

Federal Wage System Job Grading Standard for Elevator Mechanic, 5313

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WORK COVERED

This standard is to be used for grading nonsupervisory jobs involved in the repair and maintenance of high speed elevator systems and moderate or low speed elevators, dumbwaiters, leveling ramps, and escalators to meet regulatory codes and work requirements. The work requires a knowledge of the construction, function, and maintenance procedures of dispatching or scheduling systems, systems components, driving and hoisting machinery, control mechanisms, guide structures, and car or platform equipment and counterweights. Skill is required in planning and carrying out tasks such as tracing and locating troubles, aligning and balancing the network of controls, adjusting and resetting safety devices, repairing and servicing electromechanical parts and equipment located in the machinery penthouse, shaftway, pit, or on the car or platform.

WORK NOT COVERED

The following kinds of work are not covered by this standard:

- Operating elevators. (See [Elevator Operating Series, 5438](#).)
- Repairing or adjusting elevator systems or equipment where one kind of work (e.g., electrical, electronic, or rigging) is performed on a regular and recurring basis and represents the highest skill and qualification requirement. (See Job Grading Standards for [Rigging, 5210](#).)

TITLE

Jobs graded by this standard are to be titled *Elevator Mechanic*.

GRADE LEVELS

This standard does not describe all possible grade levels for this occupation. If jobs differ substantially from the skill, knowledge, and other work requirements described in the grade levels of the standard, they may be graded above or below these grades based on the application of sound job grading methods.

HELPER AND INTERMEDIATE JOBS

Helper and Intermediate Elevator Mechanic jobs are graded by the [Job Grading Standards for Trades Helper Jobs](#) and [Intermediate Jobs](#). (Grade 10 in this standard is to be used as the journey level in applying the Intermediate Job Grading Table.)

NOTE TO USERS

The terms "high speed" and "moderate or low speed" as applied in this standard pertain to the control systems of elevators or related equipment. The primary features of high speed systems are the complexity of the systems (i.e., magnetic amplifiers, variable regulators or computer units, and the network of electronic circuitry) and the capability of these systems to operate simultaneously and independently the individual cars in a bank of elevators to provide fast service for all traffic patterns. In contrast, the moderate or low speed systems are less complex (i.e., involve rheostatic, single-speed AC, two-speed AC, or collective automatic units; include a network of electromechanical control circuits; and are capable only of operating individual cars or related equipment without changing direction in midcourse). Stated differently, speed in terms of feet per minute is the end product of the system; while speed may be used for one comparative measure, the complexity of the system is the controlling factor in analysis of levels of work.

ELEVATOR MECHANIC, GRADE 10

General: The grade 10 elevator mechanic services elevator systems, dumbwaiters, leveling ramps, or escalators which are powered by a one or two speed system (moderate or low speed rheostatic, single-speed AC, two-speed AC, or collective automatic units) that contain a variety of interrelated electromechanical control circuits, machinery and devices, and involve applying a combination of established practices to troubleshoot problems.

Traces and locates electrical and mechanical troubles in control, drive, guide, and car or platform assemblies by applying electrical test meters, precision measuring instruments, and test procedures. For example, in checking excessive sparking of brushes at motor generator set commutator, checks brush grade, setting or pressure by measuring the commutator, or using a millivoltmeter, spring scale, etc.; and checks loading, power supply, coils, insulation, or for cross connection problems with electrical test meters.

Adjusts settings, pressures, resistances, or clearances of systems components, control mechanisms, motors, machinery, mechanical guides, structures, and accessories to remedy problems. Dismantles assemblies, using handtools. Repairs or replaces defective or worn parts, realigns rails, splices or renews electrical wires and conduits, resets safety devices, replaces worn or defective bearings, relines car and brake shoes, or aligns drive units, gears, car and counterweight guides. Reassembles and restores assemblies to normal operation. Readjusts motor generators, relays, automatic switches, control valves, speed governors, electromechanical controllers and selectors, rectifiers, AC and DC motors, hoisting machinery, and mechanical guides, structures and accessories located in the machinery penthouses, shaftways, pits, or on the car or platform.

Skill and Knowledge: Knowledge of all equipment functions, repair and maintenance procedures of moderate and low speed elevator systems, escalators, or dumbwaiters to remedy problems. Level of knowledge enables the mechanic to adjust or repair system components such as motor generators, relays, etc.; control mechanisms such as automatic switches, control valves,

speed governors, electromechanical controllers or rectifiers; AC and DC motors such as those that drive hoisting machines; machinery such as those used for hoisting and lowering cars or platforms; and mechanical guides, structures, and accessories. Key use of knowledge is to carryout troubleshooting and repair in conjunction with a scheduled preventive maintenance program. Ability to dismantle operational assemblies (e.g., control drive, guide and car, or platform equipment), and to select proper replacement parts (e.g., components and wiring in relay panels and controller equipment, signal devices and lamps, motor bearings, worm gearing, valves and cylinders, shackles and guide rails, motors, leveling devices, safety shoes, or cables). Ability to reassemble and test to assure satisfactory operation of assemblies within predetermined limits, using handtools and test instruments.

Ability to trace and locate the cause of troubles such as overheating, excessive or insufficient current, undesirable ground, frayed connections and broken components, leaks, sticking or binding valves, badly pitted surfaces, incorrect pressures, or improper clearances of contacts or mechanisms, by applying electromechanical trade knowledge while using test meters and procedures (e.g., voltmeter, ammeter, ohmmeter, fuse tester, capacitor tester, tube tester, cable tensiometer, tachometer, multimeter, hydraulic pressure gage, or odometer), or detecting potential breakdowns through unusual noises, odors, or signs of friction or wear.

Ability to identify materials, wiring (i.e., conduit, field and straight line), mechanisms, and components from a knowledge of symbols, color codes, descriptions, drawings, or manufacturer's numbers. Ability to use this knowledge to interpret schematics, engineering specifications, blueprints, or oral or general instructions while checking, adjusting, or repairing the various circuits, equipment, or controls.

Responsibility: Receives maintenance schedules and trouble-call assignments from the supervisor in the form of oral or written general instructions, or work orders accompanied by blueprints, schematics, engineering specifications, and appropriate regulatory codes. Carries out assignments with considerable independence, although safety checks may be made by the supervisor during the progress of hoisting machinery repairs, or repairs on cables, mechanical guides, or structures. The supervisor checks these types of repairs when the work is completed to insure that accepted trade practices and regulatory codes are met.

Physical Effort: Work requires lifting, carrying, pulling, steadying, or otherwise moving elevator parts, chain falls, weight blocks, or tools weighing up to 34 kilograms (75 pounds). Adjustment, repair, or replacement of parts or assemblies may require kneeling, stooping, climbing ladders, reaching over, under, and into equipment while in cramped or awkward positions.

Working Conditions: The elevator mechanic is frequently exposed to abrasions, cuts, burns, or shock, broken bones, or other serious injury from slips, falls, moving parts and equipment, high voltage components, or machinery while working in machinery penthouses, elevator shafts, or atop elevator cars. Frequently works in cramped spaces and around hot, oily, and dusty surfaces.

ELEVATOR MECHANIC, GRADE 11

General: The grade 11 elevator mechanic services elevators which are more complex than the elevator systems serviced at the grade 10 level, in that they contain more complicated and varied types of high-speed electronic dispatching and scheduling systems including for example magnetic amplifiers, variable voltage regulators, and computer units that interrelate with a variety of operation and control circuits, components, machinery and devices, and may involve unusually difficult troubles not specifically covered by technical information.

Diagnoses power and timing troubles in high speed elevator operational systems by applying test meters, simulated test runs, or using event recorder or oscilloscope results. In diagnosing insufficient power buildup in the multivoltage generator, checks all connections for loose or cross connections; tests current flow at the terminals or amperage level at the loop circuit; and measures the resistance of power output and timing during simulated test runs of elevator systems, i.e., starting-to-running speed and slow down-to-stop.

Aligns and balances the power amplitude, polarity, or differential of computerized memory circuits and components in multivoltage elevator systems by adjusting the resistance or capacitance to increase or decrease power capacity and rate of flow, within predetermined limits. Resets out-of-phase clearances, settings, voltage pull-in and drop-out rates, or voltage dividing frequencies in signal, supervising, power, and control circuits and electronic devices. Repairs or replaces faulty circuits and electronic components with original replacement parts or recommended substitutes. Analyzes and readjusts elevator control and drive systems, including moderate or low speed elevator systems converted to high speed with modern electronic devices, system components, and control mechanisms; aligns and balances reworked interconnecting power control circuits, power connections, timing devices, limit switches, etc.; and modifies all types of elevator circuits to improve operations or correct circuit design error. Simulates elevator runs (i.e., start-to-running speed and slow down-to-stop) to tune up all reworked control and drive systems.

Skill and Knowledge: Knowledge of the construction, functions, and service practices of high speed elevator operational systems. Ability to use this knowledge in testing, adjusting, repairing, aligning and balancing computerized circuits and components such as capacitor charging and discharging circuit, cathode follower vacuum tube circuit, energized or de-energized relays, pivoting clearance of relay contacts, voltage pull-in-drop-out of relays, rheostat settings of capacitor discharge rate, or voltage dividing circuit of condensers to vary each car's operation within predetermined limits to meet a variety of traffic situations, using test meters and trade tools.

Knowledge of a variety of high speed elevator electronic control circuits and components, e.g., electrolytic condensers, vacuum tubes, transistors, potentiometers, etc. Ability to use this knowledge in changing moderate speed controls to high speed, automatic, operatorless system, or making modifications such as those that are designed to increase the rated load or speed of the

elevator, boost the power supply, or provide added safety features to system components and control mechanisms.

Ability to align and balance reworked systems with existing control panels and remote control devices, motors, and generators, or hoisting machinery. Ability to diagnose elevator operational troubles (e.g., power buildup problems in a multivoltage generator system, changes in platform leveling, high maximum elevator speeds, or abrupt stops or changes in elevator speed) by applying trade knowledge of control circuits (e.g., parallel, reverse, self-holding, dynamic, and suicide), test procedures and instruments (e.g., simulated test runs and checks with a variety of test meters and instruments such as oscilloscope, signal generator, recording meter, event recorder, or thermograph), and skill in using tools and equipment to test live circuits or components in determining cause of malfunctions and the remedy. Ability to interpret and respond to technical directions of engineering or testing personnel, event readings or recordings, oscilloscope waveforms, and technical information contained in engineering or inspection reports. Ability to follow manufacturers', manuals, regulatory codes, blueprints, schematics, and diagrams in aligning and balancing operational systems and components of complete high speed elevator system.

Responsibility: Work assignments are received orally through special instructions for unusual situations, service calls, and procedural changes in established practices; or through written instructions in the form of work orders, technical information, and regulatory codes. Determines the best way of diagnosing troubles and making repairs with minimum interruption of service, i.e., what test and repair steps to take, material to use, and parts to replace, order, or change to properly maintain elevator operational systems. Completes work with little or no technical assistance.

Physical Effort: Physical effort at this level is the same as described at the [grade 10 level](#).

Working Conditions: Working conditions at this level are the same as those described at the [grade 10 level](#).