



NOVA SCOTIA
APPRENTICESHIP
AGENCY

NOVA SCOTIA

CURRICULUM STANDARD

ELEVATING DEVICE MECHANIC

Based on National Harmonization
Recommendations

Atlantic Apprenticeship Curriculum Standard

Elevating Device Mechanic

Preface

This Nova Scotia Curriculum Standard (NSCS) is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the apprenticeship program.

This NSCS contains all the technical training elements required to complete the apprenticeship program and has been developed based on the 2020 Nova Scotia Occupational Standard (NSOS) for the trade.

Implementation of the NSCS for Apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	2021-2022
Level 2	2022-2023
Level 3	2023-2024
Level 4	2024-2025

The above implementation schedule was current at time of publication.

Granting of credit or permission to challenge level examinations (if applicable) for pre-apprenticeship training for this trade will be based on the content outlined in this standard. Training providers must contact the Nova Scotia Apprenticeship Agency for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program.

Acknowledgements

The Nova Scotia Apprenticeship Agency (Agency) wishes to acknowledge the contributions of trade advisory committee members, tradespersons, industry establishments, professional associations, labour organizations, training providers, government departments and agencies, and all others who contributed to this publication.

Special thanks are offered to the following representatives who contributed greatly to the original draft of the standard and provided expert advice throughout its development.

Andrew Gilby
Marty Jollimore

CKG Elevator
CKG Elevator

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User Guide

Nova Scotia Curriculum Standards (NSCS) are developed based on Red Seal Occupational Standards (RSOS) or Nova Scotia Occupational Standards (NSOS) and industry consultation. This document represents the minimum content to be delivered as part of the apprenticeship program for this trade.

The NSCS documents are purposefully constructed for ease of use and flexibility of structure to adapt to all delivery requirements. They detail units of training, unit outcomes and objectives. They do not impose a delivery model or teaching format.

Training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The NSCS does not dictate study materials, textbooks or learning activities to be used in delivery.

Structure

The content of the NSCS is divided into units, and it contains a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another. Unit codes are used to identify, not to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Units may be delivered one at a time or concurrently within a level; all outcomes must be met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, “Demonstrate knowledge of...” acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

The Occupational Standard (OS) to Curriculum Comparison chart maps the OS trade skills/sub-tasks to the curriculum standard. Each unit of training in the curriculum standard lists both theoretical and practical objectives, which represent the minimum content that must be covered during technical training. Detailed content/bulleted lists for each objective have not been developed. Where detail is required for clarity, content has been provided.

The practical objectives represent the tasks/skills that apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum standard as a practical objective or not. As well, each unit provides suggested hours (a guide only), which can be adjusted for apprentice learning, delivery methods, practical/hands-on learning, examinations, registration, holidays, storm days, etc.

Glossary of Terms

These definitions are intended as a guide to how language is used in the document.

ADJUST	To put in good working order; regulate; bring to a proper state or position.
APPLICATION	The use to which something is put and/or the circumstance in which an individual would use it.
CHARACTERISTIC	A feature that helps to identify, tell apart or describe recognizably; a distinguishing mark or trait.
COMPONENT	A part that can be separated from or attached to a system; a segment or unit.
DEFINE	To state the meaning of (a word, phrase, etc.).
DESCRIBE	To give a verbal account of; tell about in detail.
EXPLAIN	To make plain or clear; illustrate; rationalize.
IDENTIFY	To point out or name objectives or types.
INTERPRET	To translate information from observation, charts, tables, graphs and written material.
MAINTAIN	To keep in a condition of good repair or efficiency.
METHOD	A means or manner of doing something that has procedures attached to it.
OPERATE	How an object works; to control or direct the functioning of.
PROCEDURE	A prescribed series of steps taken to accomplish an end.
PURPOSE	The reason for which something exists or is done, made or used.

Glossary of Terms (continued)

SERVICE	<p>Routine inspection and replacement of worn or deteriorating parts.</p> <p>An act or business function provided to a customer in the course of an individual's profession (e.g., haircut).</p>
TECHNIQUE	<p>Within a procedure, the manner in which technical skills are applied.</p>
TEST	<p>v. To subject to a procedure that ascertains effectiveness, value, proper function or other quality.</p> <p>n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.</p>
TROUBLESHOOT	<p>To follow a systematic procedure to identify and locate a problem or malfunction and its cause.</p>

Essential Skills Profiles

Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Essential Skills Profiles describe how workers in various occupations use each of the key essential skills. They include:

- a brief description of the occupation;
- examples of tasks that illustrate how each essential skill is applied; and,
- complexity ratings that indicate the level of difficulty of the example tasks.

Essential Skills profiles can be found on the Employment and Social Development Canada (ESDC) website at <https://www.canada.ca/en/services/jobs/training/initiatives/skills-success/tools.html>

The development and improvement of these Essential Skills is inherent throughout the apprenticeship training program as apprentices work towards achieving journey person status.

Level Structure

Level 1, 7 Weeks (210 hrs)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
EDM-100	Safety	12	12	1. Perform a lock-out, tag-out procedure. 2. Conduct a workplace hazard assessment.
EDM-105	Tools and Equipment	6	15	1. Use basic tools and equipment.
EDM-110	Intro to Elevating Devices	27	17	
EDM-115	Measuring and Layout	9	19	1. Read and interpret measurements. 2. Take inside and outside measurements.
EDM-120	Rigging, Hoisting/Lifting and Moving	12	22	1. Tie basic knots. 2. Rig and lift a load.
EDM-125	Ladders, Scaffolding and Work Platforms	9	25	
EDM-130	Fasteners and Retainers	6	27	
EDM-135	Bearings and Power Transmission Components	9	30	
EDM-140	Mechanical Drawings	18	33	
EDM-145	Basic Hydraulics	18	37	
EDM-150	Basic Electricity	60	40	
EDM-155	Introduction to B44 and B355 Code Books	9	44	1. Locate and interpret info from the CSA B44 & B355 code books.
EDM-160	General Maintenance	9	46	
EDM-165	Communication	3	48	
EDM-170	Workplace Mentoring I	3	51	

Level 2, 6 Weeks (180 hrs) for Class A; 7 Weeks (210 hrs) for Class B

Code	Unit Title	Hrs*	Pg	Practical Objectives*
EDM-200	Barrier-Free Lifts	20	54	
EDM-205	Hydraulic Elevator Installation	20	56	
EDM-210	AC Motors, Drives and Controls	20	59	
EDM-215	Solid State Electronics	60	62	
EDM-220	Circuit Tracing	60	67	
EDM-225	Workplace Mentoring II (Class B)	6	70	
EDM-230	Program Review (Class B)	24	72	

Level Structure (continued)

Level 3, 7 Weeks (210 hrs)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
EDM-300	Work Platforms and False Cars	12	75	
EDM-305	Traction Elevator Installation	78	77	
EDM-310	Elevator Hydraulic System Maintenance	36	84	
EDM-315	DC Motors, Generators, Controls and Drives	30	87	
EDM-320	Electricity for Elevating Devices	54	91	1. Read and interpret electrical schematic diagrams.

Level 4, 5 Weeks (150 hrs)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
EDM-400	Workplace Mentoring II (Class A)	6	97	
EDM-405	Escalators and Moving Walkways Installation	15	99	
EDM-410	Preventive Maintenance	12	102	
EDM-415	CSA B44 Section C.8.6.12 and Appendix J	3	104	
EDM-420	Elevator Machine Room Equipment Maintenance	36	106	
EDM-425	Elevator Car Equipment Maintenance	12	110	
EDM-430	Elevator Hoistway and Pit Equipment Maintenance	12	113	
EDM-435	Escalators and Moving Walkways Maintenance	9	116	
EDM-440	Elevator Modernization/Alterations	15	119	
EDM-445	Program Review (Class A)	30	121	

***Hours:** The time it should take to cover the unit (a guide only).

***Practical Objectives:** The tasks/skills apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum as a practical objective or not.

Level 1

7 Weeks (210 hours)

EDM-100 Safety

Learning Outcomes:

- Demonstrate knowledge of personal protection equipment (PPE) and safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of maintaining a safe work environment.
- Demonstrate knowledge of regulatory requirements pertaining to workplace safety.
- Demonstrate knowledge of procedures to lock-out, tag-out and isolate equipment.

Nova Scotia Occupational Standard Reference Class A

- 1.01 Uses personal protective equipment (PPE) and safety equipment
- 1.02 Maintains a safe worksite
- 1.03 Performs lock-out/tag-out and zero-energy state procedures
- 1.04 Performs access and egress procedures
- 1.05 Protects the environment

Nova Scotia Occupational Standard Reference Class B

- 1.01 Uses personal protective equipment (PPE) and safety equipment
- 1.02 Maintains a safe worksite
- 1.03 Performs lock-out/tag-out and zero-energy state procedures
- 1.04 Performs access and egress procedures
- 1.05 Protects the environment

Suggested Hours

12 Hours

Objectives and Content

1. Define terminology associated with safety in the workplace.
2. Identify hazards and describe safe work practices.
 - i) high voltage
 - v) fire
 - vi) rotating equipment
 - vii) working at heights
 - viii) confined spaces
 - ix) noisy locations
 - x) pressure hazards
 - xiv) weather

- xv) obstacles (overhead, access/egress)
 - xvi) electrical
 - xviii) hazardous materials
 - xviii) poor housekeeping
3. Interpret regulations and standards pertaining to safety in the workplace.
- i) Occupational Health and Safety (OHS)
 - ii) working at heights
 - iii) confined spaces
 - iv) jurisdictional training and certification requirements
 - vii) Workplace Hazardous Materials Information System (WHMIS)
4. Identify types of PPE and safety equipment, their applications and procedures for use.
- i) PPE
 - hard hats
 - safety glasses
 - respirators
 - safety footwear
 - gloves
 - safety vests
 - harnesses
 - lanyards
 - anchor points
 - lifeline
 - ii) safety equipment
 - first aid kits
 - eye wash stations
 - fire extinguishers
 - caution/danger tape
 - barricades
 - fall protection equipment and devices
5. Describe the procedures used to maintain and store PPE and safety equipment.
- i) excessively worn PPE
 - ii) damaged PPE
 - iii) expired PPE and safety equipment
 - iv) PPE inspection procedures
6. Describe the procedures used to conduct a job hazard assessment.
- i) job tasks
 - ii) identify hazards
 - iii) identify controls
 - iv) identify PPE

7. Describe considerations for handling materials and supplies.
8. Describe the procedures used to lock-out, tag-out and isolate equipment and confirm zero energy.
 - i) identify the potential of stored energy
 - ii) identify energy sources to be locked out
 - electrical circuits
 - valves
 - capacitors
 - rotating sheaves
 - motors
 - hydraulics
 - mechanical energy
 - iii) select lock-out device
9. Describe situations where zero energy state cannot be achieved.
10. Describe safe access and egress considerations and procedures.
11. Identify environmental hazards and describe the procedures used to protect the environment.
 - i) contamination (water, air, soil)
 - ii) hazardous materials

Practical Objectives

1. Perform a lock-out, tag-out procedure.
2. Conduct a workplace hazard assessment.

EDM-105 Tools and Equipment

Learning Outcomes

- Demonstrate knowledge of hand tools, their applications and procedures for use.
- Demonstrate knowledge of portable power tools, their applications and procedures for use.
- Demonstrate knowledge of mechanical measuring and testing devices, their applications and procedures for use.
- Demonstrate knowledge of procedures to maintain and store tools and equipment.

Nova Scotia Occupational Standard Reference (Class A)

- 2.01 Uses hand and portable power tools
- 2.02 Uses mechanical measuring and testing devices

Nova Scotia Occupational Standard Reference (Class B)

- 2.01 Uses hand and portable power tools
- 2.02 Uses mechanical measuring and testing devices

Suggested Hours

6 Hours

Objectives and Content

1. Define terminology associated with tools and equipment.
2. Identify hazards and describe safe work practices pertaining to tools and equipment.
 - i) hand tools
 - ii) portable power tools
 - iii) mechanical measuring and testing devices
3. Identify types of hand tools and describe their applications and procedures for use.
 - i) wrenches
 - ii) screwdrivers
 - iii) hammers
 - iv) pry bars
 - v) ratchet and socket sets
 - vi) pliers

4. Describe the procedures used to inspect, store and maintain hand tools.
 - i) clean
 - ii) lubricate
 - iii) sharpen
 - iv) tighten

5. Identify types of portable power tools and describe their applications and procedures for use.
 - i) pneumatic
 - ii) electric
 - iii) hydraulic

6. Describe the procedures used to inspect, store and maintain portable power tools.
 - i) clean
 - ii) lubricate
 - iii) sharpen
 - iv) tighten

7. Identify types of mechanical measuring and testing devices and describe their applications and procedures for use.

8. Describe the procedures used to inspect, store and maintain mechanical measuring and testing devices.

Practical Objectives

N/A

EDM-110 Introduction to Elevating Devices

Learning Outcomes

- Demonstrate knowledge of elevating devices, their characteristics and applications.
- Demonstrate knowledge of regulatory requirement for elevating devices.

Nova Scotia Occupational Standard Reference (Class A)

3.04 Applies acts, regulations, codes and manufacturer's specifications

Nova Scotia Occupational Standard Reference (Class B)

3.04 Applies acts, regulations, codes and manufacturer's specifications

Suggested Hours

27 Hours

Objectives and Content

9. Define terminology associated with elevating devices.
 - i) elevators
 - ii) escalators
 - iii) other elevating devices.

10. Identify types of Class A elevating devices and describe their characteristics and applications.
 - i) electric elevators
 - ii) hydraulic elevators
 - iii) elevators with other types of driving machines
 - rack and pinion elevators
 - screw column elevators
 - hand elevators
 - iv) special application elevators
 - v) escalators and moving walkways
 - vi) dumbwaiters
 - vii) material lifts
 - viii) manlifts
 - ix) construction hoists
 - x) stage lifts

11. Identify types of Class B elevating devices and describe their characteristics and applications.
 - i) stair chair lifts
 - ii) stair platform lifts
 - iii) vertical platform lifts

12. Identify types of elevator equipment and describe their purpose and operation.
 - i) machine room equipment
 - ii) hoistway equipment
 - iii) car assembly equipment
 - iv) pit equipment

13. Identify codes and regulations pertaining to Class A and B elevating devices.
 - i) B44
 - ii) B355
 - iii) B311
 - iv) Z185
 - v) Z256
 - vi) ASME A17.4
 - vii) Nova Scotia Elevators and Lifts Act and General Regulations
 - viii) Canadian Electrical Code
 - ix) Canadian Building Code

Practical Objectives

N/A

EDM-115 Measuring and Layout

Learning Outcomes

- Demonstrate knowledge of precision measuring and layout tools, their applications and procedures for use.
- Demonstrate knowledge of procedures to perform precision measuring operations.
- Demonstrate knowledge of procedures to lay out equipment and components.
- Demonstrate knowledge of procedures to maintain and store precision measuring and layout tools.

Nova Scotia Occupational Standard Reference (Class A)

- 2.02 Uses mechanical measuring and testing devices.
- 3.01 Plans project tasks and procedures
- 6.01 Prepares work area, tools and materials.
- 6.02 Measures material and components.
- 6.03 Lays out components.

Nova Scotia Occupational Standard Reference (Class B)

- 2.02 Uses mechanical measuring and testing devices.
- 3.01 Plans project tasks and procedures
- 6.01 Prepares work area, tools and materials.
- 6.02 Measures material and components.
- 6.03 Lays out components.

Suggested Hours

9 Hours

Objectives and Content

1. Define terminology associated with measuring and layout.
2. Identify hazards and describe safe work practices pertaining to measuring and layout operations.
3. Interpret information pertaining to measuring and layout found on drawings and specifications.
4. Describe the imperial and metric measuring systems and the procedures used to perform conversions for measuring and layout operations.

5. Identify types of precision measuring and layout tools and describe their applications and procedures for use.

- i) precision measuring
 - micrometers
 - calipers
 - dial indicators
 - feeler gauges
 - levels
 - scribing tools
 - machinist levels
 - measuring tapes and rules
 - plumb bobs
 - Distance Between Guides (DBG)
 - tachometers
 - pressure gauges
 - torque wrenches

- ii) layout
 - straightedges
 - squares
 - combination sets
 - surface plates
 - scribes
 - hermaphrodite calipers
 - dividers
 - trammels
 - prick and centre punches
 - angle plates
 - parallels
 - v-blocks
 - surface gauges
 - layout dye

6. Describe the procedures used to prepare a work area for measuring and lay out operations.

- i) verify tools for accuracy
- ii) prepare material to be measured
- iii) clean and prepare work area

7. Describe the procedures used to measure material, equipment and components.

- i) inside measurements
- ii) outside measures

8. Interpret information from precision measuring tools.
9. Describe the procedures used to transfer and document measurements.
10. Describe the procedures used to lay out equipment and components.
 - i) hoistway
 - ii) pit
 - iii) machinery space equipment
11. Describe the procedures used to inspect, maintain and store precision measuring and layout tools.
 - i) lubrication
 - ii) visual inspection (worn, damaged or defective)
 - iii) accuracy checks
 - iv) corrosion protection
 - v) location and storage method

Practical Objectives

1. Read and interpret measurements.
2. Take inside and outside measurements.

EDM-120 Rigging, Hoisting/Lifting and Moving

Learning Outcomes

- Demonstrate knowledge of rigging, hoisting, lifting and moving equipment, their applications, and limitations
- Demonstrate knowledge of calculations required when performing hoisting/lifting and moving operations.
- Demonstrate knowledge of safety practices related to rigging, hoisting/lifting and moving equipment.
- Demonstrate knowledge of communication methods used during rigging, hoisting, lifting and moving operations.
- Demonstrate knowledge of procedures to perform rigging, hoisting/lifting and moving operations.
- Demonstrate knowledge of procedures to maintain and store rigging, hoisting, lifting and moving equipment.

Nova Scotia Occupational Standard Reference (Class A)

- 7.01 Determines load
- 7.02 Selects rigging equipment
- 7.03 Selects hoisting/lifting and moving equipment
- 7.04 Secures area
- 7.05 Sets up rigging, hoisting/lifting and moving equipment
- 7.06 Performs hoist/lift and move
- 7.07 Maintains rigging, hoisting/lifting and moving equipment

Nova Scotia Occupational Standard Reference (Class B)

- 2.07 Performs rigging, hoisting/lifting and moving equipment

Suggested Hours

12 Hours

Objectives and Content

1. Define terminology associated with rigging, hoisting, lifting and moving equipment.
2. Identify hazards and describe safe work practices pertaining to rigging, hoisting, lifting and moving equipment.
 - i) power lines
 - ii) excavations

- iii) excessive loads
 - iv) center of gravity
 - v) weather
 - vi) equipment damage
 - vii) uneven ground
 - viii) slippery surfaces
3. Interpret codes and regulations pertaining to rigging, hoisting, lifting and moving equipment.
 4. Interpret information pertaining to rigging, hoisting, lifting and moving equipment found on drawings and specifications.
 5. Identify types of rigging, hoisting, lifting and moving equipment and describe their applications, limitations and procedures for use.
 - i) slings
 - ii) come-alongs/chain falls
 - iii) shackles
 - iv) jacks
 - v) hoists
 - vi) belts
 - vii) ropes
 - viii) cables
 - ix) spreader bars
 - x) tuggers
 - xi) rollers
 - xii) dollies
 6. Identify types of knots, hitches and bends, and describe their applications and associated procedures.
 7. Identify factors to consider when selecting rigging, hoisting, lifting and moving equipment.
 - i) safety
 - ii) load characteristics
 - iii) environment
 - iv) application
 8. Identify factors to consider when rigging a load (materials and/or equipment) for lifting and hoisting.
 - i) load characteristics
 - ii) equipment and accessories
 - iii) environment
 - iv) anchor points/attachment locations

- v) sling angles
 - vi) machine capacity/load chart
9. Describe the procedures used to ensure the work area is safe for lifting.
- i) barriers installed and tagged
 - ii) assessment of ground conditions
 - iii) non-congestion of the work area
 - iv) approach limits
 - v) obtain required permits
10. Identify communication methods used during rigging, hoisting, lifting and moving and describe their associated procedures.
- i) standard crane and hoist hand signals
 - ii) two-way radios
 - iii) video
 - iv) radio
 - v) mobile phones
11. Describe the procedures used to perform a basic lift.
- i) planning
 - ii) environment analysis
 - iii) load determination
 - iv) communication methods
 - v) pre-lift checks
 - vi) placement of load
 - vii) post-lift inspection
 - viii) supervision of lift
 - ix) securing work area
12. Describe the procedures used to inspect, store and maintain rigging, hoisting, lifting and moving equipment.

Practical Objectives

1. Tie basic knots.
2. Rig and lift a load.

EDM-125 Ladders, Scaffolding and Work Platforms

Learning Outcomes

- Demonstrate knowledge of ladders, scaffolding and work platforms and their applications.
- Demonstrate knowledge of procedures to install and remove ladders, scaffolding and work platforms.
- Demonstrate knowledge of safety practices related to ladders, scaffolding and work platforms.
- Demonstrate knowledge of procedures to inspect, maintain and store ladders, scaffolding and work platforms.

Nova Scotia Occupational Standard Reference (Class A)

- 2.04 Uses ladders
- 2.05 Uses scaffolding
- 2.06 Uses work platforms and false cars

Nova Scotia Occupational Standard Reference (Class B)

- 2.04 Uses ladders
- 2.05 Uses scaffolding
- 2.06 Uses work platforms

Suggested Hours

9 Hours

Objectives and Content

1. Define the terminology associated with ladders, scaffolding and work platforms.
2. Identify hazards and describe safe work practices pertaining to the use of ladders, scaffolding and work platforms.
3. Interpret codes and regulations pertaining to ladders, scaffolding and work platforms.
4. Identify tools and equipment used to construct ladders, scaffolding and work platforms and describe their applications and procedures for use.
5. Identify types of ladders and describe their construction, limitations and applications

6. Describe the procedures used to set up and remove ladders.
 - i) determining angle limits
 - ii) determining required height
 - iii) tying off

7. Identify types of scaffolding and describe their construction, limitations and applications.
 - i) hoistway
 - ii) exterior scaffolding

8. Describe the procedures used to set up and remove scaffolding.
 - i) load limits
 - ii) assembly and disassembly
 - iii) bracing and tying off
 - iv) leveling

9. Identify types of work platforms and describe their construction, limitations and applications.
 - i) hoistway
 - ii) false cars

10. Describe the procedures used to install and remove work platforms.
 - i) load limits
 - ii) assembly and disassembly
 - iii) bracing and tying off
 - iv) leveling

11. Describe the procedures used to inspect, store and maintain ladders, scaffolding and work platforms.

Practical Objectives

N/A

EDM-130 Fasteners and Retainers

Learning Outcomes

- Demonstrate knowledge of fastening and retaining devices and their applications.
- Demonstrate knowledge of the procedures used to install and remove fastening and retaining devices.

Nova Scotia Occupational Standard Reference (Class A)

- 5.01 Fabricates and assembles work pieces
- 5.03 Uses mechanical fastening and retaining devices

Nova Scotia Occupational Standard Reference (Class B)

- 5.01 Assembles work pieces
- 5.03 Uses mechanical fastening and retaining devices

Suggested Hours

6 Hours

Objectives and Content

1. Define terminology associated with fastening and retaining devices.
2. Identify hazards and describe safe work practices pertaining to the use of fastening and retaining devices.
3. Identify tools and equipment pertaining to the use of fastening and retaining devices and describe their applications and procedures.
 - i) torque wrenches
 - ii) impact drivers
 - iii) hand tools (snap ring pliers, riveting tools)
4. Identify types of fastening devices and describe their characteristics and applications.
 - i) mechanical
 - bolts
 - nuts
 - lock washers
 - flat washers
 - bevel washers

- pins
 - dowels
 - retaining rings
 - screws
 - anchors
 - inserts
 - ii) chemical
 - anchors
 - epoxies
 - panel bond
5. Identify factors to consider when selecting fasteners.
- i) materials
 - ferrous metals
 - non-ferrous metals
 - metal alloys
 - Neoprene
 - Plastic
 - Composite
 - ii) strength and grade
 - head markings
 - tensile strength
 - yield strength
 - hardness
 - elongation rate
 - safety factors
 - iii) thread types and classifications
 - UNC
 - UNF
 - metric
 - NPT
 - NPTF
6. Identify types of retaining devices and describe their characteristics and applications.
- i) snap-rings
 - ii) pins
 - iii) keys
 - iv) set screws
 - v) locking tabs
7. Explain the purpose of torquing and tensioning fastening devices and describe their associated procedures.
8. Describe the procedures used to install, remove and repair fastening devices.

9. Describe the procedures used to install and remove retaining devices.
10. Describe the procedures used to make internal and external threads to specifications.
 - i) external threading (dies)
 - ii) internal threading (taps)

Practical Objectives

N/A

EDM-135 Bearings and Power Transmission Components

Learning Outcomes

- Demonstrate knowledge of bearings and seals, their characteristics and applications.
- Demonstrate knowledge of lubricants, their characteristics, applications and procedures for use.
- Demonstrate knowledge of power transmission components and their operation.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Nova Scotia Occupational Standard Reference (Class B)

Integrated throughout

Suggested Hours

9 Hours

Objectives and Content

1. Define terminology associated with bearings and power transmission components.
2. Identify hazards and describe safe work practices pertaining to bearings and power transmission components.
3. Interpret codes and regulations pertaining to bearings and power transmission components.
4. Interpret information pertaining to bearings and power transmission components found on drawings and specifications.
5. Identify tools and equipment pertaining to the use of bearing and seals and describe their applications and procedures for use.
 - i) pullers
 - ii) drivers
 - iii) presses
6. Identify types of bearings and seals and describe their characteristics and applications.
 - i) sleeve (journal) bearings

- ii) anti-friction bearings
- iii) ball
- iv) taper
- v) roller
- vi) thrust
- vii) mounted bearings
- viii) pillow blocks
- ix) flange cartridges
- x) seals
- xi) static
- xii) dynamic

7. Identify bearing failures and describe their causes.

- i) Indicators
 - scoring
 - galling
 - corrosion
 - pitting
- ii) causes
 - lack of lubrication
 - contamination
 - overloading
 - overheating
 - electrolysis

8. Describe the procedures used to maintain, troubleshoot and repair bearings.

9. Describe the procedures used to install and remove bearings.

10. Describe the procedures used to install and remove seals.

11. Identify types of lubrication and describe their characteristics, applications, and procedures for use.

- i) oil
- ii) grease
- iii) solids
- iv) gases

12. Describe the procedures used to store lubricants.

- i) fire protected
- ii) ventilation
- iii) temperature
- iv) containers
- v) location

13. Describe the procedures used to dispose of lubricants.
14. Identify types of power transmission components and describe their purpose, operation and applications.
 - i) V-belts
 - ii) belt sheaves
 - iii) taper bushings
 - iv) chains and sprockets
 - v) gear reducers
 - vi) couplings, keys, pins and set screws
15. Perform calculations relevant to bearings and power transmission components.

Practical Objectives

N/A

EDM-140 Mechanical Drawings

Learning Outcomes

- Demonstrate knowledge of mechanical drawings, their use and interpretation.
- Demonstrate knowledge of elevator layout and structural drawings, their use and interpretation.
- Demonstrate knowledge of basic sketching techniques.

Nova Scotia Occupational Standard Reference (Class A)

3.02 Uses mechanical drawings

Nova Scotia Occupational Standard Reference (Class B)

3.02 Uses mechanical drawings

Suggested Hours

18 Hours

Objectives and Content

1. Define terminology associated with mechanical drawings
2. Identify types of drawings and describe their purpose and applications.
 - i) civil/site
 - ii) engineered
 - iii) mechanical
 - iv) structural
 - v) electrical
 - vi) shop
 - vii) field
 - viii) sketches
 - ix) as-builts
 - x) working
 - xi) installation
 - xii) detailed drawing
3. Identify the views found on drawings and describe their characteristics.
 - i) elevation
 - ii) plan section
 - iii) detail

4. Identify drawing projections and describe their applications.
 - i) orthographic
 - ii) oblique
 - iii) isometric
 - iv) section
 - v) auxiliary
 - vi) detailed/exploded

5. Interpret and extract information from mechanical drawings.
 - i) dimensions
 - ii) lines
 - iii) legend
 - iv) material specifications
 - v) symbols and abbreviations
 - structural beams
 - beam connections
 - poured concrete
 - concrete blocks
 - masonry
 - drywall
 - heating cooling and ventilation ducts
 - exhaust fans
 - pit floor drains
 - cored holes
 - vi) title block
 - vii) notes and specifications
 - viii) tolerances/allowances
 - ix) bill of materials

6. Perform calculations relevant to information found on drawings.
 - i) imperial
 - ii) metric

7. Explain the use of scales.

8. Identify the styles of dimensioning on mechanical drawings and describe their applications.
 - i) definition and requirements of dimensioning
 - vi) dimensioning systems
 - vii) rules for dimensioning
 - viii) checking dimensions

9. Demonstrate basic sketching techniques.

10. Interpret construction and installation elements found on mechanical drawings and specifications.
- i) elevating device in plan views
 - ii) elevation views
 - iii) floor heights and number of landings
 - iv) travel, pit depth and overhead
 - v) grid lines and relate position of elevating device to the grid lines
 - vi) thickness and type of finished walls for the hoistway
 - vii) fixtures forming part of the elevating device control equipment and other ancillary fixtures.
 - Communications and Fire Control (CAFC) room
 - lobby dispatch panel
 - recall switches
 - smoke and heat sensors
 - sprinkler heads
 - transfer switch signals
 - viii) elevating device entrances
 - ix) elevating device machine room
 - machine room configuration
 - secondary level configuration
 - special trenches or tunnels (oil lines and electrical conduit)
 - x) pit depth
 - xi) normal travel of the elevating device
 - xii) overhead and related dimensions
 - xiii) width and depth of the hoistway in the plan view
 - xiv) position of guide rails
 - xv) size and orientation of the car frame
 - xvi) pit equipment
 - buffers
 - rail foot brackets
 - pit channels
 - compensating sheave
 - pit ladder
 - pit stop switch
 - pit light and light switch
11. Describe clearance requirements.
- i) sill to sill running
 - ii) car to car counterweight
 - iii) car to hoistway wall
 - iv) top and bottom of hoistway
 - v) run-by and buffer stroke
 - vi) controller and main disconnect

12. Describe power requirements.
 - i) main electrical components
 - ii) main disconnect switches
 - iii) car light disconnect/power supply
 - iv) signal switches
 - v) dispatcher disconnect switches
 - vi) elevating device power requirements
 - vii) voltage
 - viii) amperage

13. Identify elevating device machine elements and describe their characteristics and applications
 - i) structural steel sections
 - ii) shafts, keys and pins
 - iii) fasteners

Practical Objectives

N/A

EDM-145 Basic Hydraulics

Learning Outcomes

- Demonstrate knowledge of hydraulic systems operating principles.
- Demonstrate knowledge of hydraulic systems, their components and operation.

Nova Scotia Occupational Standard Reference (Class A)

- 9.01 Installs pit hydraulic components (Introduction)
- 10.01 Installs hydraulic control equipment (Introduction)
- 10.02 Maintains hydraulic control equipment (Introduction)

Nova Scotia Occupational Standard Reference (Class B)

- 9.01 Installs pit hydraulic components (Introduction)
- 10.01 Installs hydraulic control equipment (Introduction)
- 10.02 Maintains hydraulic control equipment (Introduction)

Suggested Hours

18 Hours

Objectives and Content

1. Define terminology associated with hydraulics.
2. Identify hazards and describe safe work practices pertaining to hydraulic systems
3. Interpret codes and regulations pertaining to hydraulic systems
4. Interpret information pertaining to hydraulic systems found on drawings and specifications.
5. Explain the operating principles of hydraulic systems.
6. Explain the basic principles of force, work and power.
 - i) weight and specific gravity
 - ii) pressure and force
 - iii) static pressure
 - iv) gauge pressures in imperial and metric units
 - v) Pascal's Law
 - vi) conversion of energy and hydraulic power
 - vii) pressure losses

7. Identify types of hydraulic systems and describe their characteristics and applications
 - i) open system
 - ii) closed system

8. Identify hydraulic fluids and describe their characteristics and applications.
 - i) viscosity
 - ii) fire resistance
 - iii) lubricity

9. Identify the components of hydraulic systems and describe their purpose and operation.
 - i) tanks and reservoirs
 - materials used
 - location
 - capacities
 - ii) distribution systems
 - pipes
 - tubing
 - flexible hoses and fittings
 - couplings
 - grooved
 - threaded
 - crimped
 - pressure ratings of pipes, hoses, couplings and fittings
 - iii) pumps
 - gear
 - vane
 - screw
 - iv) pump drives
 - electric motors
 - couplings
 - v) plungers and cylinders
 - plunger stop ring
 - plunger coupling
 - cylinders
 - above ground
 - below ground
 - gland, seal (packing), wiper ring
 - vi) control valves
 - relief valve
 - manual lowering valve
 - shut off valve
 - pipe rupture valve
 - flow control devices
 - vii) pressure switches

- viii) pressure gauges
- ix) jacks

Practical Objectives

N/A

EDM - 150 Basic Electricity

Learning Outcomes

- Demonstrate knowledge of basic electrical theory.
- Demonstrate knowledge of basic mathematical and electrical calculations.
- Demonstrate knowledge of principles and operation of direct current (DC) electrical circuits.
- Demonstrate knowledge of principles and operation of alternating current (AC) electrical circuits.
- Demonstrate knowledge of procedures to measure voltage, current and resistance.
- Demonstrate knowledge of the principles of permanent magnetism.
- Demonstrate knowledge of the principles of electromagnetism.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Nova Scotia Occupational Standard Reference (Class B)

Integrated throughout

Suggested Hours

60 Hours

Objectives and Content

1. Define terminology associated with electricity.
 - i) alternating current
 - ii) direct current
 - iii) voltage
 - iv) amperage
 - v) resistance
 - vi) Electro Motive Force (EMF)
 - vii) Potential Difference (PD)
 - viii) Ohm's law
 - ix) Sine wave
 - x) Root mean square (RMS)
 - xi) inductance
 - xii) capacitance
 - xiii) impedance

2. Identify hazards and describe safe work practices pertaining to electricity.
3. Interpret codes and regulations pertaining to electrical installations.
4. Interpret information pertaining to electrical installations found on drawings and specifications.
 - i) electrical symbols
5. Identify electrical measuring tools and equipment and describe their applications and procedures for use.
6. Perform basic mathematical calculations.
 - i) whole numbers
 - ii) decimals
 - iii) fractions
 - iv) reciprocals
 - v) percentages
 - vi) powers
 - vii) roots
 - viii) ratio
 - ix) proportion
7. Explain fundamental principles of electricity.
 - i) atomic structure of matter
 - ii) free electrons
 - iii) source of electricity
 - iv) nature of electricity
 - v) static electricity
8. Explain the principles and operation of direct current (DC) electrical circuits.
9. Identify types of electrical circuits and describe their characteristics and applications.
 - i) series circuits
 - ii) parallel circuits
 - iii) series/parallel circuits
 - iv) Kirchoff's law
 - v) power and heat loss
10. Identify types of electrical components and describe their characteristics, purpose and operation.
 - i) resistors
 - series
 - parallel
 - colour coding

- wattage
 - potentiometers/rheostats
 - ii) capacitors
 - series/parallel
 - colour coding
 - ratings
 - timing circuits
 - iii) diodes
 - capacities
 - series/parallel
11. Explain the principles and operation of alternating current (AC) electrical circuits.
12. Perform basic electrical calculations.
13. Describe the procedures used to measure voltage, current and resistance.
- i) identify precautions
 - switching from ohmmeter to voltage and amperage scales
 - moisture
 - electrical shock prevention
 - ii) measure AC and DC voltage and amperage
 - analog meters
 - digital meters
 - clamp-on meters
 - iii) measure resistance
 - ohmmeter
 - multi-meter
14. Describe the principles of permanent magnetism.
- i) magnetic poles
 - ii) magnetic fields
 - iii) magnetic properties
15. Describe the principles of electromagnetism.
- i) properties of electromagnets
 - ii) action of magnetic fields around a conductor
 - iii) induced voltage
 - iv) effects of motion on induced voltage
 - v) factors that affect induced voltage
 - vi) Lenz's law

Practical Objectives

N/A

EDM-155 Introduction to B44 and B355 Code Books

Learning Outcomes

- Demonstrate knowledge of the B44 Safety Code for Elevators and Escalators and its use.
- Demonstrate knowledge of the B355 Platform Lifts and Stair Lifts for Barrier-free Access and its use.
- Demonstrate knowledge of the procedures to locate and interpret information in the B44 and B355 code books.

Nova Scotia Occupational Standard Reference (Class A)

3.04 Applies acts, regulations, codes and manufacturer's specifications. (Introduction)
Integrated throughout

Nova Scotia Occupational Standard Reference (Class B)

3.04 Applies acts, regulations, codes and manufacturer's specifications. (Introduction)

Suggested Hours

9 Hours

Objectives and Content

1. Define terminology associated with the B44 and B355 code books.
2. Describe the purpose of code and standards.
3. Describe the format of standards and conventions used for codes.
 - i) the numbering system
 - ii) interpretations
 - iii) inquiries
4. Describe the procedures used to locate and interpret information in the B44 and B355 code books.
 - i) search for keywords
 - ii) process of elimination
 - iii) the hierarchal approach
 - iv) use of trade terms
 - v) searching with the index
 - vi) search levels and cross references

Practical Objectives

1. Locate and interpret information from the CSA B44 and B355 code books.

EDM-160 General Maintenance

Learning Outcomes

- Demonstrate knowledge of general maintenance procedures.
- Demonstrate knowledge of public safety requirements and liability concerns.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Nova Scotia Occupational Standard Reference (Class B)

Integrated throughout

Suggested Hours

9 Hours

Objectives and Content

1. Define terminology associated with general maintenance.
2. Identify hazards and describe safe work practices pertaining to general maintenance.
 - i) heat and smoke generating equipment
 - ii) falling items when doors are open
 - iii) oil, grease and heavy equipment damage
3. Interpret codes and regulations pertaining to general maintenance.
4. Identify tools and equipment related to general maintenance and describe their applications and procedures for use.
5. Interpret information pertaining to general maintenance found on drawings and specifications.
6. Describe the procedures used to work in occupied buildings.
 - i) use of jumpers
 - ii) secure the work area
 - iii) barricade entrances
 - iv) appropriate personal appearance and language
 - v) maintain acceptable condition of the work site
 - vi) minimize disruption and safety hazards

7. Identify requirements and responsibilities pertaining to shut down and reinstatement procedures.
 - i) notifying building personnel
 - ii) using “maintenance in progress” signs
 - iii) equipment and procedures for barricading entrances
 - iv) owner and contractor responsibilities
8. Describe the procedure used to take an elevating device out of service including lock-out procedures.
9. Describe the procedures used to inspect elevating device equipment and performance.
 - i) safety circuits and devices
 - ii) mechanical operating components
 - iii) electrical operating components
 - iv) abnormal noises or odours
 - v) condition of all equipment
 - vi) condition of drive equipment
 - vii) operation and condition of fixtures
 - viii) appearance and cosmetic details
 - ix) operation of all door equipment
 - x) ride quality and overall operation
10. Describe the procedures used to perform general maintenance.
11. Describe the procedure used to bring an elevating device back into service.
12. Describe elevating device maintenance logbooks, their purpose and procedures for use.

Practical Objectives

N/A

EDM-165 Communication

Learning Outcomes

- Demonstrate knowledge of effective communication practices.

Nova Scotia Occupational Standard Reference (Class A)

- 3.01 Plans project tasks and procedures
- 4.01 Uses communication techniques.

Nova Scotia Occupational Standard Reference (Class B)

- 3.01 Plans project tasks and procedures
- 4.01 Uses communication techniques.

Suggested Hours

3 Hours

Objectives and Content

1. Define terminology associated with communication and e-communications.
2. Describe the importance of using effective verbal and non-verbal communication with people in the workplace.
 - i) active listening
 - hearing
 - interpreting
 - reflecting
 - Responding
 - paraphrasing
 - ii) non-verbal communication
 - body language
 - Signals
 - written
 - iii) people in the workplace
 - customers
 - supervisors
 - apprentices
 - colleagues/co-workers
 - authorities having jurisdiction (AHJ)
 - suppliers

- manufacturers
 - other tradespeople
- 3. Identify types of electronic communication devices and describe their applications and procedures.
 - i) computers
 - software
 - email
 - internet
 - ii) smart phones
 - apps
- 4. Explain the importance of appropriate and effective use of electronic communication devices and sources of information.
- 5. Describe the coaching and mentoring relationship between journeyperson and apprentice.
- 6. Describe the importance of communicating with others to organize materials and supplies on site and effectively plan work tasks.
- 7. Identify communication and learning styles.
 - i) visual
 - ii) auditory
 - iii) reading/writing
 - iv) kinesthetic
- 8. Describe effective listening and speaking skills.
- 9. Identify personal responsibilities and attitudes that contribute to on-the-job success.
 - i) working safely
 - ii) asking questions
 - iii) accepting constructive feedback
 - iv) time management and punctuality
 - v) respect for authority
 - vi) good stewardship of materials
 - vii) tools and property
 - viii) efficient work practice
- 10. Identify the value of diversity, equity and inclusion in the workplace.
- 11. Identify communication that constitutes harassment and discrimination.
 - i) harassment
 - objectionable conduct

- comments or actions made either on a one time or continuous basis that threatens, demeans, belittles or causes humiliation or embarrassment to the recipient
- ii) discrimination
 - race
 - national or ethnic origin
 - colour
 - religion
 - age
 - sex
 - sexual orientation
 - gender identity
 - marital status
 - family status
 - disability
 - conviction for which a pardon has been granted

Practical Objectives

N/A

EDM-170 Workplace Mentoring I

Learning Outcomes

- Demonstrate knowledge of strategies to assist in learning skills in the workplace.

Nova Scotia Occupational Standard Reference (Class A)

- 4.01 Uses communication techniques
- 4.02 Uses mentoring techniques

Nova Scotia Occupational Standard Reference (Class B)

- 4.01 Uses communication techniques
- 4.02 Uses mentoring techniques

Suggested Hours

3 Hours

Objectives and Content

1. Describe the importance of personal experiences.
2. Identify partners involved in apprenticeship.
3. Describe the shared responsibilities for workplace learning.
4. Determine individual learning preferences and explain how these relate to learning new skills.
5. Describe the importance of different types of skills in the workplace.
6. Describe the importance of essential skills in the workplace.
7. Identify different ways of learning.
8. Identify learning preferences.
9. Identify different learning needs and strategies to meet learning goals.
10. Identify techniques for effective communication.
11. Identify strategies to assist in learning a skill.

Practical Objectives

N/A

Level 2

Class A: 6 Weeks (180 hours),

Class B: 7 Weeks (210 hours)

EDM-200 Barrier-Free Lifts

Learning Outcomes

- Demonstrate knowledge of barrier-free lifts, their components and operation.
- Demonstrate knowledge of procedures to install barrier-free lifts.
- Demonstrate knowledge of procedures to maintain, adjust and repair.
- Demonstrate knowledge of procedures to inspect and test barrier-free lifts.

Nova Scotia Occupational Standard Reference (Class A)

- 13.01 Assesses installation site for other elevating devices
- 13.02 Installs mechanical systems on other elevating devices
- 13.03 Maintains mechanical systems on other elevating devices
- 13.04 Installs electrical systems on other elevating devices
- 13.05 Maintains electrical systems on other elevating devices
- 14.01 Performs pre-inspection procedures on other elevating devices
- 14.02 Performs initial inspection of other elevating devices
- 14.03 Performs mandated maintenance tests on other elevating devices
- 14.04 Performs return to service procedures on other elevating devices

Nova Scotia Occupational Standard Reference (Class B)

- 11.04 Installs barrier-free lift door operators
- 11.05 Maintains barrier-free lift door operators.
- 12.01 Performs pre-inspection procedures on barrier-free lifts
- 12.02 Performs initial inspection on barrier-free lifts
- 12.03 Performs mandated maintenance tests on barrier-free lifts
- 12.04 Performs return to service procedures on barrier-free lifts

Suggested Hours

20 Hours

Objectives and Content

1. Define terminology associated with barrier-free lifts.
2. Identify hazards and describe safe work practices pertaining to barrier-free lifts.
3. Interpret codes and regulations pertaining to barrier-free lifts.

4. Identify tools and equipment used to install and maintain barrier-free lifts and describe their applications and procedures for use.
5. Interpret information pertaining to barrier-free lifts found on drawings and specifications.
6. Identify types of barrier-free lifts and describe their characteristics, applications and operation.
 - i) stair chair lifts
 - ii) stair platform lifts enclosed
 - iii) stair platform lifts unenclosed
 - iv) vertical platform lifts enclosed
 - v) vertical platform lifts unenclosed
7. Identify components of barrier-free lifts and describe their purpose and operation.
 - i) drives
 - ii) controls
8. Describe the procedures used to construct and install barrier-free lifts.
9. Describe the procedures used to maintain, adjust and repair barrier-free lifts.
10. Describe the procedures used to inspect and test barrier-free lifts.

Practical Objectives

N/A

EDM - 205 Hydraulic Elevator Installation

Learning Outcomes

- Demonstrate knowledge of hydraulic elevators, their components and operation.
- Demonstrate knowledge of procedures to install hydraulic elevator components.
- Demonstrate knowledge of preparing and testing for inspection.
- Demonstrate knowledge of completing field test and data reports.

Nova Scotia Occupational Standard Reference (Class A)

- 9.01 Installs pit hydraulic components
- 9.03 Installs pit equipment
- 10.01 Installs hydraulic control equipment
- 11.02 Installs car/carriage enclosure
- 11.04 Installs passenger door operators, gates and re-opening devices
- 11.10 Installs car top electrical protective devices
- 12.01 Performs pre-inspection procedures on passenger and freight elevating devices.
- 12.02 Performs initial inspection on passenger and freight elevating devices.

Nova Scotia Occupational Standard Reference (Class B)

- 9.01 Installs pit hydraulic components
- 9.03 Installs pit equipment
- 10.01 Installs hydraulic control equipment
- 11.02 Installs carriage enclosure

Suggested Hours

20 Hours

Objectives and Content

1. Define terminology associated with hydraulic elevator installation.
2. Identify hazards and describe safe work practices pertaining to hydraulic elevator installation.
3. Interpret codes and regulations pertaining to hydraulic elevator installation.
4. Interpret information pertaining to hydraulic elevator installation found on drawings and specifications.

5. Identify tools and equipment pertaining to hydraulic elevator installation and describe their applications and procedures for use.
6. Identify components of hydraulic elevators and describe their purpose and operation.
 - i) pit equipment
 - ii) control equipment
 - iii) hydraulic control equipment
 - iv) car/carriage enclosure
 - v) doors, gates and opening devices
 - vi) car top electrical protective devices
7. Describe the procedures used to install hydraulic elevator components.
8. Describe the procedures used to install jack units.
 - i) above-ground and in-ground jack units
 - ii) one piece
 - iii) two piece
 - iv) telescopic
 - v) plumbing
 - vi) cylinder
 - vii) hoistway
 - viii) roped hydraulics
 - ix) jack unit alignment
9. Describe the procedures used to install oil lines.
 - i) grooved couplings
 - ii) grooved fittings
 - iii) threaded fittings
 - iv) flexible hoses and fittings
 - v) hydraulic couplings
 - vi) mufflers
 - vii) oil supports
 - viii) bleed air from hydraulic systems
10. Describe the procedures used to install pumping units.
 - i) pump unit work area
 - ii) orientation of pumping units
 - iii) securing pump units
11. Describe the procedures used to adjust the control valve.
 - i) coordination with electrical controls
12. Describe the procedures used to establish working pressure and perform relief valve tests.

13. Describe the procedures used to complete field tests and data reports.
 - i) car speeds
 - ii) up and down
 - iii) rated load and rated empty
 - iv) safety testing of roped hydraulics
 - v) working pressure
 - vi) relief pressure
 - vii) supply voltage at motor with full current load
 - viii) disconnect fuse rating and overload setting

14. Describe the procedures used to perform inspection tests.
 - i) inspection checklist
 - ii) full load safety test for roped hydraulics
 - iii) full load running test
 - iv) redundancy check
 - v) run-by distance and clearance checks
 - vi) door opening times and closing force
 - vii) ground tests of primary safety circuit
 - viii) identification of machine room equipment
 - ix) final clean up procedures
 - x) turnover inspection
 - xi) mechanical stored energy
 - pipe stands
 - rail clamps

Practical Objectives

N/A

EDM-210 AC Motors, Drives and Controls

Learning Outcomes

- Demonstrate knowledge of AC motors, their components and operation.
- Demonstrate knowledge of AC motor drives and control systems, their components and operation.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Nova Scotia Occupational Standard Reference (Class B)

Integrated throughout

Suggested Hours

20 Hours

Objectives and Content

1. Define terminology associated with AC motors, drives and controls.
2. Identify hazards and describe safe work practices pertaining to AC motors, drives and controls.
3. Interpret codes and regulations pertaining to AC motors, drives and controls.
4. Interpret information pertaining to AC motors, drives and controls found on drawings and specifications.
5. Identify tools and equipment pertaining to AC motors, drives and controls and describe their applications and procedures for use.
6. Explain the operating principles of AC motors.
7. Identify types of AC motors and describe their characteristics and applications.
 - i) induction motors
 - ii) capacitance in an AC circuit
 - iii) split phase and capacitor start motors
 - iv) synchronous motors

- v) AC series motors
 - vi) three phase motors
 - vii) two speed three phase motors
 - viii) slip ring motors
 - ix) variable frequency motors
 - x) permanent magnet motors
8. Identify AC motor components and describe their purpose and operation.
- i) main frame
 - ii) pole pieces
 - iii) stator
 - iv) rotating field winding
 - v) Wye connections
 - vi) Delta connections
 - vii) proper wiring of connections
 - viii) reversing direction of rotation
 - ix) brush assemblies
 - x) slip rings
 - xi) rotor
 - xii) name plate data
9. Describe AC motor performance characteristics.
- i) torque current draw
 - ii) motor action (AC)
 - iii) rotating field
 - iv) armature rotation
10. Identify AC motor drives and control systems and describe their characteristics and applications.
- i) AC with DC injection
 - ii) AC with wound-rotor induction
 - iii) AC hydraulic pump motor (full or reduced starting voltage)
 - soft start
 - iv) AC VVVF or Vector inverter
 - v) types of motor control
 - open loop VF
 - closed loop VF
 - flux Vector
 - open loop Vector
 - vi) encoders
 - vii) braking circuit and DC Buss
 - viii) controlled frequency
 - ix) Insulated Gate Bipolar Transistor (IGBT)
 - x) motors for other elevating devices

- escalators
- hydraulic elevators
- door motors
- other AC motors

Practical Objectives

N/A

EDM-215 Solid State Electronics

Learning Outcomes

- Demonstrate knowledge of solid state electronics, their components and operation.
- Demonstrate knowledge of procedures to troubleshoot solid state electronics.
- Demonstrate knowledge of analogue integrated circuits.
- Demonstrate knowledge of power supplies and operational amplifiers.
- Demonstrate knowledge of digital systems.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Nova Scotia Occupational Standard Reference (Class B)

Integrated throughout

Suggested Hours

60 Hours

Objectives and Content

1. Define terminology associated with solid state electronics.
2. Interpret codes and regulations pertaining to solid state electronics.
3. Identify hazards and describe safe work practices pertaining to solid state electronics.
4. Interpret information pertaining to solid state electronics found on drawings and specifications.
5. Identify tools and equipment pertaining to solid state electronics and describe their applications and procedures for use.
6. Explain the operating principles of solid state electronic devices.
 - i) atomic theory of matter
 - semiconductor material
 - semiconductor crystals
 - ii) conduction in intrinsic germanium and silicon
 - low temperature characteristics
 - high temperature characteristics

- hole theory
 - current flow
 - iii) conduction in doped germanium and silicon
 - N type semiconductors
 - P type semiconductors
 - iv) solid state devices precautions
 - static discharge
 - excessive heat
 - ultraviolet light
 - radio frequency induction
7. Identify solid state electronic components used in elevating devices and describe their characteristics and applications.
- i) diodes
 - ii) transistors
 - iii) thyristors
 - iv) integrated circuits
 - analogue
 - digital
8. Identify types of diodes and describe their characteristics and applications.
- i) semiconductor diodes
 - PN junction
 - ions
 - junction diodes
 - depletion region
 - barrier voltage
 - ii) forward and reverse biasing
 - iii) germanium diodes
 - iv) silicon diodes
 - v) diode ratings
 - temperature considerations
 - vi) rectifiers
 - half wave
 - full wave
 - three-phase
 - vii) Zener diodes
 - voltage-current
 - voltage
 - power distribution
 - power-temperature curves
 - viii) Zener diode packages
 - ix) voltage regulation with Zener diodes
 - x) Zener diodes in elevator circuits

- xi) varistors
 - xii) light emitting diodes (LED)
 - LED construction features
 - circuit operation
 - application in elevator circuits
 - xiii) photodiodes
9. Describe the procedures used to test diodes and rectifiers.
- i) electrical resistance test
 - ii) voltage tests
 - iii) amperage
10. Identify types of transistors and describe their characteristics, applications and operation
- i) PNP junction
 - ii) NPN junction
 - iii) construction techniques
 - iv) packaging
 - v) biasing action for NPN and PNP transistors
 - vi) transistor amplification
 - vii) circuit arrangements
 - common emitter
 - common base
 - common collector
 - viii) junction FET
 - ix) insulated gate FET
 - x) FET circuit arrangements
11. Describe the procedures used to test transistors
- i) resistance
 - ii) voltage
 - iii) amperage
12. Identify types of thyristors and describe their configuration/construction, characteristics, applications and operation.
- i) bi-directional triode
 - ii) Silicon controlled rectifiers (SCR)
13. Identify types of analogue circuits and describe their characteristics, applications and operation.
- i) dual in-line packaging (DIP)
 - ii) surface mount technology (SMT)
 - iii) heat sink
 - iv) basic power supplies

- v) regulated power supplies
 - vi) operational amplifier (OP AMP)
14. Identify types of power systems and describe their characteristics, applications and operation.
- i) power transformers
 - ii) rectifiers
 - half wave
 - full wave
 - full wave bridge
 - i) voltage multipliers
 - ii) half wave voltage doubler
 - iii) full wave voltage doubler
 - iv) ripple
 - v) filter networks
 - vi) regulators
 - voltage
 - Zener diode
 - series pass transistor
 - integrated circuit
 - vii) circuit protection
 - viii) power supplies
15. Describe the procedures used to test power systems.
16. Identify types of amplifiers and describe their characteristics, applications and operation.
17. Identify numbering systems and describe their applications.
- i) decimals
 - ii) binary
 - iii) octal
 - iv) hexadecimal
18. Identify types of digital integrated circuits and describe their characteristics, applications and operation.
- i) gates
 - ii) printed circuit boards
 - handling procedures
 - inspection procedures
 - iii) memory elements
 - flip flops
 - counters
 - registers

- memory
- SMI, MSI, LSI, VLSI, devices
- ROM, RAM, PROM, EPROM, EEPROM, EAPROM

19. Identify types of microprocessors and describe their characteristics and applications.
 - i) hardware
 - ii) software
 - iii) CPU
20. Identify microprocessor programmable logic control systems and describe their characteristics, applications and operation.
21. Describe the procedures used to troubleshoot solid state electronic devices.
 - i) fault logs
 - ii) error codes

Practical Objectives

N/A

EDM - 220 Circuit Tracing

Learning Outcomes

- Demonstrate knowledge of circuit tracing.
- Demonstrate knowledge of test equipment, its applications and procedures for use.
- Demonstrate knowledge of procedures to troubleshoot circuits.

Nova Scotia Occupational Standard Reference (Class A)

2.03 Uses electrical measuring and testing devices.
Integrated throughout

Nova Scotia Occupational Standard Reference (Class B)

2.03 Uses electrical measuring and testing devices.
Integrated throughout

Suggested Hours

60 Hours

Objectives and Content

1. Define terminology associated with circuit tracing.
2. Identify hazards and describe safe work practices pertaining to circuit tracing.
3. Interpret codes and regulations pertaining to circuit tracing.
4. Interpret information pertaining to circuit tracking found on electrical drawings.
 - i) field wiring
 - ii) straight line (schematics)
 - iii) wiring diagram symbols
5. Identify tools and equipment used to diagnose circuit tracing and describe their applications and procedures for use.
 - i) ammeter
 - ii) voltmeter
 - iii) ohmmeter
 - iv) digital multi-meter (DMM)
 - v) continuity circuit tester
 - vi) high and low impedance multi-meters

- vii) current probe
 - viii) induction pickup
 - ix) meggers
 - x) analog
6. Identify types of circuits and describe their characteristics, applications and operation.
- i) wye-delta starting
 - ii) pump motor connections
 - iii) logic functions
 - iv) selector circuits
 - v) call registration
 - vi) direction selection
 - vii) call cancellation
 - viii) starting and acceleration
 - ix) stepping circuits
 - x) stopping circuits
 - xi) door operation
 - xii) safety circuits
 - xiii) firefighters service
 - xiv) phase I
 - xv) phase II
7. Identify types of control systems and describe their characteristics, applications and operation and.
- i) constant pressure relay
 - ii) constant pressure control
 - iii) single automatic push button
 - iv) collective relay
 - v) duplex operating systems
 - vi) Programmable Logic Controller (PLC)
 - vii) microprocessor-based
8. Describe the procedures used to trace circuits.
- i) interpret electrical/electronic schematic wiring diagrams for elevating device constant pressure control systems
 - ii) identify the main system components
 - iii) trace the circuit from the power source through the wiring, connections, electrical/electronic devices and return ground path
9. Describe the procedures used to troubleshoot with diagnostic equipment.
- i) ammeter, voltmeter, ohmmeter
 - ii) continuity circuit tester
 - high and low impedance multi-meters
 - current probe

- iii) induction pickup
10. Describe the procedures used to troubleshoot control circuits.
- i) constant pressure relay
 - ii) constant pressure control
 - iii) single automatic push button
 - iv) collective relay
 - v) duplex operating systems
 - vi) PLC
 - vii) microprocessor-based
 - viii) DC motor speed control system

Practical Objectives

N/A

EDM-225 Workplace Mentoring II (Class B)

Learning Outcomes

- Demonstrate knowledge of strategies for teaching workplace skills.

Nova Scotia Occupational Standard Reference (Class B)

4.02 Uses mentoring techniques

Suggested Hours

6 Hours

Objectives and Content

1. Identify different role played by a workplace mentor.
2. Describe teaching skills.
3. Explain the importance of identifying the point of a lesson.
4. Identify how to choose a good time to present a lesson.
5. Explain the importance of linking the lesson.
6. Identify the component of the skill (the context).
7. Describe considerations for demonstrating a skill.
8. Identify types of skill practice.
9. Describe considerations in setting up opportunities for skill practice.
10. Explain the importance of providing feedback.
11. Identify techniques for giving effective feedback.
12. Describe a skills assessment.
13. Identify methods of assessing progress.
14. Explain how to adjust a lesson to different situations.

Practical Objectives

N/A

EDM-230 Program Review (Class B)

Learning Outcomes

- Demonstrate knowledge of the Occupational Standard and its relationship to the Certification Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Certification Examination.

Nova Scotia Occupational Standard Reference

Entire Occupational Standard

Suggested Hours

24 Hours

Objectives and Content

1. Define terminology associated with an Occupational Standard.
 - i) major work activities (MWA)
 - ii) tasks
 - iii) sub-tasks
2. Describe the RSOS is developed and the link it has with the Certification Examination.
 - i) development
 - ii) validation
 - iii) MWA and task weighting
 - iv) examination breakdown (pie-chart)
3. Identify exam preparation resources and describe their use in preparing for the Certification Examination.
 - i) Red Seal and Agency websites
 - ii) examination preparation guide
 - iii) self-assessment guides
 - iv) exam breakdowns/counselling sheets
 - v) sample questions
4. Explain the relationship between the NSOS and the Curriculum Standard.
5. Review common occupational skills for the Elevating Device Mechanic trade as identified in the NSOS.
 - i) safety-related functions

- ii) tools and equipment
 - iii) organizes work and documentation
 - iv) communication and mentoring techniques
6. Review process to perform routine trade tasks for the Elevating Device Mechanic trade as identified in the NOS.
- i) trade activities
 - ii) measuring and layout
7. Review process to install and maintain elevator systems for the Elevating Device Mechanic trade as identified in the NSOS.
- i) runway equipment
 - ii) pit equipment
 - iii) machine/control room/space equipment
 - iv) carriage equipment
 - v) barrier-free lifts

Practical Objectives

N/A

Level 3
7 weeks (210 hours)

EDM-300 Work Platforms and False Cars

Learning Outcomes

- Demonstrate knowledge of work platforms and false cars and their applications.
- Demonstrate knowledge of procedures to install and remove work platforms and false cars.
- Demonstrate knowledge of safety practices related to work platforms and false cars.
- Demonstrate knowledge of procedures to maintain and store work platforms and false cars.

Nova Scotia Occupational Standard Reference (Class A)

2.06 Uses work platforms and false cars

Suggested Hours

12 Hours

Objectives and Content

1. Define the terminology associated with work platforms and false cars.
2. Identify hazards and describe safe work practices pertaining to the use of work platforms and false cars.
3. Interpret codes and regulations pertaining to work platforms and false cars.
4. Identify tools and equipment related to work platforms and false cars and describe their applications and procedures for use.
5. Identify types of work platforms and false cars and describe their characteristics, applications, and procedures for use.
6. Identify factors to consider when selecting work platforms and false cars.
7. Describe the procedures used to install work platforms and false cars.
 - i) installing safeties
 - correct rail size
 - testing safeties
 - check service history
 - ii) counterweight calculation and installation
 - iii) overhead protection installation

- iv) temporary run buttons use and installation
 - v) temporary scaffold and barricades installation and bracing
 - vi) safety line tie-off points
 - vii) platform maximum allowable weight calculation and operation
8. Describe the procedures used to inspect, store and maintain work platforms and false cars.

Practical Objectives

N/A

EDM-305 Traction Elevator Installation

Learning Outcomes

- Demonstrate knowledge of traction elevators, their components and operation.
- Demonstrate knowledge of procedures to install traction elevators.
- Demonstrate knowledge of special emergency service procedures.
- Demonstrate knowledge of preparing and testing for inspection.

Nova Scotia Occupational Standard Reference (Class A)

- 10.03 Installs traction control equipment
- 10.05 Installs governors
- 10.07 Installs machine/control room/space wiring and electrical components
- 11.01 Installs work platforms
- 11.02 Installs car/carriage enclosure
- 11.04 Installs passenger door operators, gates and re-opening devices/Installs barrier-free lift door operators
- 11.06 Installs freight door operators, gates and re-opening devices
- 11.08 Installs car top control devices
- 11.10 Installs car top electrical protective devices
- 12.01 Performs pre-inspection procedures on passenger and freight elevating devices.
- 12.02 Performs initial inspection on passenger and freight elevating devices.

Suggested Hours

78 Hours

Objectives and Content

1. Define terminology associated with traction elevator installation.
2. Identify hazards and describe safe work practices pertaining to traction elevator installation.
3. Interpret codes and regulations pertaining to traction elevator installation.
4. Interpret information pertaining to traction elevator installation found on drawings and specifications.
5. Identify tools and equipment pertaining to traction elevator installation and describe their applications and procedures for use.

6. Identify components of traction elevators and describe their purpose and operation.
 - i) hoistways
 - ii) guide rails
 - iii) machine room equipment
 - iv) pit equipment
 - v) car counterweight assembly
 - vi) wire ropes, sheaves and suspension devices
 - vii) door frames
 - viii) hoistway doors and lock assemblies
 - access devices
 - door closures
 - ix) duct risers and conduit
 - x) wiring and hoistway switches
 - xi) travelling cables
 - xii) car/cab assemblies
 - xiii) car door systems

7. Describe the procedures used for site planning.

8. Describe the procedures used to plumb hoistways.
 - i) required dimensions
 - ii) vertically plumb
 - iii) lifelines
 - iv) fall arrest system
 - v) overhead protection
 - vi) dividing beams
 - vii) measurement calculations main layout
 - viii) working lines
 - ix) templates
 - x) plumb lines
 - xi) dimensional measuring devices
 - xii) temporary and/or working platforms

9. Describe the procedures used to install guide rails.
 - i) planning guide rail runs
 - ii) preparing rails
 - iii) stacking rails
 - iv) fish plates
 - v) rail clips
 - vi) rail alignment
 - vii) rail gauges
 - viii) finishing rails

10. Describe the procedures used to install machine room equipment.
 - i) machine beams
 - ii) machine
 - iii) deflector sheaves
 - iv) governors
 - v) controllers
 - vi) monitoring devices
 - vii) encoders
 - viii) machine room less equipment (MLR)

11. Describe the procedures used to wire machine room equipment.
 - i) electrical field wiring diagrams
 - ii) wire ways and conduit
 - iii) raceway layout
 - iv) wire run sheets
 - v) wire and conduit sizes
 - vi) grounding requirements

12. Describe the procedures used to install pit equipment.
 - i) channels
 - ii) compensating sheaves
 - iii) buffers
 - iv) governor tension sheaves
 - v) pit switches
 - vi) counterweight guards
 - vii) ladders
 - viii) sundry pit equipment
 - ix) access doors

13. Describe the procedures used to install car and counterweight assemblies.
 - i) car frames
 - ii) platforms and isolation
 - iii) sheaves and rope hitches
 - iv) safety types
 - v) guide shoes and roller guides
 - vi) toe guards
 - vii) static and dynamic balancing
 - viii) counterweight frame
 - ix) positioning
 - x) balancing
 - xi) idler sheaves
 - xii) freight cars
 - xiii) corner post elevators

14. Identify factors to consider when selecting wire rope.
 - i) rope material
 - ii) wire count
 - iii) strand count
 - iv) recording rope data

15. Describe the procedures used to install wire ropes. care and handling
 - i) rope inspection for defects
 - ii) shortening ropes
 - iii) cutting ropes
 - iv) governor ropes
 - v) belt ropes
 - vi) compensating ropes
 - vii) compensating chains
 - viii) rope tensioning
 - ix) rope lubrication
 - x) rope termination devices
 - xi) rope lubrication procedures
 - xii) rope clip and eyebolt requirements
 - xiii) wedge clamp shackles
 - xiv) run-by clearances
 - xv) roping 1:1
 - xvi) roping 2:1

16. Describe the procedures used to install door frames.
 - i) elevation
 - ii) struts
 - iii) headers
 - iv) jambs
 - v) sills
 - vi) plumbing and alignment
 - vii) hall fixture mountings
 - viii) lobby panels and fixtures
 - fire service
 - emergency power
 - hoistway access switches

17. Describe the procedures used to install hoistway doors and lock assemblies.
 - i) access devices
 - ii) door closures
 - iii) aircord
 - iv) eccentrics
 - v) retainers
 - vi) gibs and fire gibs

- vii) fire rating
 - viii) facia plates
 - ix) bi-parting doors
 - x) vertical gates
 - xi) dumbwaiter doors and locks
 - xii) retiring cams
18. Describe the procedures used to install duct risers and conduit.
- i) interpret field wiring diagrams
 - ii) identify wire ways
 - iii) identify conduit layout and fittings
 - iv) review installation planning procedures
 - v) identify raceway layout
 - o wire
 - o duct sizes and numbering of conductors
 - vi) describe grounding and bonding procedures
 - vii) strain blocks and fish paper
19. Describe the procedures used to install wiring and hoistway switches.
- i) interpret wiring diagrams
 - ii) determine wiring requirements
20. Describe the procedures used to install travelling cables.
- i) prevention of kinking or birdcaging
 - ii) hanger types and applications
 - iii) protection for traveling cables
 - iv) replacement practices
21. Describe the procedures to install car cab assemblies.
- i) assembly of wall panels
 - ii) cab steadier
 - iii) car operating panels
 - iv) panels and hand railings
 - v) ceilings and fixtures
 - vi) top of car equipment
 - vii) emergency exit
 - viii) wiring methods
 - o field wiring diagram
 - o top of car electrical devices
 - o car operating panel
 - o car positioning indicator

22. Identify types of car door systems and their characteristics and applications.
23. Describe the procedures used to install car door systems.
- i) door operators
 - special hospital service
 - ii) wiring methods
 - iii) hanger and tracks
 - iv) linkages
 - v) aircord
 - vi) eccentrics
 - vii) gate switches
 - viii) vanes and clutches
 - ix) door restrictors
 - x) clearance checks and adjustments
 - xi) mechanical safety edges
 - xii) multi-beam devices
 - xiii) detectors
 - xiv) photo eyes
 - xv) proximity devices
 - xvi) kinetic energy measurement and requirements
24. Describe start-up procedures.
- i) brake hold adjustment
 - ii) fusing protection
 - iii) safety circuits
 - iv) temporary jumpers and wiring
 - v) car counterweight balancing
25. Describe special emergency service procedures.
- i) emergency recall system
 - ii) firefighter services
 - iii) S.E.S. phase I and II
 - iv) sequence of operation
 - v) special hospital service requirements
26. Describe the procedures used to prepare elevating devices for inspection.
- i) remove from temporary operation
 - ii) remove temporary jumpers
 - iii) communication links
 - iv) test safety and door lock circuits
 - v) setting door operation
 - opening speed
 - closing speed
 - closing force

- vi) setting contract, leveling and inspection speeds
- vii) completion procedure for field tests and data reports

27. Describe the procedures used to perform inspection tests.

- i) branch inspection
- ii) inspection check list:
 - check building
 - lighting
 - tripping hazards
 - contractor deficiency list
 - full load safety test
 - full load oil buffer test
 - full load running test
 - run-by distances and clearances
 - door operating times and closing force
 - ground test on primary safety circuit
 - machine room equipment identification
 - final clean-up
 - turnover inspection
 - redundancy tests

Practical Objectives

N/A

EDM-310 Elevator Hydraulic System Maintenance

Learning Outcomes

- Demonstrate knowledge of elevator hydraulic systems maintenance requirements.
- Demonstrate knowledge of procedures to inspect, test and troubleshoot elevator hydraulic systems and components.
- Demonstrate knowledge of procedures to adjust, maintain and repair elevator hydraulic systems and components.

Nova Scotia Occupational Standard Reference (Class A)

- 9.02 Maintains pit hydraulic components.
- 10.02 Maintains hydraulic control equipment
- 12.03 Performs mandated maintenance tests on passenger and freight elevating devices.

Suggested Hours

36 Hours

Objectives and Content

1. Define terminology associated with elevator hydraulic systems maintenance.
2. Identify hazards and describe safe work practices pertaining to elevator hydraulic systems maintenance.
3. Interpret codes and regulations pertaining to elevator hydraulic systems maintenance.
4. Interpret information pertaining to elevator hydraulic systems found on drawings and specifications.
5. Identify tools and equipment pertaining to elevator hydraulic systems and describe their applications and procedures for use.
6. Identify types of hydraulic pumping system components and describe their characteristics and applications.
 - i) tanks and reservoirs
 - ii) distribution systems
 - pipes
 - tubing
 - flexible hoses
 - couplings

- grooved
- threaded, NPT and NPTF
- isolation
- pressure ratings of pipes, hoses, couplings and fittings
- sound isolation
- iii) pumps
- iv) pump drives
 - couplings
 - electric motors
 - submersed
 - non-submersed
- v) plungers and cylinders
 - plunger stop ring
 - plunger coupling
 - cylinders
 - above and below ground
 - gland, seal (packing), wiper ring
- vi) control valves
 - relief valve
 - manual lowering valve
 - shut off valve

7. Identify types of elevator hydraulic system components and describe their purpose and operation.

- i) fluid level indicators
- ii) fluid filters
- iii) distribution systems
- iv) pumps
- v) plungers and cylinders
- vi) valve control of flow direction, rate, and pressure
- vii) pressure switches
- viii) pressure gauges
- ix) telescoping jacks
- x) safeties
- xi) roped hydraulics

8. Describe effects of corrosion and protective measures.

- i) electrolysis
- ii) passive and active cathodic protection
- iii) PVC protection

9. Describe the procedures used to inspect, test and troubleshoot elevator hydraulic systems.

- i) visual inspection
 - fluid leaks
 - loose fasteners or brackets
 - corrosion
 - ii) testing
 - case studies
 - hydraulic defects
 - electrical defects
 - mechanical defects
 - iii) troubleshooting
 - unexplained loss of oil in the hydraulic system
 - trapped air problems
 - excessive high or low oil temperatures
10. Describe the procedures used to maintain and adjust elevator hydraulic systems.
- i) control valve set-up procedure
 - ii) operating sequence for valve solenoids
 - iii) relief valve set-up
 - iv) packing (seal) friction
 - v) oil temperature and control valve performance

Practical Objectives

N/A

EDM-315 DC Motors, Generators, Controls and Drives

Learning Outcomes

- Demonstrate knowledge of DC motors, their components and operation.
- Demonstrate knowledge of DC generators, their components and operation.
- Demonstrate knowledge of DC motor controls and drive, their components and operation.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Suggested Hours

30 Hours

Objectives and Content

1. Define terminology associated with DC motors, generators, controls and drives.
2. Interpret codes and regulations pertaining to DC motors, generators, controls and drives.
3. Identify hazards and describe safe work practices pertaining to DC motors, generators, controls and drives.
4. Interpret information pertaining to DC motors, generators, controls and drives found on drawings and specifications.
5. Identify tools and equipment pertaining to DC motors, generators, controls and drives and describe their applications and procedures for use.
6. Explain the operating principles of DC motors and generators
7. Identify types of DC motors and describe their characteristics and applications.
 - i) DC motor action
 - ii) counter electromotive force (CEMF)
 - iii) speed of a motor
 - iv) efficiency
 - v) hysteresis loss
 - vi) armature Eddy current loss
 - vii) pole face Eddy currents

- viii) speed and torque in a compound motor
 - ix) cumulative compound motors
 - x) differential compound motors
8. Identify types of generators and describe their characteristics, and applications.
- i) electromagnetism pertaining to motor generator action
 - induction
 - induced EMF strength
 - motion on direction of current
 - ii) elementary generator operation
 - iii) elementary generator components
 - loop of wire
 - field poles
 - slip rings
 - iv) principles of operation
 - direction of induced voltage
 - Fleming's right hand rule
 - induced voltage and current
 - v) voltage output waveform
 - vi) commutator segments, brushes and brush rigging
 - commutation
 - vii) DC generator armature
 - viii) DC generator field structure
 - ix) current flow
 - x) series
 - xi) shunt
 - xii) compound
 - xiii) field windings
9. Identify DC motor components and describe their purpose and operation.
- i) main frame
 - ii) pole pieces
 - iii) field windings
 - iv) end bells
 - v) armature assemblies
 - armature core
 - laminations
 - windings
 - lap
 - wave
 - commutator
 - brush rigging
 - bearings (roller, ball, sleeve)
 - cooling

- balancing
 - vi) exciters
 - vii) name plate data
10. Describe DC motor performance characteristics.
- i) output voltage and amperage
 - wave forms
 - voltage and amperage limits
 - ii) input voltage and amperage
 - loop circuit
 - lifting loads
 - lowering loads
 - resistance
 - iii) motor applications
 - expected (smooth ride, leveling accuracy)
 - specified (flight time)
 - predictable (repeatability)
 - iv) torque
 - v) current draw
 - vi) load and speed compensation
 - vii) motors for other elevating devices
 - door motors
 - other DC motors
11. Identify types of DC motor controls and drives and describe their characteristics and applications.
- i) DC motor speed control system
 - loop circuits
 - compounding
 - ii) control system
 - DC with SCR inverter (tachometer)
 - DC with DC motor speed control system (series field)
 - DC with DC motor speed control system (tachometer)
 - iii) speed control
 - open loop
 - closed loop
 - iv) SCR/transistor drives
 - two quadrant
 - four quadrant
 - v) speed sensing devices
 - tachometers
 - encoders
 - vi) electronic drive safety features

Practical Objectives

N/A

EDM-320 Electricity for Elevating Devices

Learning Outcomes

- Demonstrate knowledge of electrical system control devices, their characteristics and applications.
- Demonstrate knowledge of transformers, their characteristics and applications.
- Demonstrate knowledge of electrical distribution and control systems, their characteristics and applications.
- Demonstrate knowledge of procedures to install electrical distribution and control systems.
- Demonstrate knowledge of electrical schematic diagrams.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Suggested Hours

54 Hours

Objectives and Content

1. Define terminology associated with electricity for elevating devices.
2. Interpret codes and regulations pertaining to all electricity for elevating devices.
3. Identify hazards and describe safe work practices pertaining to all electricity for elevating devices.
4. Interpret information pertaining to electricity for elevating devices found on electrical diagrams and schematics.
 - i) power circuit
 - ii) rotating equipment
 - iii) power supplies
 - iv) fuses and breakers
 - v) overload/overheat devices
 - vi) safety circuit
 - vii) direction circuit
 - viii) brake circuit
 - ix) door operating circuit
 - x) door position monitoring system
 - xi) signals

- xii) valve solenoids (hydraulic)
 - xiii) car and hoistway door interlocks
5. Identify tools and equipment pertaining to electricity for elevating devices and describe their applications and procedures for use.
6. Identify electrical system control devices and describe their characteristics and applications.
- i) switches
 - switch notation
 - contacts and ratings
 - pushbutton type
 - toggle switch
 - rotary switch
 - snap action switch
 - limit switches (positive acting)
 - dual in line switches (DIP)
 - ii) relays
 - basic relay
 - coils
 - types of contacts
 - iii) types of relays
 - AC vs DC
 - plug in
 - reed
 - memory (set/reset, mechanical latching)
 - reverse phase
 - solid-state
 - Normally Open (N/O) contacts
 - Normally Closed (N/C) contacts
 - power contacts
 - iv) relay ratings
 - v) common relay circuits
 - relay interlocks (electrical and mechanical interlock)
 - self holding contacts
 - diode controlled relay
 - vi) solenoids
 - vii) timers
 - air and oil dashpot
 - motor driven
 - thermal or bimetallic
 - solid state timers
 - viii) contactors
 - ix) main line disconnect switches

- purpose
- ratings
- auxiliary contacts
- x) circuit protection devices
 - fuses (ratings, types)
 - circuit breakers
 - overload relays
 - over temperature sensing devices
- xi) rectifiers
- xii) symbols

7. Explain the operating principles of electrical system control devices.

- i) switches
 - effects of operation under load
 - DIP/switch settings/operation
- ii) relays
 - contact wipe
 - contact gap
 - contact material
 - contact conditions
 - mechanical operating principles
 - electrical operating principles
 - magnetic operating principles
- iii) solenoids
 - mechanical vs. electrical operation
- iv) timers
 - on delay/off delay
 - adjustment
- v) contactors
 - contact wipe
 - contact gap
 - contact material
 - contact conditions
 - mechanical operating principles
 - electrical operating principles
 - magnetic operating principles
- vi) main line disconnect switches
 - types
 - hazards
- vii) circuit protection devices
 - adjustment
- viii) rectifiers
 - heat dissipation

8. Identify types of electrical transformers and describe their characteristics and applications
 - i) transformer action
 - ii) moving magnetic fields
 - iii) transformer losses
 - iv) transformer ratings
 - v) primary windings
 - vi) secondary windings
 - vii) winding turns/voltage ratio
 - viii) nameplate data
 - ix) DC injection
 - x) voltage
 - xi) current
 - xii) power ratings

9. Identify types of electrical distribution and control systems and describe their characteristics and applications.
 - i) distribution systems
 - voltage relationship
 - phase to phase
 - phase to ground
 - single phase
 - three phase
 - neutral and ground
 - bonding
 - ii) control systems
 - grounded
 - ungrounded
 - iii) electrical power circuits
 - motor start circuits
 - power circuits
 - iv) motion control systems
 - single and two speed AC motors
 - DC motor speed control
 - solid-state drive
 - variable voltage - variable frequency drives
 - v) brake controls
 - DC
 - AC
 - brake cooling through resistance

10. Identify types of electrical circuit conductors and wiring devices and describe their characteristics and applications.
 - i) electrical conductors
 - solid
 - stranded
 - insulating materials and ratings
 - ii) American wire gauge numbers (AWG)
 - iii) current carrying capacity of conductors (ampacity)
 - iv) thermal rating and designations for conductors

11. Describe the procedures used to install electrical circuit conductors and wiring devices.
 - i) stripping and connecting wires
 - ii) determining wire sizes
 - iii) construction wiring
 - iv) survey and planning
 - v) making pull sheets
 - traveling cables
 - field wiring diagrams
 - straight line wiring diagrams
 - vi) wiring the hoistway and machine room
 - wiring tools
 - wiring materials
 - wiring hardware
 - hoistway devices
 - marking wires and cables
 - pulling hoistway wires
 - high rise installation
 - branch runs
 - using a running car
 - pulling machine room wires
 - connecting machine room wires
 - connecting hoistway wires
 - vii) piping and wiring the car
 - car fixtures and equipment
 - car junction box
 - piping the car
 - junction box on top of the car
 - junction box under the car
 - junction box inside the car operating panel
 - devices and switches

Practical Objectives

1. Read and interpret electrical schematic diagrams.

Level 4
5 Weeks (150 hours)

EDM-400 Workplace Mentoring II (Class A)

Learning Outcomes

- Demonstrate knowledge of strategies for teaching workplace skills.

Nova Scotia Occupational Standard Reference (Class A)

4.02 Uses mentoring techniques

Suggested Hours

6 Hours

Objectives and Content

2. Identify different role played by a workplace mentor.
3. Describe teaching skills.
4. Explain the importance of identifying the point of a lesson.
5. Identify how to choose a good time to present a lesson.
6. Explain the importance of linking the lesson.
7. Identify the component of the skill (the context).
8. Describe considerations for demonstrating a skill.
9. Identify types of skill practice.
10. Describe considerations in setting up opportunities for skill practice.
11. Explain the importance of providing feedback.
12. Identify techniques for giving effective feedback.
13. Describe a skills assessment.
14. Identify methods of assessing progress.
15. Explain how to adjust a lesson to different situations.

Practical Objectives

N/A

EDM-405 Escalators and Moving Walkways Installation

Learning Outcomes

- Demonstrate knowledge of escalators and moving walkways, their components and operation.
- Demonstrate knowledge of procedures to install escalators and moving walkways.
- Demonstrate knowledge of procedures for preparing and testing for inspection.

Nova Scotia Occupational Standard Reference (Class A)

- 15.01 Assesses installation site for escalators and moving walkways
- 15.02 Installs mechanical systems on escalators and moving walkways
- 15.04 Installs electrical systems on escalators and moving walkways
- 15.06 Adjusts escalators and moving walkways
- 16.01 Performs initial inspection of escalators and moving walkways
- 16.03 Performs return to service procedures on escalators and moving walkways

Suggested Hours

15 Hours

Objectives and Content

1. Define terminology associated with escalators and moving walkways.
2. Identify hazards and describe safe work practices pertaining to escalators and moving walkways installation.
3. Interpret codes and regulations pertaining to escalators and moving walkways installation.
4. Interpret information pertaining to escalators and moving walkways installation found on drawings and specifications.
5. Identify tools and equipment pertaining to escalators and moving walkways installation and describe their applications and procedures for use.
6. Describe operating principles of escalators and moving walkways.
7. Identify types of escalators and moving walkways and describe their components and operation.
 - i) drive mechanisms

- ii) moving belts
 - iii) steps, pallets and belt type treadway
 - iv) power systems
 - v) handrail systems
 - vi) balustrades
 - vii) electrical protective devices
 - viii) other protection devices
8. Describe the procedures used to prepare for installation of escalators and moving walkways.
- i) verify site is ready for installation
 - size of wells
 - bearing surfaces
 - accessibility
 - readiness to receive units
 - ii) outline rigging and hoisting truss procedures
 - slings
 - chain falls
 - A-frames and gantries
 - cranes
9. Describe construction methods and the procedures used to install escalators and moving walkways.
- i) working lines
 - main layout drawings
 - center line stands
 - piano wire
 - ii) plumb bob
 - measuring devices
 - adjusting center line to center marks on truss
 - iii) setting truss
 - jack and leveling equipment
 - building of grid lines
 - finishing floor elevations
 - iv) tracks and brackets
 - use of measuring devices
 - referencing the center line
 - leveling the tracks
 - v) machine, bull gear and tension carriage
 - use of hoisting equipment
 - positioning
 - vi) wire the electrical components
 - reference main layout drawings
 - reference field wiring diagrams

- vii) chains and belts
 - viii) steps, pallets and belts
 - fastening techniques
 - shimming
 - ix) skirting and decking
 - aligning and fastening
 - butt joints and clearances
 - x) newels and tracks
 - fitting and securing
 - xi) handrails and guide assemblies
 - fitting and securing
 - xii) electrical protective devices
 - xiii) specified equipment adjustments
 - setting all safety switches
 - testing all safety switches
 - adjusting brake control
 - step indexing
 - clearances
10. Describe the procedures used to prepare escalators and moving walkways for inspection.
- i) specified equipment adjustments
 - ii) setting all safety switches
 - iii) testing all safety switches
 - iv) adjusting brake control
 - v) step indexing
 - vi) clearances

Practical Objectives

N/A

EDM-410 Preventive Maintenance

Learning Outcomes

- Demonstrate knowledge of preventive maintenance procedures.
- Demonstrate knowledge of public safety requirements and liability concerns.
- Demonstrate knowledge of incident and accident investigations.

Nova Scotia Occupational Standard Reference (Class A)

12.04 Performs return to service procedures on passenger and freight elevating devices.
Integrated throughout

Suggested Hours

12 Hours

Objectives and Content

1. Define terminology associated with preventive maintenance.
2. Interpret codes and regulations pertaining to all preventive maintenance.
3. Identify hazards and describe safe work practices pertaining to preventive maintenance.
4. Interpret information pertaining to preventive maintenance found on drawings and specifications.
5. Identify tools and equipment used for preventive maintenance and describe their applications and procedures for use.
6. Describe preventative maintenance, its purpose, scheduling and documentation requirements.
7. Describe effective communication and professionalism when dealing with the public in occupied buildings and worksites.
8. Describe the procedures used to perform an investigation of an incident/accident.
 - i) secure site
 - ii) document details
 - iii) notify company officials

- iv) notify AHJ
9. Describe responsibilities of an owner and a contractor after an incident or accident.
- i) owner responsibilities
 - ii) contractor responsibilities
 - iii) review AHJ accident/incident report form
10. Describe the procedures used to take an elevating device out of service.
- i) maintenance operation in controller
 - ii) method of ensuring the device is unoccupied
 - iii) method of locking main disconnect switch in the off position
 - iv) assuring the device is mechanically secured
11. Describe the procedures used to inspect elevating device equipment and performance.
- i) safety circuits and devices
 - ii) mechanical operating components
 - iii) electrical operating components
 - iv) abnormal noises or odours
 - v) condition of all equipment
 - vi) operation and condition of fixtures
 - vii) appearance and cosmetic details
12. Describe the procedures used to perform preventive maintenance and repair.
- i) follow safety rules for working in machine rooms, on car tops and in the hoistway or pit
 - ii) take equipment out of service
 - iii) reinstate equipment into service
 - iv) ride elevating device to ensure it is operating according to specifications prior to releasing it for public use
 - v) observe the location of smoke and heat detector when using heat and smoke generating equipment
 - vi) prevent dropping items from car tops or hall entrances when doors are open
 - vii) provide protection for floors and carpets
13. Describe the procedures used to bring an elevating device back into service.
- i) electrical protective devices are operating normally
 - ii) ensure all equipment is restored to normal operation
 - iii) test and verify the correct operation prior to returning to service
14. Describe elevating device use of remote monitoring.
- i) read and interpret information provided by computer monitor systems
 - ii) interpret diagnostic screen or printer
 - iii) display management technique

EDM-415 CSA B44 Section C.8.6.12 and Appendix J

Learning Outcomes

- Demonstrate knowledge of maintenance requirements outlined in CSA B44 Section C.8.6.12 and Appendix J.
- Demonstrate knowledge of examinations and tests outlined in CSA B44 Section C.8.6.12 and Appendix J.

Nova Scotia Occupational Standard Reference (Class A)

- 12.01 Performs pre-inspection procedures on passenger and freight elevating devices
- 12.02 Performs initial inspection on passenger and freight elevating devices
- 12.03 Performs mandated maintenance tests on passenger and freight elevating devices
- 14.01 Performs pre-inspection of other elevating devices
- 14.02 Performs initial inspection of other elevating devices
- 14.03 Performs mandated maintenance tests on other elevating devices
- 14.04 Performs return to service procedures on other elevating devices
- 16.01 Performs initial inspection of escalators and moving walkways
- 16.02 Performs maintenance tests on escalators and moving walkways
- 16.03 Performs return to service procedures on escalators and moving walkways

Suggested Hours

3 Hours

Objectives and Content

1. Define terminology associated with CSA B44 Section C.8.6.12 and Appendix J.
2. Describe the maintenance requirements for all installations outlined in CSA B44 Section C.8.6.12 and Appendix J.
3. Demonstrate knowledge of mandated maintenance inspection and tests outlined in CSA B44 Section C.8.6.12 and Appendix J.
4. Describe mandatory maintenance inspection and tests outlined in CSA B44 Section C.8.6.12 and Appendix J.
 - i) elevators
 - ii) dumbwaiters
 - iii) escalators
 - iv) moving walkways

Practical Objectives

N/A

EDM-420 Elevator Machine Room Equipment Maintenance

Learning Outcomes

- Demonstrate knowledge of elevator machine room equipment maintenance requirements.
- Demonstrate knowledge of procedures used to inspect and test elevator machine room equipment and components.
- Demonstrate knowledge of procedures to adjust, maintain and repair machine room equipment and components.
- Demonstrate knowledge of procedures to perform pressure tests on hydraulic systems.

Nova Scotia Occupational Standard Reference (Class A)

10.06 Maintains governors

10.08 Maintains machine/control room/space wiring and electrical components

12.03 Performs mandated maintenance tests on passenger and freight elevating devices

13.03 Maintains mechanical systems on other elevating devices

13.05 Maintains electrical systems on other elevating devices

Suggested Hours

36 Hours

Objectives and Content

1. Define terminology associated with elevator machine room equipment maintenance.
2. Identify hazards and describe safe work practices pertaining to elevator machine room equipment maintenance.
3. Interpret codes and regulations pertaining to elevator machine room equipment maintenance.
4. Interpret information pertaining to elevator machine room equipment maintenance found on drawings and specifications.
5. Identify tools and equipment pertaining to elevator machine room equipment maintenance and describe their applications and procedures for use.

6. Describe maintenance checks and procedures for motors and generators.
 - i) odors relating to electrical problems, overheating, etc.
 - ii) touch for heat, cold, vibration etc.
 - iii) sight of visual problems
 - iv) sounds normal and abnormal
 - v) identify evidence of carbon contamination
 - vi) identify worn or sticking brush gear
 - vii) identify loose connections
 - viii) check bearing oil levels
 - ix) excessive heat and unexplained noise
 - x) condition of commutators

7. Describe maintenance checks and procedures for drive machines.
 - i) identify the condition of machine parts
 - gearing and backlash
 - gear and bearing lubricant quality
 - bearings and seals
 - thrust bearings
 - mating machined surfaces
 - shafts and supports anchor bolts
 - machine isolation
 - hydraulic pump units
 - drive components
 - control valves and oil distribution system
 - hydraulic oil and level
 - ii) identify source of hydraulic oil loss
 - review oil unit record logs

8. Describe maintenance checks and procedures for sheaves and drums.
 - i) condition of sheave grooves
 - normal wear
 - abnormal wear
 - brinelling
 - ii) wire rope tracking
 - iii) features of sheave groove non-metallic liners
 - iv) rope creep and slip conditions
 - v) integrity of sheave shafts and bearings
 - vi) integrity of torque transmitting elements to drive sheaves
 - keys
 - fitted bolts
 - vii) integrity of wire rope fastenings on drums

9. Describe the maintenance checks and procedures for machine brakes.
 - i) brake action checks

- ii) brake system cleaning procedures
 - iii) brake system lubricating procedures
 - iv) brake system adjustment and alignment procedures
 - brake core lift
 - shoe to drum contact
 - brake torque
 - v) brake system testing procedures
10. Describe the maintenance checks and procedures for machine safety devices.
- i) machine governor operation
 - ii) testing procedures of governor system components
 - electrical switches
 - tripping switches
 - tripping speed and pull through force
 - iii) outline the procedure to spin test governors with a tachometer
 - iv) governor cleaning and lubrication
 - v) rope brakes construction features, operation and maintenance
 - vi) sheave jamming devices construction features, operation and maintenance
 - vii) causes of uncontrolled motion
11. Describe the maintenance checks and procedures for control equipment.
- i) integrity and condition
 - connections
 - contacts
 - leads
 - relays
 - contactors
 - solid state components
 - fuses
 - circuit breakers
 - overload/overheat protection devices
 - drive unit
 - ii) cleaning control equipment
 - iii) electromechanical components and assemblies
 - lubrication
 - adjustment
 - replacement of worn or defective components
12. Describe the maintenance checks and procedures for wire rope.
- i) cleaning and lubricating
 - ii) characteristics of wire rope
 - iii) inspection
 - iv) checking and adjusting tension
 - v) measuring

- vi) prevention of corrosion (rust)
 - vii) integrity of wire rope termination
13. Describe the procedures used to perform pressure tests on hydraulic systems.
- i) visual inspection for fluid leaks
 - ii) pressure tests

Practical Objectives

N/A

EDM-425 Elevator Car Equipment Maintenance

Learning Outcomes

- Demonstrate knowledge of elevator car equipment maintenance requirements.
- Demonstrate knowledge of procedures to inspect and test elevator car equipment and components.
- Demonstrate knowledge of procedures to adjust, maintain and repair elevator car equipment and components.

Nova Scotia Occupational Standard Reference (Class A)

11.03 Maintains car/carriage enclosure

11.05 Maintains passenger door operators, gates and re-opening devices

11.07 Maintains freight door operators, gates and re-opening devices

11.09 Maintains car top control devices

11.11 Maintains car top electrical protective devices

Suggested Hours

12 Hours

Objectives and Content

1. Define terminology associated with elevator car equipment maintenance
2. Identify hazards and describe safe work practices pertaining to elevator car equipment maintenance
3. Interpret codes and regulations pertaining to elevator car equipment maintenance
4. Interpret information pertaining to elevator car equipment maintenance found on drawings and specifications.
5. Identify tools and equipment pertaining to elevator car equipment maintenance and describe their applications and procedures for use.
6. Describe maintenance checks and procedures for elevator car doors and gates.
 - i) door operation
 - ii) door re-opening devices
 - iii) gib wear, eccentric adjustment and retainers
 - iv) skates, vanes and clutches
 - v) gate switches and operating rollers

- vi) linkage arms and assemblies
 - vii) re-opening device cabling
 - viii) relating devices
 - ix) sills
7. Describe maintenance checks and procedures for elevator enclosures.
- i) call buttons
 - ii) alarm button (including emergency power supply)
 - iii) key switches
 - iv) other fixtures and bulbs
 - v) operation of communication system
 - vi) audible devices
 - vii) cab interior
 - viii) emergency lighting
8. Describe maintenance checks and procedures for elevator car tops.
- i) load weighing devices
 - ii) guides
 - o shoes
 - o slippers
 - o rollers
 - iii) clean adjust and lubricate guides as required
 - iv) retiring cams and motors
 - v) clean adjust and lubricate as required
 - vi) wire rope shackles, hitches and springs
 - vii) door operators, cam assemblies and resistors
 - viii) sheaves, guards and shafts
 - ix) data plates
 - x) electrical switches and switch assemblies
 - xi) governor rope hitch, release carriers, levers, arms, return springs
 - xii) car top cleaning
 - xiii) escape hatch
9. Describe maintenance checks and procedures for elevator car bottoms.
- i) safeties
 - ii) load weighing devices
 - iii) guide shoes, slippers, rollers
 - o clean, adjust and lubricate
 - iv) isolation devices
 - v) traveling cable attachments
 - vi) compensating rope and chain attachments
 - vii) buffer striker plates
 - viii) platen and plunger attachments (hydraulic)
 - ix) mechanical stored energy

- pipe stands
- rail clamps

10. Describe maintenance checks and procedures for elevator car safeties.
- i) disassembling
 - ii) cleaning
 - iii) lubricating
 - iv) reassembling
 - v) adjusting
 - vi) testing

Practical Objectives

N/A

EDM-430 Elevator Hoistway and Pit Equipment Maintenance

Learning Outcomes

- Demonstrate knowledge of elevator hoistway and pit equipment maintenance requirements.
- Demonstrate knowledge of procedures to inspect and test elevator hoistway and pit equipment and components.
- Demonstrate knowledge of procedures to adjust, maintain and repair elevator hoistway and pit equipment and components.

Nova Scotia Occupational Standard Reference (Class A)

- 8.03 Maintains counterweight and car guide systems
- 8.05 Maintains car/carriage and counterweight suspension means
- 8.07 Maintains hoistway door entrance assemblies
- 8.09 Maintains travelling cables
- 8.11 Maintains hoistway wiring
- 8.13 Maintains hoistway electrical components
- 9.02 Maintains pit hydraulic components
- 9.04 Maintains pit equipment

Suggested Hours

12 Hours

Objectives and Content

1. Define terminology associated with elevator hoistway and pit equipment maintenance
2. Identify hazards and describe safe work practices pertaining to elevator hoistway and pit equipment maintenance
3. Interpret codes and regulations pertaining to elevator hoistway and pit equipment maintenance
4. Interpret information pertaining to elevator hoistway and pit equipment maintenance found on drawings and specifications.
5. Identify tools and equipment pertaining to elevator hoistway and pit equipment maintenance and describe their applications and procedures for use.
6. Describe the maintenance checks and procedures for elevator hoistway door equipment.

- i) locking equipment
 - ii) pick-up rollers
 - iii) gibs
 - iv) sight guards
 - v) retainers
 - vi) eccentrics
 - vii) tracks
 - viii) hangers
 - ix) hanger rollers
 - x) cleaning
 - xi) lubricating
 - xii) adjustments
7. Describe the maintenance checks and procedures for the elevator hoistway counterweight assembly.
- i) rope hitch
 - ii) shackles
 - iii) springs
 - iv) guide rollers
 - v) slippers
 - vi) buffer
 - vii) buffer striker plate
 - viii) rods
8. Describe maintenance checks and procedures for elevator hoistway vanes and switches.
- i) operation
 - ii) clearance between vanes and switches
9. Describe maintenance checks and procedures for elevator hoistway counterbalance ratio.
- i) after cab renovations
 - ii) after replacement of traveling cables
10. Describe maintenance checks and procedures for elevator hoistway governor rope.
- i) normal and abnormal wear
 - ii) breaks
 - iii) clean and lubricate
11. Describe maintenance checks and procedures for elevator hoistway traveling cable suspension.
- i) potential interference with the building structure
 - ii) normal and abnormal wear
 - iii) traveling cable hang loop
 - iv) provide beam pads

12. Describe maintenance checks and procedures for elevator hoistway car top sheave clearances.
 - i) deflector sheave mounting
 - ii) normal and abnormal wear
 - iii) car top clearance and run-by
 - iv) overhead deflector sheave, shaft and bearings
 - v) clean and lubricate

13. Describe maintenance checks and procedures for elevator hoistway pit equipment.
 - i) governor tension sheave
 - ii) compensating sheave
 - iii) oil buffers
 - iv) buffer mounting arrangements
 - v) car counterweight run-by
 - vi) limit and other EPD switches
 - vii) tape sheaves and tensioning assemblies
 - viii) pit light and light switch
 - ix) pit ladders
 - x) inspection platforms
 - xi) pit stop switches
 - xii) hydraulic cylinders, oil lines and pipe rupture valves

Practical Objectives

N/A

EDM-435 Escalators and Moving Walkways Maintenance

Learning Outcomes

- Demonstrate knowledge of escalators and moving walkways maintenance requirements.
- Demonstrate knowledge of procedures to inspect and test escalators and moving walkways and components.
- Demonstrate knowledge of procedures to adjust, maintain and repair escalators and moving walkways and components.

Nova Scotia Occupational Standard Reference (Class A)

- 15.03 Maintains mechanical systems on escalators and moving walkways
- 15.05 Maintains electrical systems on escalators and moving walkways
- 15.06 Adjusts escalators and moving walkways
- 16.02 Performs maintenance tests on escalators and moving walkways

Suggested Hours

9 Hours

Objectives and Content

1. Define terminology associated with escalators and moving walkways maintenance.
2. Identify hazards and describe safe work practices pertaining to escalators and moving walkways maintenance.
3. Interpret codes and regulations pertaining to escalators and moving walkways maintenance.
4. Interpret information pertaining to escalators and moving walkways maintenance found on drawings and specifications.
5. Identify tools and equipment pertaining to escalators and moving walkways maintenance and describe their applications and procedures for use.
6. Identify types of electrical protective devices of escalators and moving walkways and describe their purpose and operation.
 - i) emergency stop buttons
 - ii) speed governors
 - iii) broken step chain device

- iv) stop switch in machinery spaces
 - v) skirt obstruction device
 - vi) escalator egress restriction device
 - vii) reverse stop device
 - viii) step up thrust device
 - ix) disconnect motor safety device
 - x) step level device
 - xi) handrail entry device
 - xii) comb-step impact device
 - xiii) step lateral displacement device
 - xiv) stop switch in inspection controls
 - xv) handrail speed monitoring device
 - xvi) missing step device
7. Identify types of other protective devices and describe their purpose and operation.
- i) step demarcation lights
 - ii) caution signs
 - iii) comb plates
 - iv) ceiling guards
 - v) anti-slide devices
 - vi) deck barricades
8. Describe the procedures used to prepare the work for maintenance.
- i) ensure public safety
 - ii) barricades
 - iii) carpets and floors
 - iv) storage of steps
 - v) noise levels
 - vi) cleaning solvent odours
 - vii) smoke and heat detector locations
9. Describe the procedures used to perform maintenance tests on escalators and moving walkways.
- i) visual inspection
 - ii) performance
 - iii) safety devices
 - iv) clearances
 - v) category 1 tests
10. Describe the procedures used to adjust, maintain and repair escalators and moving walkways.

Practical Objectives

N/A

EDM-440 Elevator Modernization/Alterations

Learning Outcomes

- Demonstrate knowledge of elevating device modernization and alterations.
- Demonstrate knowledge of procedures to perform elevating device modernization and alterations in an occupied building.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Suggested Hours

15 Hours

Objectives and Content

1. Define terminology associated with elevator modernization and alterations.
2. Identify hazards and describe safe work practices pertaining to elevator modernization and alterations.
3. Interpret codes and regulations pertaining to elevator modernization and alterations.
 - i) code requirements
 - major alterations
 - minor alterations
 - type A
 - type B
 - ii) fire rating of new cab panels
 - iii) counterbalancing ratios
 - iv) changes to loading on safeties
 - v) sheave shaft load
 - vi) groove loading
 - vii) rope loading
 - viii) safety factors pertaining to hydraulic elevators
4. Interpret information pertaining to elevator modernization and alterations found on drawings and specifications.
5. Identify tools and equipment pertaining to elevator modernization and alterations and describe their applications and procedures for use.

6. Describe the procedures used to perform elevating device modernization and alterations in an occupied building.
- i) communicating with building personnel
 - ii) planning
 - iii) site conditions
 - iv) housekeeping
 - v) jumpers
 - vi) cutting out multi-group controls
 - vii) temporary controls
 - viii) safety precautions
 - asbestos
 - guarding the work areas
 - ix) delivery/storage & hoisting of new equipment
 - x) dismantling & removal of old equipment
 - xi) interfacing old equipment with new equipment
 - xii) over/under balance of counterweight during cab removal
 - xiii) rebalance of elevator
 - xiv) elevator safeties rating
 - xv) grounding
 - xvi) building power requirements
 - xvii) control wiring requirements
 - xviii) integrity of rail fastenings
 - xix) wiring new components

Practical Objectives

N/A

EDM-445 Program Review (Class A)

Learning Outcomes

- Demonstrate knowledge of the Occupational Standard and its relationship to the Certification Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Certification Examination.

Nova Scotia Occupational Standard Reference (Class A)

Entire Occupational Standard

Suggested Hours

30 Hours

Objectives and Content

1. Define terminology associated with an Occupational Standard.
 - i) major work activities (MWA)
 - ii) tasks
 - iii) sub-tasks
2. Describe the RSOS is developed and the link it has with the Certification Examination.
 - i) development
 - ii) validation
 - iii) MWA and task weighting
 - iv) examination breakdown (pie-chart)
3. Identify exam preparation resources and describe their use in preparing for the Certification Examination.
 - i) Red Seal and Agency websites
 - ii) examination preparation guide
 - iii) self-assessment guides
 - iv) exam breakdowns/counselling sheets
 - v) sample questions
4. Explain the relationship between the NSOS and the Curriculum Standard.
5. Review common occupational skills for the Elevating Device Mechanic trade as identified in the NSOS.
 - i) safety-related functions

- ii) tools and equipment
 - iii) rigging, hoisting and lifting equipment
 - iv) organizes work and documentation
 - v) communication and mentoring techniques
6. Review process to perform routine trade tasks for the Elevating Device Mechanic trade as identified in the NOS.
- i) trade activities
 - ii) measuring and layout
 - iii) rigging and hoisting/lifting and moving
7. Review process to install and maintain elevator systems for the Elevating Device Mechanic trade as identified in the NSOS.
- i) hoistway equipment
 - ii) pit equipment
 - iii) machine/control room/space equipment
 - iv) car equipment
 - v) testing and inspection
8. Review process to install and maintain other elevating devices for the Elevating Device Mechanic trade as identified in the NSOS.
- i) installation site
 - ii) mechanical systems
 - iii) electrical systems
 - iv) testing and inspection
9. Review process to install and maintain escalators and moving walkways for the Elevating Device Mechanic trade as identified in the NSOS.
- i) installation site
 - ii) mechanical systems
 - iii) electrical systems
 - iv) testing and inspection

Practical Objectives

N/A

Feedback and Revisions

This curriculum standard will be amended periodically; comments or suggestions for improvements should be directed to:

Nova Scotia Apprenticeship Agency

1256 Barrington St.

Halifax, NS B3J 1Y6

Tel: 902-424-5651

Toll Free in NS: 1-800-494-5651

www.nsapprenticeship.ca

Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate, it will result in a revision to this version of the AACS and will be detailed in the following section.

Version Changes

Revision Date	Revision	Implementation Date
March 8, 2023 (v 1.0)	Developed based on the 2019 NSOS	2022-2023 Training Year

