

**COMPETENCY MODEL FOR
ELECTRICAL MECHANIC
CLASS CODE 3841**

The following competencies have been identified as those that best separate superior from satisfactory job performance in the class of **ELECTRICAL MECHANIC**. (Numbers refer to the order of competencies in the Competency Bank.)

- 2. MATHEMATICS
- 8. SAFETY FOCUS
- 10. PHYSICAL CAPABILITY
- 20. JOB KNOWLEDGE
- 23. EQUIPMENT OPERATION
- 24. MECHANICAL APTITUDE
- 26. ELECTRICAL UNDERSTANDING
- 45. ORAL COMMUNICATION
- 47. WRITTEN COMMUNICATION

On the following pages are descriptions of each competency, including a definition, the level of the competency required for the class (*italicized*, **bolded**, and underlined), examples of behavioral indicators, and satisfactory and superior performance levels.

2. MATHEMATICS – Performs arithmetic or higher-level mathematical computations accurately.

Level of Competency Required by Job:

Level 1: Perform arithmetic computations (add, subtract, multiply, divide, ratios, percentages).

Level 2: **Use algebra (substitute numbers for letters in a formula), geometry (angles, distances, area), and/or descriptive statistics (mean/median/mode, standard deviation, range).**

Level 3: Apply and interpret calculus, inferential statistics (t-tests, correlations, ANOVA, multiple regression) or other very high level mathematics.

Examples of Behavioral Indicators:

- Quickly and accurately performs arithmetic computations.
- Appropriately selects and applies formulas for stated purpose.
- Correctly identifies an appropriate analysis for a specific purpose and selects the appropriate computer program for computation.
- Accurately interprets and presents results of mathematical/statistical computations.

Performance Levels:

Satisfactory

Knows mathematical requirements of the job and performs them correctly. Verifies work to ensure accuracy.

Superior

Identifies additional opportunities for the application of mathematics in work. Answers questions/trains others to assist them in their use of mathematics.

Mathematics Areas

1. Knowledge of arithmetic sufficient to calculate lengths, areas, and quantities of materials.
2. Knowledge of scales and units used for measurements related to equipment used in electric stations such as current, voltage, and resistance and other measurements such as pressure, temperature, and concentration of gasses.
3. Knowledge of algebra sufficient to do electrical calculations such as power factors, current-voltage relationships, or setting ranges on meters.

8. SAFETY FOCUS – Performs work in a way that minimizes risk of injury to self or others.

Level of Competency Required by Job:

Level 1: Maintain awareness of unsafe conditions and actions to avoid injury.

Level 2: Follow safety rules/procedures; avoid known hazards in the work environment.

Level 3: **Carefully follow safety rules and procedures and consistently use all necessary safety equipment.**

Examples of Behavioral Indicators:

- Wears seat belt.
- Ensures safe physical work environment by taking actions such as eliminating unstable stacks of materials, closing drawers so filing cabinets will not tip over, and keeping pathways clear of tripping hazards.
- Reviews safety procedures before beginning each job with known hazards.
- Follows safety procedures while performing work even when it takes more time.
- Uses safety equipment such as goggles, gloves, and earplugs as required or warranted.
- Frequently checks safety equipment for proper condition and operation.

Performance Levels:

Satisfactory

Maintains awareness of personal safety to avoid injury or property damage during all work activities.

Superior

“Safety first.” Places avoidance of injury or property damage above all other job requirements. Mentions the need to follow safe work practices to co-workers. Actively seeks ways to avoid injury.

Safety Focus Areas

1. Knowledge of safety principles and regulations such as Cal/OSHA regulations, procedures for working near energized circuits or equipment (including high-voltage lines and equipment), keeping litter out of the workplace, and safe use of hoisting equipment and rigging.
2. Knowledge of Department procedures for getting and removing accident prevention tags associated with work authorities such as CLEARANCES and OKs TO, for equipment to be worked on which will take the equipment out of service and/or let other workers know that there may be workers out of sight near equipment and that the equipment cannot be operated.
3. Knowledge of safe procedures for working on overhead lines and equipment such as use of safety belts and safety lines; wearing hard hats, and other protective clothing when needed; and maintaining a safe distance from energized power lines.
4. Knowledge of safe working procedures for work in substructures such as ventilation requirements; testing for toxic or asphyxiating gasses, adequate oxygen, and/or asbestos before going into confined spaces; wearing hard hats, tyvek suits, and other protective clothing when needed; maintaining a safe distance from energized power lines; and designating an observer trained in substructure rescue techniques.
5. Knowledge of procedures for assembling and using Self Controlled Breathing Apparatus and/or Air Line Breathing Apparatus sufficient to work in substructures and to accomplish safe rescues.
6. Knowledge of special equipment and procedures for working on or in close proximity to energized electrical circuits and/or equipment such as using rubber gloves, sleeves, boots, and blankets; using hot sticks and insulated tools; following "working hot" electrical station maintenance procedures; and designating a safety observer.
7. Knowledge of first aid and emergency supplies kept at various sites in stations and generating plants.
8. Knowledge of safety equipment, emergency equipment, and first aid supplies to be carried on trucks going to field work sites.
9. Knowledge of CPR and first aid sufficient to begin resuscitation in case of electric shock or to take immediate action to prevent further harm in case of other injury.

10. PHYSICAL CAPABILITY – Strength, endurance, flexibility, and/or coordination.

Level of Competency Required by Job:

Level 1: Sitting and/or standing for extended periods of time.

Level 2: *Awkward body position and/or precise motions required; and/or repeated lifting, carrying, and/or manipulation of objects; and/or walking for extended periods of time.*

Level 3: Continuous or extreme exertion of physical effort.

Examples of Behavioral Indicators:

- Sits and may occasionally stand or walk for entire workday (except breaks).
- Walks for the duration of the workday.
- Repetitive motion required to perform task.
- Repeatedly lifts and carries heavy objects.
- Exerts maximal effort for extended periods of time.

Performance Levels:

Satisfactory

Performs tasks requiring physical capability satisfactorily and without undue physical stress or harm.

Superior

Performs tasks requiring physical capability correctly with relative ease. May be asked to perform the most physically demanding tasks or be sought by co-workers for assistance.

20. JOB KNOWLEDGE – Knows information required to perform a specific job. Includes both widely available courses of study (for example, chemistry, human resources management, graphic arts) and City-specific information (parking regulation and ticketing practices; purchasing procedures; provisions of the City Charter).

Level of Competency Required by Job:

Level 1: **Knowledge is concrete, factual, and/or procedural and may be defined by the organization. Situations in which it is applied are quite consistent.**

Level 2: Knowledge is substantive and may be defined by an external trade, field, or profession. Situations in which it is applied vary and, as such, require breadth and depth of understanding.

Level 3: Knowledge is abstract, conceptual, and/or complex and may be supported by a well-defined academic discipline or authoritative sources (e.g., laws, ordinances, government guidelines/regulations/codes). Situations in which it is applied may vary greatly or be novel.

Examples of Behavioral Indicators:

- Performs work correctly/avoids technical (job content related) errors.
- Answers technical questions about work accurately.
- Asks few technical questions about the performance of routine work activities.
- Offers advice (“coaching”) to new employees regarding their work.
- Develops training programs for other employees.
- Sought out as a source of information by others.

Performance Levels:

Satisfactory

Sufficient job knowledge to perform work correctly independently. Answers technical questions about work correctly.

Superior

Expertise in technical job information sufficient to serve as a resource to others. May develop training manuals/ programs and/or give internal and/or external presentations related to work

Job Knowledge Areas

1. Knowledge of scales, dials, digital readouts, and measurements sufficient to use various meters, test equipment, and measuring devices.
2. Knowledge of tests used for checking oil quality such as dielectric strength tests for moisture and tests of gas concentrations, sufficient to interpret results.
3. Knowledge of job orders, single line diagrams, circuit maps, and station plans sufficient to identify circuits and locations of work sites.
4. Knowledge of rigging techniques including ropes, knots, wire ropes, slings, hooks, and clips sufficient to prepare heavy equipment for safe hoisting and moving.
5. Knowledge of use of both powered and manually assembled scaffolding including requirements for clearance; maximum use heights for various types; railings and footing requirements for various heights and types; and when safety belts and lines are required.
6. Knowledge of hand and power tools such as drill motors, saws, hammers, pliers, strippers, and wrenches sufficient to properly use and care for them.
7. Knowledge of soldering sufficient to use and care for soldering irons and tips and to select resin-core or acid-core solder depending on the particular application.
8. Knowledge of procedures and equipment such as gas-tech or oxygen meters to test oxygen level in confined spaces.
9. Knowledge of the uses of pumps, blowers, and motor generators sufficient to set up and to operate them when they are required.
10. Knowledge of equipment used in transmission and distribution of electric power, such as within an electrical substation, sufficient to perform required service including dismantling and/or disassembling.
11. Knowledge or variations in meter readings such as operating temperature, air or vacuum pressure, phase differences, or frequency which indicate trouble and/or potential trouble and probable causes of variations.
12. Knowledge of transformers and circuit breaker's oil processing equipment, portable pumps, and filters sufficient to clean the oil.
13. Knowledge of splicing wires in cables, sufficient to make circuits complete, to repair cables, or to install various equipment.
14. Knowledge of the methods and materials used to terminate cable including the mounting of stress cones, jumpers, and terminal blocks.

15. Knowledge of high voltage solid state thyristor rectifiers sufficient to service them.
16. Knowledge of construction plans and standard plans sufficient to lay out jobs, to plan sequence of activities, and to select locations for material and refuse storage areas
17. Knowledge of measuring tapes sufficient to measure materials such as lumber, fencing, or wire.
18. Knowledge of cutting and assembling cable tray and fixing it in position with hangers.
19. Knowledge of cutting, bending, and assembling conduit, laying it in position, and installing connectors.
20. Knowledge of pulling cable through conduit, in cable trays, or for overhead cable installation (gradually increasing size of pull line, for example, from cord to rope to cable) and equipment used such as dollies, winches, and pulleys.
21. Knowledge of welding sufficient to join conduit and buses.

23. EQUIPMENT OPERATION – Operates specialized equipment in performance of job duties.

Level of Competency Required by Job:

Level 1: Operate equipment based on on-the-job training.

Level 2: *Operate equipment based on attendance at a training program and practice.*****

Level 3: Operate equipment for which in-depth, complex training was required and which may require certification.

Examples of Behavioral Indicators:

- Operates equipment proficiently.
- Operates equipment with strict adherence to safety procedures.
- Understands the operation of equipment used on the job and correctly answers questions about it.
- Willingly participates in any training necessary to maintain up-to-date knowledge of equipment operation.

Performance Levels:

Satisfactory

Operates equipment safely and with a high degree of proficiency.

Superior

Operates equipment with extreme proficiency and correctly answers questions about its operation. Trains and/or coaches others in the operation of equipment.

Equipment Operation Areas

1. Knowledge of light equipment such as forklifts, bridge cranes, or winches sufficient to operate and move other equipment or materials.
2. Knowledge of hand signals used to direct operation of cranes, bucket trucks, and other heavy construction equipment.
3. Knowledge of heavy construction equipment such as bucket trucks, aerial lifts, or truck cranes sufficient to operate and position the equipment to give workers access to the work or to lift and position.

24. MECHANICAL APTITUDE – Accurately predicts the impact of forces on objects and assesses the behavior of other physical phenomena (e.g., volume, weight, velocity). Readily learns work involving the application of mechanical principles.

Level of Competency Required by Job:

Level 1: **Maintain a safe work environment by ensuring objects in it are stable, tools and equipment are properly used.**

Level 2: Know the physical properties of objects in the work environment and correctly anticipate the action of forces upon them; performs work accordingly (correctly and safely).

Level 3: In-depth understanding of mechanical and physical phenomena sufficient to design and/or oversee the construction of systems.

Examples of Behavioral Indicators:

- Recognizes the impact of an earthquake on objects in the work environment and re-arranges them as possible to avoid possible damage or destruction and potential to cause injury.
- Uses tools properly to accomplish work correctly and safely.
- Recognizes the effects of various actions on objects and performs only those actions that will accomplish intended result and will not cause property damage or injury.
- Systems designed and/or for which construction is overseen operate as intended upon completion.

Performance Levels:

Satisfactory

Recognizes the operation of mechanical/physical phenomena sufficient to readily learn and perform work of a mechanical nature.

Superior

Displays exceptional insight into the operation of mechanical phenomena, and makes correct inferences regarding it. Promptly and accurately troubleshoots problems.

26. ELECTRICAL UNDERSTANDING – Comprehends the concept and the operation of flow of electrical current.

Level of Competency Required by Job:

Level 1: **Know the properties of electricity relevant to the work environment and work to be performed in order to correctly perform work and recognize hazards that will be created by the failure to do so.**

Level 2: Sufficient understanding of electricity to recognize problems and determine repair needed to prevent disaster/restore operation.

Level 3: In-depth understanding of electrical principles and phenomena sufficient to design and/or oversee the installation of complex electrical systems.

Examples of Behavioral Indicators:

- Ensures safe physical work environment by taking actions such as eliminating exposed electrical wire, faulty connections, empty sockets, and overloaded circuits.
- Recognizes the danger of fire from faulty electrical installations.
- Uses tools, equipment, and instruments properly to accomplish electrical work correctly and safely.
- Systems designed and/or for which installation is overseen perform as intended upon completion.

Performance Levels:

Satisfactory

Understands the operation of electricity sufficient to readily learn and perform electrical work.

Superior

Displays exceptional insight into the operation of electrical systems, and makes correct inferences regarding them. Promptly and accurately troubleshoots problem

Electrical Understanding Areas

1. Knowledge of direct current electrical theory sufficient to handle and to connect d.c. electrical equipment such as capacitors, batteries, meters, and protective devices correctly.
2. Knowledge of alternating current theory sufficient to predict the ways in which changing conditions such as variations in voltage and current, connecting circuits in series or parallel, variations in phase or frequency, and induction effects will affect a.c. circuits containing such equipment as motors, generators, turbine generators, transformers, capacitors, coils, and protective devices.
3. Knowledge of meters used in testing and/or inspecting electrical equipment such as multi-meters, voltmeters, ammeters, meggers, and high potential meters sufficient to attach and use them correctly and to make minor adjustments.
4. Knowledge of recording meters such as the meaning of distortions in wave forms or out of range peaks or depressions sufficient to interpret the output and apply findings.
5. Knowledge of differences between colored materials sufficient to identify resistors, colored wires, and/or to perform other tasks.

45. ORAL COMMUNICATION – Communicates orally in a clear, concise, and effective manner.

Level of Competency Required by Job:

Level 1: **Exchange specific, job-related information orally with others in the immediate work environment or via telephone and/or radio.**

Level 2: Obtain/provide/present general and/or job-specific information orally to a variety of others in various situations.

Level 3: Obtain/provide/present a diverse array of information orally at varying levels of complexity to a wide range of others across many different situations and circumstances.

Examples of Behavioral Indicators:

- Audience clearly understands the intended message.
- Rarely must repeat information in response to questions.
- Refrains from use of unnecessary words, phrases, or jargon.
- Provides a level of detail appropriate to the situation (avoids too much or too little detail).
- Speaks at a level appropriate to the audience in terms of terminology, sentence structure, and simplicity/complexity of ideas expressed.
- Uses words with precision (vocabulary) to convey exact information.

Performance Levels:

Satisfactory

Speaks clearly and audibly, providing the appropriate information and level of detail. Typically conveys the message on the first attempt. Answers questions accurately and directly.

Superior

Speech is direct and to the point. Speaks convincingly and with authority when appropriate. Maintains sensitivity to the audience while providing thorough information with the appropriate level of detail through the use of precise language

47. WRITTEN COMMUNICATION – Communicates effectively in writing.

Level of Competency Required by Job:

Level 1: **Write notes/emails Completes forms with some open-ended responses (sentences).**

Level 2: Write letters, articles/reports, and/or detailed descriptions of activities/occurrences.

Level 3: Write lengthy reports, instruction manuals, in-depth analyses/reviews of complex issues and/or articles for publication. Reviews the written work of others.

Examples of Behavioral Indicators:

- Writing includes the necessary information to convey the intended message.
- Sufficiently few errors in spelling, punctuation, grammar to not interfere with the intended message or distract the reader.
- Little editing or re-writing needed to produce a final product.
- Composes materials efficiently.
- Information is presented in a well organized manner.
- Tone and degree of formality are appropriate to the purpose and audience.

Performance Levels:

Satisfactory

Writes material that clearly communicates the necessary information; needs little editing.

Superior

Precisely uses words and organizes information in a way that enhances presentation of the message. Virtually no editing needed.