NOVA SCOTIA
APPRENTICESHIP
AGENCY

NOVA SCOTIA CURRICULUM STANDARD ELEVATING DEVICE MECHANIC

Based on National Harmonization Recommendations

NSCS V2 | 2023

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

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

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 journeyperson 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	
MENT-700	Mentoring I	6	48	

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	51	
EDM-205	Hydraulic Elevator Installation	20	53	
EDM-210	AC Motors, Drives and Controls	20	56	
EDM-215	Solid State Electronics	60	59	
EDM-220	Circuit Tracing	60	64	
MENT-701	Mentoring II (Class B)	6	67	
EDM-230	Program Review (Class B)	24	68	

Level Structure (continued)

Level 3, 7 Weeks (210 hrs)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
EDM-300	Work Platforms and False Cars	12	71	
EDM-305	Traction Elevator Installation	78	73	
EDM-310	Elevator Hydraulic System Maintenance	36	80	
EDM-315	DC Motors, Generators, Controls and Drives	30	83	
EDM-320	Electricity for Elevating Devices	54	87	1. Read and interpret electrical schematic diagrams.

Level 4, 5 Weeks (150 hrs)

Code	Unit Title	Hrs*	Pg	Practical Objectives*
MENT-701	Mentoring II (Class A)	6	93	
EDM-405	Escalators and Moving Walkways Installation	15	94	
EDM-410	Preventive Maintenance	12	97	
EDM-415	CSA B44 Section C.8.6.12 and Appendix J	3	99	
EDM-420	Elevator Machine Room Equipment Maintenance	36	101	
EDM-425	Elevator Car Equipment Maintenance	12	105	
EDM-430	Elevator Hoistway and Pit Equipment Maintenance	12	108	
EDM-435	Escalators and Moving Walkways Maintenance	9	111	
EDM-440	Elevator Modernization/Alterations	15	114	
EDM-445	Program Review (Class A)	30	116	

***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

Theoretical Objectives:

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

Theoretical Objectives:

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) rachet 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

Theoretical Objectives:

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

Theoretical Objectives:

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
      - scribers
      - 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

Theoretical Objectives:

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) dolleys

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

Theoretical Objectives:

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 dissembly
   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

Theoretical Objectives:

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

Theoretical Objectives:

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.
   bearings
   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

Theoretical Objectives:

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

Theoretical Objectives:

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

Theoretical Objectives:

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) Route 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

Theoretical Objectives:

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

Theoretical Objectives:

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

MENT-700 Workplace Mentoring I

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a learner.
- 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:

6 Hours

Theoretical Objectives:

1. Describe the importance of one's own individual experiences.

2. Identify behaviours that demonstrate positive learning experiences.

3. Identify the benefits of workplace mentoring for the apprentice, mentor, and employer.

4. Identify the partners involved in apprenticeship training.

5. Describe the shared responsibilities for workplace learning in apprenticeship.

6. Identify different learning needs and strategies to address challenges or barriers in the workplace.
   i) learning disabilities
   ii) language
   iii) underrepresentation

7. Identify the components that create a positive and inclusive workplace culture.
   i) workplace characteristics
   ii) individual behaviours

8. Identify various learning styles and determine one's own learning preferences.

9. Explain how learning preferences impact learning new skills.

10. Identify different learning strategies to meet individual learning needs.

11. Describe the importance of adapting to a variety of teaching and learning methods in the workplace.

12. Identify techniques for effective communication as a learner.
    i) verbal and non-verbal
    ii) active listening

13. Identify and describe personal responsibilities and attitudes that contribute to on-the-job success.
    i) self advocating
    ii) asking questions
    iii) accepting constructive feedback
    iv) working safely
    v) employing time management techniques and being punctual

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

Theoretical Objectives:

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

Theoretical Objectives:

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

Theoretical Objectives:

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

Theoretical Objectives:

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

Theoretical Objectives:

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

MENT-701 Mentoring II (Class B)

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a mentor.
- Demonstrate knowledge of strategies for teaching workplace skills.

Nova Scotia Occupational Standard Reference (Class B)

4.02 Uses mentoring techniques

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Identify the different roles played by a workplace mentor.

2. Identify strategies to create a supportive learning environment.

3. Identify techniques for effective communication as a mentor.
   i) constructive feedback
   ii) active listening
   iii) leading meetings and one-on-one sessions

4. Describe the steps in teaching a skill.
   i) identifying the point of lesson
   ii) linking the lesson
   iii) demonstrating the skill
   iv) providing practice
   v) giving feedback
   vi) assessing skill and progress

5. Identify strategies to assist in teaching a skill while meeting individual learning needs.
   i) principles of instruction
   ii) coaching skills

6. Explain how to adjust a lesson for various 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

Theoretical Objectives:

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

Theoretical Objectives:

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

Theoretical Objectives:

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
        - wire
        - 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
        - field wiring diagram
        - top of car electrical devices
        - car operating panel
        - 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

Theoretical Objectives:

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

Theoretical Objectives:

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

Theoretical Objectives:

1. Define terminology associated with electricity for elevating devices.

2. Interpret codes and regulations pertaining to al electricity for elevating devices.

3. Identify hazards and describe safe work practices pertaining to al 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)

MENT-701 Mentoring II (Class A)

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a mentor.
- Demonstrate knowledge of strategies for teaching workplace skills.

Nova Scotia Occupational Standard Reference (Class A)

4.02 Uses mentoring techniques

Suggested Hours:

6 Hours

Theoretical Objectives:

1. Identify the different roles played by a workplace mentor.

2. Identify strategies to create a supportive learning environment.

3. Identify techniques for effective communication as a mentor.
   iv) constructive feedback
   v) active listening
   vi) leading meetings and one-on-one sessions

4. Describe the steps in teaching a skill.
   vii) identifying the point of lesson
   viii) linking the lesson
   ix) demonstrating the skill
   x) providing practice
   xi) giving feedback
   xii) assessing skill and progress

5. Identify strategies to assist in teaching a skill while meeting individual learning needs.
   iii) principles of instruction
   iv) coaching skills

6. Explain how to adjust a lesson for various 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

Theoretical Objectives:

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

Theoretical Objectives:

1. Define terminology associated with preventive maintenance.

2. Interpret codes and regulations pertaining to al 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

Theoretical Objectives:

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

Theoretical Objectives:

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

Theoretical Objectives:

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
      - shoes
      - slippers
      - 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
      - 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

Theoretical Objectives:

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

Theoretical Objectives:

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 alternations in an occupied building.

Nova Scotia Occupational Standard Reference (Class A)

Integrated throughout

Suggested Hours:

15 Hours

Theoretical Objectives:

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

Theoretical Objectives:

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:

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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
May 2024	Level 1 and Final levels	Integration of MENT-700 Mentoring I and MENT-701 Mentoring II
March 8, 2023 (v 1.0)	Developed based on the 2019 NSOS	2022-2023 Training Year