controllers and drives.
- Upgrade controllers and drives.

Learning Tasks		Content	
1	Describe the process of upgrading controllers and drives	<ul style="list-style-type: none">• Personal safety• Public safety• Housekeeping• Materials• Shut down procedures• Work procedures• Temporary interface• Raceway and wiring• Transformers	<ul style="list-style-type: none">• Rigging / hoisting• Adjustment procedures• Manufacturer's documentation• Engineering requirements• Verify operation• Environmental considerations• Start-up procedure• Documentation
2	Upgrade controllers and drives	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will carry out upgrades to a minimum of three separate controllers and complete required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L **Alter Elevating Systems**
Competency: L4 **Replace Governors and Safeties**

Objectives

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

- Describe the process of replacing governors and safeties.
- Replace governors and safeties.

Learning Tasks		Content	
1	Describe the process of replacing governors and safeties	<ul style="list-style-type: none">• Personal safety• Public safety• Housekeeping• Materials• Shut down procedures• Work procedures• Governor• Governor tension sheave	<ul style="list-style-type: none">• Governor rope• Safeties• Adjustment procedures• Manufacturer's documentation• Engineering requirements• Verifying operation• Start-up procedure• Documentation
2	Replace governors and safeties	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will carry out the replacement of a minimum of three governors and safeties and complete required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L Alter Elevating Systems
Competency: L5 Perform Seismic Upgrading

Objectives

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

- Describe the process of performing seismic upgrading.
- Perform seismic upgrading.

Learning Tasks		Content	
1	Describe the process of performing seismic upgrading	<ul style="list-style-type: none"> • Personal safety • Public safety • Seismic area • Housekeeping • Materials • Shut down procedures • Work procedures • Rope retainers • Seismic sensor • Counterweight displacement sensor • Car and counterweight retainers 	<ul style="list-style-type: none"> • Additional counterweight brackets • Securing of control equipment • Additional machine tie downs • Escalators • Pipe rupture valve • Adjustment procedures • Manufacturer's documentation • Engineering requirements • Verify operation • Start-up procedure • Documentation
2	Perform seismic upgrading	<ul style="list-style-type: none"> • Procedures • Safety 	<ul style="list-style-type: none"> • Code requirements

Workplace Achievement Criteria

1. The individual will carry out seismic upgrades to an elevating device and complete required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L Alter Elevating Systems
Competency: L6 Upgrade Car Enclosures

Objectives

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

- Describe how to upgrade car enclosures.
- Upgrade car enclosure.

Learning Tasks		Content	
1	Describe how to upgrade car enclosures	<ul style="list-style-type: none"> • Personal safety • Public safety • Housekeeping • Materials • Shut down procedures • Work procedures • Types of materials used <ul style="list-style-type: none"> - Fire ratings • Common modifications • Ventilation • Role of sub-contractor <ul style="list-style-type: none"> - Communication 	<ul style="list-style-type: none"> • Checking car and counterweight mass <ul style="list-style-type: none"> - Sheave shaft load considerations - Balancing the counterweight • Adjustment procedures • Accessibility requirements • Manufacturer's documentation • Engineering requirements • Verify operation • Start-up procedure • Documentation
2	Upgrade car enclosures	<ul style="list-style-type: none"> • Procedures • Safety 	<ul style="list-style-type: none"> • Code requirements

Workplace Achievement Criteria

1. The individual will carry out upgrades to a car enclosure and complete required documentation and testing.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L **Alter Elevating Systems**
Competency: L7 **Upgrade Fixtures**

Objectives

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

- Describe how to upgrade fixtures.
- Upgrade fixtures.

Learning Tasks		Content	
1	Describe how to upgrade fixtures	<ul style="list-style-type: none">• Personal safety• Public safety• Housekeeping• Verifying correct material• Shut down procedures• Types• Work procedures• Installation procedures	<ul style="list-style-type: none">• Accessibility requirements• Interfacing to existing systems• Tagging of existing wires• Wiring methods• Manufacturer's documentation• Engineering requirements• Verify operation• Start-up procedure• Documentation
2	Upgrade fixtures	<ul style="list-style-type: none">• Procedures	<ul style="list-style-type: none">• Safety

Workplace Achievement Criteria

1. The individual will carry out upgrades to a car operating panel and complete required documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L **Alter Elevating Systems**
Competency: L8 **Replace Jacks**

Objectives

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

- Describe how to replace jacks.
- Replace jacks.

Learning Tasks		Content	
1	Describe how to replace jacks	<ul style="list-style-type: none">• Personal safety• Public safety• Housekeeping• Verifying correct materials• Shut down procedures• Work procedures• Jack assembly components• Multi-section jacks• Rigging / hoisting• Removal of concrete• Removal of soil• Contamination• Ground water ingress• Well hole collapse	<ul style="list-style-type: none">• Survey well hole<ul style="list-style-type: none">- Plumb- Depth- Diameter• PVC system• Cathodic system• Welding requirements• Installation procedure• Adjustment procedures• Manufacturer's documentation• Engineering requirements• Environmental considerations• Verifying operation• Start-up procedure• Documentation
2	Replace jacks	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will replace a minimum of three jack units and complete required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L Alter Elevating Systems
Competency: L9 Upgrade Hydraulic Systems

Objectives

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

- Describe how to upgrade hydraulic systems.
- Upgrade hydraulic systems.

Learning Tasks		Content	
1	Describe how to upgrade hydraulic systems	<ul style="list-style-type: none"> • Personal safety • Public safety • Housekeeping • Verifying correct material • Shut down procedures • Work procedures • Types of equipment <ul style="list-style-type: none"> - Valve - Pump unit - Piping - Over-speed valve - Pressure switch - Scavenger pump - Muffler - Electric motors - Life jacket 	<ul style="list-style-type: none"> • Adjustment procedures • Manufacturer's documentation • Engineering requirements • Environmental considerations • Verify operation • Start-up procedure • Documentation
2	Upgrade hydraulic systems	<ul style="list-style-type: none"> • Procedures • Safety 	<ul style="list-style-type: none"> • Code requirements

Workplace Achievement Criteria

1. The individual will carry out upgrades to an elevator hydraulic system and complete required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.

Line (GAC): L Alter Elevating Systems
Competency: L10 Install Emergency Braking Systems

Objectives

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

- Describe the installation of emergency braking systems.
- Install emergency braking systems.

Learning Tasks		Content	
1	Describe the installation of emergency braking systems	<ul style="list-style-type: none">• Personal safety• Public safety• Housekeeping• Verifying correct material• Shut down procedures• Work procedures• Engineered drawings• Types of systems<ul style="list-style-type: none">- Sheave brake- Sheave jammer- Rope brake- Life jacket- Escalator brakes	<ul style="list-style-type: none">• Adjustment procedures• Manufacturer's documentation• Engineering requirements• Verify operation• Start-up procedure• Documentation
2	Install emergency braking systems	<ul style="list-style-type: none">• Procedures• Safety	<ul style="list-style-type: none">• Code requirements

Workplace Achievement Criteria

1. The individual will carry out upgrades to an emergency braking system on an elevating device and complete required testing and documentation.

Passport sign-off by a Certified Mechanic for each workplace achievement criteria is required.



Section 4: Training Provider Standards

FACILITY REQUIREMENTS

Classroom Area

- Minimum 22 square feet per student
- Comfortable seating and tables suitable for learning
- Compliance with the local and national fire code and occupational safety requirements
- Meets applicable municipal zoning bylaws for technical instruction and education facilities
- Overhead and multimedia projectors with a projection screen
- Whiteboard with marking pens and erasers
- Lighting controls to allow easy visibility of the projection screen while allowing students to take notes
- Windows must have shades or blinds to adjust sunlight
- Heating/air conditioning for comfort all year round
- Acoustics in the room must allow audibility of the instructor

Shop Area

- Minimum 3,000 square feet of shop area including a tool crib and work stations
- Minimum 10 foot ceiling height in shop areas
- Minimum 8 foot ceiling in lab areas
- Adequate heating, lighting and ventilation
- Refuse and recycling bins for used shop materials
- First-aid equipment
- Shops will support practical requirements as outlined in the program outline

LAB REQUIREMENTS

Student Facilities

- Adequate eating area as per WorkSafeBC requirements (4.84 OHS Regulation and Guidelines)
- Adequate washroom facilities as per WorkSafeBC requirements (4.85 OHS Regulation and Guidelines)
- Personal storage lockers

Instructor's Office Space

- Adequate office space for student consultation
- Desk and filing space
- Computer
- Internet access
- Printer
- Adequate storage facilities for material and training aids
- Access to photocopier
- Telephone

TOOLS AND EQUIPMENT

HAND TOOLS

Alignment bar	Knife	Scrapers	
Bench vice	Knock out set	Screwdrivers (complete set)	
Breaker bar	Levels	Security screwdrivers	
Broom and dust pan	Lubrication tools	Snips	
Burrs	Lunar key (unlocking key)	Suction cups for lifting	
Calculator	Pliers: <ul style="list-style-type: none">• Crimpers• Linesman• Locking• Needle nose• Side cutters• Wire strippers• Snap ring• Water pump (slip joint)	Square	
C-clamp		Tap and die set	
Chisels		Thread chaser	
Dollies		Thread files	
EMT benders		Torque wrenches	
Files		Wrenches: <ul style="list-style-type: none">• Adjustable• Allen• Box end• Combination• Crows foot• Hook spanner• Open end• Pipe• Socket set• Strap	
Flashlight			
Gear pullers			
Hammers: <ul style="list-style-type: none">• Ball peen• Claw• Mallet• Sledge• Soft-faced mallet			Plumb bob
			Pry bars
			Punch
			Riveting tools
		Roller	
Handcart	Saws: <ul style="list-style-type: none">• Hacksaw• Hand saw (wood)		
Helicoil			
Hex Keys (set)			

POWER HAND TOOLS

Angle drill	Drill bits	Lighting equipment
Angle grinder	Electric impact driver	Piping and threading equipment
Blower	Extension cords	Reciprocating saw
Concrete drill	Grinder	Soldering iron
Drill and cordless drills: <ul style="list-style-type: none"> • Electric • Cordless 	Hole saw	Vacuum cleaner
	Hydraulic jacks	
	Hydraulic press	

LIFTING EQUIPMENT

A-Frames	Eye bolts	Nylon lifting straps
Beam clamps	Fibre rope	Pinch bar
Beam trolley	Fibre slings	Scaffolding
Block and tackle	Hand winches	Shackles (varying sizes)
Bridles	Hoist rings	Spreader bar
Chain hoists	Hooks	Tirfors
Chain slings	Hydraulic jack	Tripods
Come-a-longs	Jacks	Wire rope
Engine hoists	Ladders	Wire slings

PERSONAL PROTECTIVE EQUIPMENT

Coveralls	Fire extinguisher	Reflective vest
Ear muffs	First aid kit	Respirators
Ear plugs	Glasses	Safety boots
Electrical gloves	Goggles	Safety harness, lanyard and life line
Eye wash kit	Gloves	Welding gloves
Face shield	Hard hat	Welding mask
Fire blanket	Lock out equipment	

CUTTING AND JOINING EQUIPMENT

Copper tube cutter	Gas cylinders	Tube bender
Crimpers	Mechanical crimper	Tube cutter
Flaring tools	Oxy-acetylene cutting equipment	

REFERENCE MATERIALS

This section contains a summary of the important Codes, Regulations and Acts that apply to each competency in the Program Outline.

REFERENCES

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Toronto: Canadian Standards Association

Canadian Standards Association. (2001).

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Elevator World Inc. (2010).

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www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/13_101_2004

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Retrieved December 7, 2010 from

www2.WorkSafeBC.com/Publications/OHSRegulation/Home.asp

WorkSafeBC. *Workers Compensation Act.*

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ABBREVIATIONS USED IN CITING REFERENCES

FE	Field Employee's Handbook
OHS	Occupational Health and Safety
WCA	Workers Compensation Act
WSBC	WorkSafeBC

LINE A: USE SAFE WORK PRACTICES

A1: Control Workplace Hazards

- WCA Part 3, Division 3, Section 115 – 117
 - General Duties of Employers, Workers and Others
- OHS Regulation Part 5, Section 5.2
 - General Information Requirement
- OHS Regulation Part 6, Section 6.6
 - Assessment and Classification
- OHS Regulation Part 6, Section 6.8
 - Procedures
- FE Safety Handbook, Section 4.2 – 4.4
 - Fall Arrest
- FE Safety Handbook, Section 7
 - Lockout and Tagout

A2: Comply with the OHS Regulation and WorkSafeBC Standards

- WCA Part 3, Division 3, Section 115 – 117
 - General Duties of Employers, Workers and Others
- WCA Part 1, Division 5, Section 53
 - Worker Notification of Injury

A3: Use WHMIS

- Hazardous Products Act (Canada)
- WSBC Guideline G5.3-1
 - WHMIS Application

A4: Use Personal Protective Equipment

- OHS Regulation Part 8
 - Personal Protective Equipment and Clothing
- FE Safety Handbook, Section 3
 - Personal Protective Equipment

A5: Apply Fire Prevention Practices

- OHS Regulation Part 4, Section 4.32
 - Access to Work Area
- WSBC Guideline G5.97
 - Emergency Plan
- WSBC Guideline G5.99
 - Risk Assessment

LINE B: USE TOOLS AND EQUIPMENT

B1: Use Hand Tools

- FE Safety Handbook, Section 9.1
 - Hand Tools

B2: Use Power Tools

- FE Safety Handbook, Section 9.2
 - Portable Electrical Tools and Lights

B3: Use Measuring and Alignment Tools

- None

B5: Use Ladders, Scaffolding, and Platforms

- FE Safety Handbook, Section 10
 - Portable Ladders/Scaffolds/ Stationary Work Platforms
- OHS Regulation Part 13, Division 2 – 4
 - Ladders, Scaffolds and Temporary Work Platforms

B6: Use Rigging and Hoisting Equipment

- FE Safety Handbook, Section 12
 - Material Handling
- OHS Regulation Part 15
 - Rigging

B7: Use Electrical Test Equipment

- FE Safety Handbook, Section 5
 - Electrical Safety

B8: Use False Cars

- FE Safety Handbook, Section 11.3
 - False Cars and Other Devices
- B44 Section 5.10
 - Elevator Use for Construction

LINE C: USE FUNDAMENTAL SKILLS

C1: Describe the Elevating Device Industry

- None

C2: Use Mathematics and Science (Level 2)

- None

C3: Apply Mechanical Principles

- None

C4: Read Drawings and Specifications

- None

C5: Use Acts, Regulations, and Codes

- Safety Standards Act General Regulations
- Elevating Devices Safety Regulation
- Applicable codes

C6: Use Manufacturer and Supplier Documentation

- None

C7: Plan a Project

- None

C8: Apply Troubleshooting Techniques

- None

LINE D: INSTALL TRACTION AND HYDRAULIC COMMON COMPONENTS

D1: Layout Hoistways

- None

D2: Install Guide Rails, Guide Rail Supports, and Fastenings

- B44 Section 2.23
 - Guide Rail Support and Fastenings

D3: Install Car Frame and Counterweight Assemblies

- B44 Section 2.15
 - Car Frames and Platforms
- B44 Section 2.21
 - Counterweights

D4: Install Door Frames, Hoistway Doors, and Lock Assemblies

- B44 Section 2.11.1.1
 - Hoistway Landing Entrances
- B44 Section 2.12
 - Hoistway Door Unlocking Devices

D5: Install Wiring Raceways, Fixtures, and Wiring

- B44 Section 2.8.2.1 (CSA – C22.1)
 - Electrical Equipment and Wiring

D6: Install Car Enclosure Assemblies

- B44 Section 2.14
 - Car Enclosures

D7: Adjust and Commission Elevating Devices

- B44 Section 8.10
 - Acceptance, Inspection and Test

D9: Install Bi-Parting Freight Elevator Door Systems

- B44 Section 2.13, 3.4
 - Vertically Sliding Car Door or Gate

D10: Seismic Upgrades

- B44 Section 8.4
 - Elevating Safety Requirements for Seismic Zones Two or Greater

LINE E: INSTALL TRACTION ELEVATORS

E1: Describe the Principles of Traction Systems

- None

E2: Install Pit Structures

- B44 Section 2.2 – Pits

E3: Install Machine Room Equipment

- B44 Section 2.7 – 2.9
 - Machinery Spaces, Control Spaces and Control Room

E4: Install Suspension Systems

- B44 Section 2.20
 - Suspension Ropes and Their Connections

LINE F: INSTALL HYDRAULIC ELEVATORS

F1: Describe the Principles of Hydraulic Systems

- None

F2: Install Pit Structures, Jacks, and Suspension Systems

- B44 Section 3.18
 - Hydraulic Jacks

F3: Install Machine Room Equipment

- B44 Section 3.7
 - Machine Room Equipment

F4: Install the Hydraulic Piping System

- B44 Section 3.19
 - Valves, Pressure Piping and Fittings

LINE G: APPLY THE PRINCIPLES OF ELECTRICITY AND ELECTRONICS

G1: Describe the Principles of Electricity

- B44 Section 8.6.1.3
 - Electrical Safety
- FE Safety Handbook, Section 5
 - Electrical Safety

G2: Read Electrical Drawings and Specifications

- None

G3: Describe the Operation of Motors and Generators

- None

G4: Describe Electrical and Electronic Controls (Level 2)

- None

G5: Install Electrical Systems

- CEC Section 38
 - Elevating Devices

G6: Maintain Electrical and Electronic Systems (Level 2)

- B44 Section 8.6.12.2.5
 - Log Book

G7: Troubleshoot Electrical and Electronic Systems (Level 2)

- None

G8: Adjust Door Operators

- None

LINE H: INSTALL ESCALATORS AND MOVING WALKS

H1: Describe the Principles of Escalators and Moving Walks

- B44 Section 6.1 – 6.2
 - Escalators and Moving Walks

H2: Install and Align Truss Assemblies

- FE Safety Handbook, Section 12
 - Material Handling

H3: Install Balustrades and Decking

- B44 Section 6.1 – 6.2
 - Escalators and Moving Walks

H4: Adjust and Commission Escalators and Moving Walks

- B44 Section 8.11.4
 - Periodic Inspection and Test

H5: Maintain Escalators and Moving Walks

- B44.2
 - Maintenance Requirements and Intervals for Elevators, Dumbwaiters, Escalators, and Moving Walks

H6: Repair Escalators and Moving Walks

- B44 Section 6.1 – 6.2
 - Escalators and Moving Walks
- FE Safety Handbook, Section 12
 - Material Handling

LINE I: DESCRIBE THE APPLICATION OF SPECIALTY LIFTS

I1: Describe the Application of Lifts for Persons with Physical Disabilities

- B355

I2: Describe the Application of Other Specialty Lifts

- B44 Section 5
 - Special Application Elevators

LINE J: MAINTAIN ELEVATING SYSTEMS

J1: Maintain Public Safety

- None

J2: Apply Requirements for Mandatory Maintenance

- B44 Section 8.6
 - Maintenance, Repair and Replacement
- B44.2

J3: Evacuate Trapped Passengers

- None

J4: Maintain Hoistways

- None

J5: Maintain Machine Rooms or Control Spaces

- B44 Section 3.24.2.2
 - Oil Level Indicator

J6: Maintain Car Enclosures

- CEC Section 38
- B44.2

J7: Maintain Elevating Device Cabs, Carriages, and Platforms

- B44.2

LINE K: REPAIR ELEVATING SYSTEMS

K1: Re-rope Elevators

- B44 Section 2.20
 - Suspension Ropes and Their Connections

K2: Service Braking Systems

- B44.2

K3: Repair Machines, Motors, or Generators

- None

K4: Repair Hydraulic Systems

- B44 Section 4.2 – Valve Replacement

K5: Repair Door Systems

- None

LINE L: ALTER ELEVATING SYSTEMS

L1: Upgrade Door Systems

- B44 Section 8.7
 - Alterations
- B44 Section 2.12.1 – 2.12.6
 - Mechanical Lock Alterations
- B44 Section 8.7.2.10.1 – 8.7.2.10.5
 - Power Operation of Hoistway Doors

L2: Replacee Machines

- B44 Section 8.7.2.25.1
 - Alterations to Driving Machines

L3: Upgrade Controllers and Drives

- B44 Section 8.7.2.27.4
 - Controllers
- B44 Section 8.7.2.27.5
 - Drive Alterations

L4: Replace Governors and Safeties

- B44 Section 8.7.3.15
 - Alterations – Safeties
- B44 Section 8.7.3.16
 - Alterations Governors / Governor Ropes

L5: Perform Seismic Upgrading

- B44 Section 8.4
 - Seismic Requirements
- B44 Section 8.5
 - Escalator and Moving Walk Seismic Requirements

L6: Upgrade Car Enclosures

- B44 Section 8.7.2.15.2
 - Increase in Deadweight of Car
- B44 Section 8.7.3.13
 - Car Enclosures

L7: Upgrade Fixtures

- None

L8: Replace Jacks

- B44 Section 8.7.3.23
 - Hydraulic Equipment

L9: Upgrade Hydraulic Systems

- B44 Section 8.7.3.24
 - Valves, Pressure Piping and Fittings

L10: Install Emergency Braking Systems

- B44 Section 8.7.5.9.2
 - Ascending Car Overspeed and Unintended Car Movement Protection

INSTRUCTOR REQUIREMENTS

Occupation Qualification

The instructor must possess one of the following:

- A BC Certificate of Qualification, or
- A Certificate of Qualification from another Canadian jurisdiction

Work Experience

The instructor must possess:

- A minimum of 5 years' experience working in the industry as a journeyperson

Instructional Experience and Education

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

- An Instructor Program Diploma, or equivalent
- A Bachelor's Degree in Education
- A Master's Degree in Education



Appendix A:

Training Topics and Suggested Time Allocation by Level / Year

ELEVATING DEVICES MECHANIC (CLASS A) - PREREQUISITES

Line A	Use Safe Work Practices	Hours	% of Total
A1	Control Workplace Hazards	4	
A2	Comply with the OHS Regulation and WorkSafeBC Standards	4	
A3	Use WHMIS	3	
A4	Use Personal Protective Equipment	4	
A5	Apply Fire Prevention Practices	1	
	Total Line A	16	2%

Line B	Use Tools and Equipment	Hours	% of Total
B1	Use Hand Tools	1	
B2	Use Power Tools	2	
B3	Use Measuring and Alignment Tools	1	
B5	Use Ladders, Scaffolding, and Platforms	4	
	Total Line B	8	1%

TOTAL PREREQUISITES	24	3%
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ELEVATING DEVICES MECHANIC (CLASS A) – LEVEL 1

Line B	Use Tools and Equipment	Hours	% of Total
B6	Use Rigging and Hoisting Equipment	12	
B8	Use False Cars	4	
	Total Line B	16	2%

Line C	Use Fundamental Skills	Hours	% of Total
C1	Describe the Elevating Industry	2	
C2	Use Mathematics and Science	12	
C3	Apply Mechanical Principles	16	
C4	Read Drawings and Specifications	8	
C5	Use Acts, Regulations, and Codes	12	
	Total Line C	50	7%

Line D	Install Traction and Hydraulic Common Components	Hours	% of Total
D1	Layout Hoistways	12	
D2	Install Guide Rails, Guide Rail Supports, and Fastenings	16	
D3	Install Car Frame and Counterweight Assemblies	16	
	Total Line D	44	6%

Line E	Install Traction Elevators	Hours	% of Total
E1	Describe the Principles of Traction Systems	16	
E2	Install Pit Structures	16	
E3	Install Machine Room Equipment	24	
	Total Line E	56	7%

Line F	Install Hydraulic Elevators	Hours	% of Total
F1	Describe the Principles of Hydraulic Systems	20	
	Total Line F	20	3%

TOTAL FOR LEVEL 1	186	25%
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ELEVATING DEVICES MECHANIC (CLASS A) – LEVEL 2

Line C	Use Fundamental Skills	Hours	% of Total
C6	User Manufacturer and Supplier Documentation	4	
C7	Plan a Project	8	
	Total Line C	12	2%

Line D	Install Traction Elevators	Hours	% of Total
D4	Install Door Frames, Hoistway Doors, and Lock Assemblies	16	
D5	Install Wiring Raceways, Fixtures, and Wiring	16	
D6	Install Car Enclosure Assemblies	16	
D9	Install Bi-Parting Freight Elevator Door Systems	8	
D10	Install Seismic Systems	8	
	Total Line D	64	8%

Line E	Install Traction Elevators	Hours	% of Total
E4	Install Suspension Systems	24	
	Total Line E	24	3%

Line F	Install Hydraulic Elevators	Hours	% of Total
F2	Install Pit Structures, Jacks, and Suspension Systems	20	
F3	Install Machine Room Equipment	12	
F4	Install the Hydraulic Piping System	12	
	Total Line F	44	6%

TOTAL FOR LEVEL 2	144	19%
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ELEVATING DEVICES MECHANIC (CLASS A) – LEVEL 3

Line B	Use Tools and Equipment	Hours	% of Total
B7	Use Electrical Test Equipment	4	
	Total Line B	4	1%

Line C	Use Fundamental Skills	Hours	% of Total
C8	Apply Troubleshooting Techniques	8	
	Total Line C	8	1%

Line G	Apply the Principles of Electricity and Electronics	Hours	% of Total
G1	Describe the Principles of Electricity	34	
G2	Read Electrical Drawings and Specifications	16	
G4	Describe Electrical and Electronic Controls	32	
G5	Install Electrical Systems	16	
G6	Maintain Electrical and Electronic Systems	16	
G7	Troubleshoot Electrical and Electronic Systems	16	
G8	Adjust Door Operators	16	
	Total Line G	146	19%

Line I	Describe the Application of Specialty Lifts	Hours	% of Total
I1	Describe the Application of Lifts for Persons with Physical Disabilities	8	
I2	Describe the Application of Other Specialty Lifts	8	
	Total Line I	16	2%

TOTAL FOR LEVEL 3	174	22%
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ELEVATING DEVICES MECHANIC (CLASS A) – LEVEL 4

Line D	Install Traction and Hydraulic Common Components	Hours	% of Total
D7	Adjust and Commission Elevating Devices	12	
	Total Line D	12	2%

Line G	Apply the Principles of Electricity and Electronics	Hours	% of Total
G3	Describe the Operation of Motors and Generators	16	
	Total Line G	16	2%

Line H	Install Escalators and Moving Walks	Hours	% of Total
H1	Describe the Principle of Escalators and Moving Walks	4	
H2	Install and Align Truss Assemblies	12	
H3	Install Balustrades and Decking	4	
H4	Adjust and Commission Escalators and Moving Walks	4	
H5	Maintain Escalators and Moving Walks	4	
H6	Repair Escalators and Moving Walks	4	
	Total Line H	32	4%

Line J	Maintain Elevating Systems	Hours	% of Total
J1	Maintain Public Safety	8	
J2	Apply Requirements for Mandatory Maintenance	12	
J3	Evacuate Trapped Passengers	4	
J4	Maintain Hoistways	16	
J5	Maintain Machine Rooms or Control Spaces	16	
J6	Maintain Car Enclosures	4	
J7	Maintain Elevating Device Cabs, Carriages, and Platforms	4	
	Total Line J	64	8%

Line K	Repair Elevating Systems	Hours	% of Total
K1	Re-rope Elevators	12	
K2	Service Braking Systems	16	
K3	Repair Machines, Motors, or Generators	16	
K4	Repair Hydraulic Systems	12	
K5	Repair Door Systems	12	
	Total Line K	68	9%

Line L	Alter Elevating Systems	Hours	% of Total
L1	Upgrade Door Systems	4	
L2	Replace Machines	4	
L3	Upgrade Controllers and Drives	4	
L4	Replace Governors and Safeties	4	
L5	Perform Seismic Upgrading	4	
L6	Upgrade Car Enclosures	4	
L7	Upgrade Fixtures	2	
L8	Replace Jacks	8	
L9	Upgrade Hydraulic Systems	4	
L10	Install Emergency Braking Systems	4	
	Total Line L	42	6%

TOTAL HOURS FOR LEVEL 4	234	31%
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GRAND TOTAL	762	100%
Minus safety prerequisite	24	

TOTAL IN-CLASS HOURS	738	
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Do it right. Stay safe.



The BC Safety Authority is an independent, self-funded organization mandated to oversee the safe installation and operation of technical systems and equipment.

In addition to issuing permits, licences and certificates we work with industry to reduce safety risks through assessment, education and outreach, enforcement, and research.

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