ELEVATOR/ESCALATOR CONSTRUCTOR & MODERNIZER

APPENDIX A

O*NET CODE 47-4021.00

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

WORK PROCESSES

Approximate Hours

A. Tools and Equipment **150**

Safely using and caring for:

1. Handtools and measuring devices.
2. Power tools (including reciprocating saw, grinder, drill, rotary hammer).
3. Testing equipment.

B. Blueprint Reading and Layout Work **200**

1. Receiving work assignment from supervisor.
2. Reading building, elevator and electrical blueprints.
3. Determining materials needed.
4. Determining equipment needed.
5. Laying out location of all system components: structural, mechanical, electrical and hydraulic.
6. Determining the priorities or sequence of activities on the job.

C. Material Handling, Rigging and Hoisting **370**

1. Safety
2. Verifying materials received at job site against a materials list; checking condition of materials.
3. Lifting, carrying, pushing, pulling materials manually, or by using rollers or dollies.
4. Assembling scaffolding in hoistway.
5. Using ladders, scaffolds, working platforms.
6. Determining appropriate rigging equipment and method for load weight and rise.

7. Inspecting rigging for wear or defects.
8. Errecting, using, dismantling hoists, cable slings, chain falls, power chain fall, electric chain hoist, wheel well and rope.
9. Using proper hand signals.

D. Installing Rails **300**

1. Safety.
2. Checking hoistway for size and plumbness; cutting or chipping concrete in “out-of-plumb” hoistway, as appropriate, or shifting templates.
3. Cutting prefabricated sections of rail to specified dimensions.
4. Filing rail joints; filing tongues and grooves.
5. Checking squareness of rails, using gauge.
6. Fabricating rail brackets.
7. Drilling and tapping holes in concrete or structural steel members.
8. Packing, shimming and fastening brackets on each floor; using anchor bolts or by welding.
9. Packing, shimming and clipping rails to brackets.
10. Verifying alignment of rails with plumb bob and level.
11. Painting rails.
12. Lubricating rails.

E. Installing Machines and Cables for Traction Elevators **600**

1. Safety.
2. Installing motor foundations
3. Positioning motor on foundation
4. Mounting other machine room equipment including: controller, governor, generator, selector, group controllers, wheel and drive.
5. Aligning and plumbing machinery.
6. Installing winch.
7. Cutting cables to specified lengths.
8. Installing sheaves.
9. Installing and connecting cables, passing over or around sheaves.

10. Installing counterweight frame.
11. Installing and connecting counterweights.
12. Setting and adjusting brushes on motors and generators.
13. Setting generator and motor field resistance
14. Adjusting brake and selector.
15. Calibrating and testing
16. Painting machine room equipment.

F. Installing Jack and Pump for Hydraulic Elevator **500**

1. Safety.
2. Drilling hole for hydraulic jack.
3. Plumbing jack hole.
4. Casing jack hole.
5. Assembling hydraulic jack unit; packing head.
6. Installing and plumbing jack.
7. Installing pump.
8. Installing cylinder.
9. Installing PVC housing for cylinder.
10. Installing hydraulic lines from pump to jack.
11. Filling hydraulic unit with oil; adjusting and stablizing oil temperature.
12. Adjusting hydraulic valves.
13. Mounting starter and controller on wall.

G. Assembling Elevator Car **360**

1. Safety.
2. Constructing level surface for building car.
3. Cutting prefabricated sections of framework to specified dimensions.
4. Bolting or welding steel framework together.
5. Installing platform, wall panels, doors; using handtools.
6. Leveling car platform.
7. Attaching guide shoes and rollers.
8. Installing cams.
9. Installing and plugging in control panels.
10. Installing load weighing device.

11. Performing inside finsih work (e.g., handrails and flooring).

H. Installing Outer Doors and Frames **200**

1. Safety.
2. Installing hoistway entrance frames.
3. Installing hoistway door sills, struts and headers.
4. Installing hoistway door hanger tracks to headers.
5. Hanging hoistway doors on tracks.
6. Squaring doors and gates.
7. Installing door operator and closers.
8. Installing door speed regulator.
9. Installing fascia, toe guards and dust covers.

I. Installing Electrical Wiring, Components and Controls **600**

1. Safety
2. Installing conduit piping in shaft, machine room and cars.
3. Pulling electrical wires through piping.
4. Preparing and hanging traveling cable.
5. Installing main control panel in machine room.
6. Installing electrical components and devices in cars and on each floor; installing variable frequency controls.
7. Connecting electrical wiring to control panels.
8. Wiring cross-connects between controllers.
9. Connecting wiring to electrical motors and generators.
10. Properly grounding all components.
11. Testing all circuits, using equipment including: oscilloscope, meters and amp probe.
12. Wiring overhead lights, fans, emergency bells/lights and receptacles in elevator.
13. Installing, testing, adjusting solid state controls and components; programming microprocessors.

J. Adjusting the System **100**

1. Safety
2. Fine-tuning installed system until it meets specifications and codes.

K. Maintenance, Service and Repair **1,400**

1. Safety.
2. Cleaning, oiling and greasing equipment.
3. Cleaning and adjusting system components including: motor, generator, door and locks, hardware, signal and lighting circuits, sheaves and drums, cables, hydraulic pumps, car, gear, worm, brake, drivers and bearings.
4. Inspecting all system components for wear and damage; replacing worn or damaged parts.
5. Troubleshooting; diagnosing causes of malfunctions by:
    a. evaluating customer complaints
    b. visual inspection
    c. observing equipment in operation
    d. listening to equipment in operation
    e. ohmmeterf
    f. voltmeter
    g. continuity meter
    h. ammeter
    i. microprocessor-based tools
    j. wiring diagrams
    k. solid state logic probes
    l. feeling (e.g. – vibration, heat)
    m. smelling (e.g. – overheating)
6. Performing repairs on all system components

L. Modernizing Old Equipment **900**

1. Safety.
2. Bringing elevator system up to NEC standards and current building code.
3. Dismantling old elevator equipment.
4. Removing and replacing components such as: electrical motors, hydraulic pumps and control panels.
5. Altering existing printed circuit boards for updates and changes.
6. Modifying solid state controllers for upgrades.
7. Installing additional or extended control panel
8. Installing computerized controls

9. Re-assembling elevator equipment.

M. Installing and Repairing Escalators **750**

1. Safety
2. Hoisting sections of steel truss into place in wellway.
3. Installing, joining, aligning sections of truss and related supports.
4. Setting and installing motor; installing upper drive gear, lower tension carriage, drive machine and chains, brake and controller.
5. Checking correctness of prefabricated wiring; soldering/taping wiring elements together; hooking up controller wiring.
6. Installing safety and key switches.
7. Suspending prefabricated sections of stairs and tracks over framework.
8. Installing handrail tension devices, decking and guides.
9. Installing newels and inside trim.
10. Installing glass balustrades and panels.
11. Installing floor plates, comb plates, skirtboards, kickplates, molding and trim.
12. Cleaning, lubricating, performing final adjustment.
13. Inspecting parts for wear and damage; replacing parts as needed.
14. Repairing a “step pileup”.
15. Repairing a “frozen lower carriage”.

N. Installing Related Equipment (optional)* **370**

1. Safety.
2. Dumbwaiters
3. Powered walkways
4. Stair lifts
5. Wheelchair lifts
6. Theatre stage lifts

Approximate Total Hours **6,800**

*If an optional Work Process is not selected, the hours should be devoted to further mastery of the other required Work Processes.

Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to https://dol.ny.gov/public-work-and-prevailing-wage

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APPENDIX B

RELATED INSTRUCTION

Safety

1. General construction site safety
2. OSHA 10-Hour Construction Course – if required for Public Work
3. Using personal protective equipment, including full body harness
4. Fall protection
5. Electrical look-out/tag-out procedures
6. Preventing back injury
7. Safely using, storing, disposing of chemicals (e.g. – cleaning compound, hydraulic oil)
8. Asbestos Awareness – minimum 4 hours (see attached)
9. Alcohol and drug awareness
10. First Aid – minimum 6.5 hours every 3 years
11. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law

Blueprints

1. Reading building, elevator and electrical prints
2. Basic sketching

Mathematics

1. Basic arithmetic
2. Measurement
3. Math for Basic Electricity
4. Algebra

Trade Theory

1. Applied physics
2. Electrical theory
3. Local and national electrical codes
4. Electronic theory

Trade Science

1. Introduction to Elevators
2. Trade Terminology
3. Material handling, rigging, hoisting
4. Guide rails
5. Machine room and overhead, installations
6. Elevator roping
7. Car and counterweight assembly and roping
8. Pit structures
9. Hydraulics
10. Electrical wiring for elevator/escalator construction
11. Circuit tracing
12. Basic elevator solid state electronics
13. Solid state digital logic circuitry
14. Doors and operators
15. Escalators
16. Welding

Interpersonal Skills

1. Communication skills
2. Team building skills

Relay logic

A minimum of 144 hours of Related Instruction is required for each Apprentice for each year.

Appendix B topics are approved by New York State Education Department.

ATTACHMENT TO APPENDIX B

Asbestos Awareness

This course must be delivered by one of the following:

1. A provider currently approved by the New York State Department of Health to deliver asbestos safety training.
2. A person holding a current Asbestos Handler certificate from the New York State Department of Labor in the title of: Inspector, Supervisor, Project Monitor, Management Planner, or Project Designer.
3. Anyone otherwise approved by the New York State Education Department.

Minimum course contents must include the following:

1. Definition of asbestos
2. Types and physical characteristics
3. Uses and applications
4. Health effects:
    a. Asbestos-related diseases
    b. Risks to families
    c. Cigarette smoking
    d. Lack of safe exposure level
5. Employer-specific procedures to follow in case of potential exposure, including making a supervisor or building owner immediately aware of any suspected incidental asbestos disturbance so that proper containment and abatement procedures can be initiated promptly.

Notwithstanding the above course requirement, employers are advised that they must also be in compliance with New York State Department of Labor Industrial Code Rule 56 at all times.

Employers are further advised, and must advise all apprentices, that completion of the above course requirement does not authorize any person to remove, encapsulate, enclose, repair, disturb, or abate in any manner, any friable or non-friable asbestos, asbestos containing material, presumed asbestos containing material, or suspect miscellaneous asbestos containing material.