



THE EZ WAY

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Company Quality Statement

The quality goal of EZ Electric is to provide electrical related services throughout central California that are second to none in terms of professionalism, price competitiveness and quality. In performing these services, provide a mutually beneficial environment for our customer, employee and supplier while at the same time provide a safe work place for our employees.

E Z Electric's commitment to quality will be accomplished by using the following guidelines:

- Focusing on satisfying customers' needs;
- Compliance with applicable construction codes, regulations, safety requirements, and good workmanship practices;
- Fulfillment of contract requirements in their entirety;
- Direction of work crews by qualified job foremen;
- Performance of inspections by qualified inspectors; and
- Continuous quality improvement and the prevention of defects.

Quality Responsibilities

Quality is everyone's responsibility. Everyone is personally responsible for:

- Adhering to quality system policies and procedures;
- Using only approved materials and construction procedures;
- Ensuring that materials and equipment are in good condition; and
- Ensuring personal safety and the safety of others and stopping work if conditions are unsafe.

Foremen have additional responsibilities for ensuring that:

- Crew members are capable of performing assigned tasks; and
- Their job meets government regulatory and code requirements, builder requirements and contract specifications, company quality standards and specifications.

Project and Field Manager responsibilities include all of the above as well as

- Conducting job inspections and accurately recording job activity; and
- Ensuring the correction of correction items.

PRESIDENT

DATE

QUALITY REPRESENTATIVE

EZ WAY TO WIRE

The EZ way to wire.....

This information is designed to help our new employees become familiar with the way EZ Electric wires. We are not so different from other contractors, we just strive to do it right the first time.

We have divided this pamphlet into three distinct sections:

- 1. Riser installation**
- 2. Rough wiring**
- 3. Trim wiring**

As with everything at EZ, if something on the following pages does not make sense to you, please feel free to ask. Communication is the answer.

Soooo.....without further ado, here we go.....

RISER INSTALLATION

Riser; A riser is a conduit run through the foundation footing to allow the utility company to run wire to our service panels. All single family homes within PG&E's jurisdiction use 3" risers, minimum. Apartments and condominiums are something else, depending upon the number of meters, there can be up to 5 – 5" risers. Apartments and condominiums must be dealt with separately.

A standard riser consists of 5' of 3" PVC with a long sweep elbow attached to it.

Telephone and television risers are normally 2" PVC. Make sure there is enough separation between the utility riser and the telephone and television risers so they end up in separate stud bays.

When setting risers, first establish the location of the electrical services on the house. Then it is best to take a look at the structural plans to identify any posts or hold downs that we need to stay away from with our electrical risers. As electricians, most of use are not familiar with structural plans so it is a good idea to meet with the superintendent to help us with this task. If he or she cannot or will not help, contact your field or project manager. Once the location of the risers is layed-out on the form, the elevation of finish grade should be established. Normally it is about 8" from the top of concrete. The risers should be dug out 24" deep. Install riser with tape on both ends in a straight up and down position with the sweep down in the dirt pointing towards the street at about a 45 degree angle. Then secure risers in place using tie wire, wood, screws and nails etc. Then fill the hole back with dirt, careful not to get dirt in concrete footings. It is a good idea to tie a piece of wood or rebar across all three risers about 36" above top of form to help support the risers, mounting a panel on top of a leaning riser is very difficult. At this time it is a good idea to talk to the foundation contractor and show him where to put the ufer ground. It should be about 5" away from your electrical riser, under the meter main. If you let the foundation contractor or the superintendent decide where it should go you may not be happy with its location. If we are contracted to install a ground rod you know where to put it (see meter main frame detail). After foundations are poured it is a good idea to return to the job a few days later once the framing

contractors layout person gets started and discuss meter main, TV and telephone service can location needs (use the attached meter main frame detail for framing instruction when meeting with the framer). The digging of the risers should be coordinated by the foreman or field manager with the foundation contractor. If this is not possible, they will have to be hand dug. The shop has an electric hammer and generator for this purpose.

It is most productive to set as many meter mains at once as possible, with the tools out, doing one after the other. It becomes systematic. Meter mains should be installed before paper or lathe to avoid being back charged by the stucco contractor for tearing up their work and so that the meter mains flanges get covered by waterproofing paper and lathe. TV and telephone boxes should be installed at the same time as meter mains. Some houses have sheer on the walls at meter main locations and some do not. Once the sheer is installed or if the house does not get sheer its time to install meter mains (see picture 1).

ROUGH WIRING

Rough wiring is broken up into five distinct functions; layout, boxing, boring, pulling and makeup. We feel that the layout of a house is the most important. Layout is to be done complete to current building codes, title 24 requirements etc. Layout should always be done 100% complete. If there are questions that arise during layout, a list should be kept so they can be answered right away and the layout can be complete. All layout should be done on walls for receptacles, switches, transformer, chime, wall light and anything else that goes on the walls. All layout for can lights, smoke detectors and ceiling mounted fixtures shall be written on floor. Layout for kitchen cabinet breaks from measurements on as-builts should also be layed-out on floor or wall. Layout for outside lights should be done and then transferred to inside so hole saw can be used next to stud for 3.0 nail on whenever possible. Make sure to leave plenty of room for trim around windows and doors. It is a good idea to wait to layout homeowner options at one time that way you are only focused on them and nothing gets missed. After all layout is done give the entire house the once over to make sure nothing got missed.

Following is a list of heights that will be used in all EZ's houses unless otherwise specified.

NOTE: all of these measurements are from the floor, unless otherwise noted. Make sure that all boxes are mounted at the specified height. There is nothing worse than to walk into a finished kitchen and find our outlet boxes breaking the tile line at different heights....we care, even if the contractor doesn't.

METER MAIN: 48" to 58" to center of meter socket from finish grade single family homes for a 200amp main

SUBPANEL: 5' to 6' to main lugs. REMEMBER: sub panels cannot be installed in closets and there must be 3' of working space in front of the panel and a 30" wide working space

TELEPHONE CAN: in next possible stud bay

SWITCHES: 48" to top of box

RECEPTACLES: 16" to top of box

KITCHEN OUTLETS: 50" to top of box (verify with job superintendent)

RANGE (DROP IN): 24" to top of 4sq. box, install extension box on rough

RANGE (FREE STANDING): 4sq. box nailed to bottom plate, check specifications for location of box in opening, install 2-gang ring on rough, check manufacturer specifications

COOKTOP: 24" to bottom of junction box

BUILT-IN OVEN: stub out at 76" not behind oven, install 4 sq. on trim (check cabinet drawing)

KITCHEN ISLAND CABINET: wiring has to be brought up through the floor on rough, do not leave it for the trim man

MICROWAVE: outlet in upper cabinet above the unit on right side, check for vent location on microwave hoods. Stub at 80" in center of upper cabinet on rough

DISHWASHER/DISPOSAL: outlet under sink, 12" to 24" to top of box, hold to dishwasher side

TRASH COMPACTOR: outlet cannot be behind the unit, it must be accessible, 24" to top of box on either side of unit, in open cabinet not behind drawers

BATHROOM OUTLETS: 46" to top of box (check with cabinet drawings, and superintendent, keep out of tile)

BATHROOM WALL MOUNT FIXTURES: from 84" to 88" from floor to center of box, centered over sink, unless otherwise noted. Always check mirror height

WASHER: 48" to top of box, stay away from faucets

DRYER: 36" to top of 2-gang box

FURNACE: junction box on left side above unit stub switch leg low 3" above furnace platform.

CHIME & ADDRESS LIGHT TRANSFORMER: put in single gang box above sub panel in garage, or in coat closet above shelf approx. 80" or as per plan

OUTSIDE RECEPTACLE: same height as the receptacle outlets in room behind it (check exterior elevations)

ADDRESS LIGHTS: 12" below light fixture, front door side of garage front or as per plans

REMEMBER: all light outlets and flush cans must be centered as per plans

The above heights are to be used to assure that all EZ houses are wired the same.

Make sure you have boxed the house complete. Mistakes are made simply because a box was not nailed up.

All entry, stairwell, dining and nook light outlets shall be metal for all custom homes. Check fixture weight for tract homes.

We have found that many wiremen are not well versed in NEC. That book is our bible. It is important that at your earliest convenience you take a code class. Many are offered, please contact your project manager if you need help locating one.

Find out about U.B.C. requirements regarding smoke detectors. Keep 36" away from air registers and no more than 8" from ceiling peak.

Boxes, can lights and fan housings should be spread throughout house complete. Cutouts should be started right away so the boxes can be put up with the rest of the boxes. Once the sheer cutouts are done the holes for light boxes should be done with the 3 5/8" hole saw. Boxes should be put up level and at the correct depth for sheetrock, sheer and sheetrock, double sheetrock and at some kitchen counter tops back splash to accommodate for tile. Making sure that the unit is 100% complete is very important, it helps the person drilling so he can drill 100% and saves time from going back and doing it later.

KITCHEN

Two 20 amp appliance circuits, receptacle outlets on the counter top evenly divided between the 2 circuits. Dining room and nook receptacles must also be on these circuits. Circuits must be balanced.

Counter top wider than 12" must have receptacle, receptacle spacing on kitchen counters is 2' from opening and then every 4' max. between each receptacle. Openings are sinks, ovens, cooktops, refrigerators, etc. All kitchen counter top receptacles must be GFI protected.

RECEPTACLE SPACING

Any wall space 2" or longer, except hallway and entry, must have a receptacle. Measurement starts at door jam. Behind a door is considered wall space.

Measuring along wall...within 6' from opening, ie. Doorway, fireplace, wall cabinet, etc., and every 12' there must be a receptacle.

Hallways of 10ft. or more must have receptacle.

One lighting circuit for every 500 sq. ft. As a rule of thumb, no more than 10 to 14 outlets per circuit.

REMEMBER; all closets light fixtures must be 12" from the shelf, unless flush can with enclosed trim or fluorescent then 6" from the shelf.

These are the most common items to remember. There are obviously many more that need to be learned.

BORING

Boring is a tough topic to cover, without actually using the hands on method. But there are a couple of things that need to be pointed out. Always keep your holes to the center of the stud. When boring ceiling joists, remember to keep your holes within 3 times the width of the joist from wall, and try to stay as close to the middle as possible. Never bore a gluelam without written permission. Always check plans for a boring schedule before you start drilling.

Drilling is a very important part of roughing a house and by drilling a unit complete you can save a lot of time. Each circuit should be drilled starting at the homerun and then complete the circuit. Always complete the circuit before starting the next. Make sure to go over a list of circuits to drill including TV and telephone, chime, address light, bond wire, subfeed, A/C, garage door sensors etc. Before drilling any large beams or questionable areas make sure to check Boring schedule in plans or manufactures recommendations. Sometimes you can ask the framing foreman for documentation on the products they are using on the job and inside that documentation will be do's and don'ts for drilling their product. If you are

unable to find information contact your field manager before drilling any questionable areas.

Now that you have boxed and bored the house complete, let's start pulling the wire.....

Use 3 wire homeruns (HR) when ever possible (not on arc fault circuit). Dishwasher/disposal: 12/3 HR make-up at switch, not at receptacle.

Trash compactor: 12/2 HR

Microwave: 12/2 HR

Furnace: 12/2 HR leave long enough tail to reach furnace on trim (sleeve romex with ½ flex on rough if possible)

Washer: 12/2 HR

Dryer: 10/3 HR

Cooktop 4 burner: 10/3 HR (check manufacturers loads)

Cooktop 6 burner: 8/3 HR (check manufacturers loads)

Range: 6/3 alum. HR (check manufacturers loads)

Single oven: 10/3 HR (check manufacturers loads)

Double oven: 6/3 alum. HR (check manufacturers loads)

Sub panel: 2/3 alum. HR for 100amp, 1/0 alum. For 125 amp, 4/0 alum. For 200 amp

A/C: as per nameplate of unit

Jacuzzi tub: 12/2 HR, install box and trim on rough. Install a switch at access opening as a disconnect for the motor. Twist black and white wires together in sub panel to show for GFI breaker. A GFI

receptacle can be used in place of breaker if access opening is accessible from inside of house. Bond motor with #8 copper to cold water clamp at cold water must be accessible.

All makeup to be in switches and receptacles only. Only switchleg makeup in light outlets. Try to keep all makeup out of cabinet outlets ie. Micro, dishwasher, etc.

Receptacle makeup shall be: from left to right, bare, white, black, folded back into the box together, with tails to front.

REMEMBER: mark all switch-legs
 twist travelers together on 3 ways
 GFI twist load wires together

3-way switches: power into first switch outlet, three wire between (black and red travelers), switch leg out of second switch outlet.

GFI (Ground Fault Interrupter): bathroom receptacles on dedicated 20amp circuit, all receptacles protected by GFI. Exterior weather proof to be pulled from closest general lighting circuit with GFI device at each location. Garage receptacles protected by GFI installed in garage pulled from closest general lighting circuit

The chime and address light are wired with 18/2 jacketed bell wire or phone wire. This wire is easy to damage, so never drive staples tight over it.

On some jobsites, we also run the TV and telephone wire. They have to be handled the same as bell wire. Too many service calls have been generated by shorted out bell wire and telephone wire. All TV runs are homerun unless specified differently.

Being complete is key when pulling wire or laying someone out on pulling wire. Lay them out on a complete circuit and when they are finished inspect to ensure it is complete before moving on. Always pull wire from a wire spinner to prevent wire from becoming twisted. Pull wire to box and put in box marking wire with correct marking ie. Switch leg, line, load etc. before continuing. When pulling wire to smoke detectors, can lights and any thing high, the wire should be pulled and the make-up should be done before

moving on. All wire should be pulled including TV and telephone, bond wire, subfeed, bell wire, etc. The meter main and sub panel should be made up before starting makeup so you can use your bell set to ring circuits as you make up.

Grounding is probably one of the most poorly understood aspects of wiring. Its not that tough. All metal boxes in a house must be grounded. Every metal box within our system must have, either a ground lug attached to the back of the box with a green ground screw, or a green ground screw with a ground wire to attach all ground wires to.

The service ground is run from the main panel directly to the ufer ground, then to the water piping system and the gas piping system. Make sure ground wire runs through phone service box.

125amp main	#6 bare copper
200amp main	#4 bare copper

All ground clamps must be accessible, either clamped onto the piping on the exterior of the building, at the water heater or in the ceiling or walls with a 2-gang ring. REMEMBER: rings installed in the ceiling of a garage fire wall require a metal cover on trim.

Garage door opener outlets: single gang box on rough with garage door opener sensor wires wrapped around nail next to box.

Keep wiring simple, nothing fancy. Ring-out completely, ie. Range runs, oven runs, chime wiring, phones, etc. Ring flush cans simply by splicing thru at switches and shorting out sockets with your tape measure. Ring 3-way switches by connecting the common and one traveler together at one end.

There must be approx. 1 ¼” of wood left between the edge of the stud and our wire after boring. If there is not, it must be plated. A simple rule: “when in doubt, plate it”. This could save us a re-inspection.

Attic work: some houses will have the furnaces in the attic. If this is the case, complete all work on the rough, ie. hook up the furnace, install the keyless, lamp, etc.

REMEMBER: all aluminum terminations must have NOALOX on them, no exceptions.

Be sure rough is complete:

1. All boxes are installed
2. All make-up complete
3. Sup panel: all grounds and neutrals must be terminated on there separate busses, hot wires twisted together for ringing purposes.
ALL CIRCUITS MUST BE MARKED.
4. Main panel: all grounds and neutrals terminated on same buss, main breaker installed and all holes filled.
5. All switch rings installed
6. Building totally rung out

Make one final walk through, clean up your mess and look for anything that you could have possibly missed. It's going to be tough running that missed home run after sheetrock

TRIM WIRING

Now comes the final phase, trim. If the person who roughed the house did his job, this is going to be a piece of cake.

Trimming complete is a very important step, it can make or break a job. You can lose all that time you spent doing a good job roughing by coming back time after time putting in trim. Gather material at storage, make sure you get everything. Spread entire unit making note of anything missing. After spreading material, connect bell set, if nothing rings that is a good sign. If there is a ring, go to sub panel and identify circuit ringing and fix it. Start trimming, send one person to gather missing items from storage. If you leave spreading material to inexperienced workers, you will have someone back and forth to storage all day long. When trimming, you should complete room by room, completing one room before starting the next. If someone doesn't know how to do something, take the time to show them. Some like to save fixtures for last, this is a personal preference thing. If there is enough manpower, it is a good idea to do fixtures at the same time as the rest of the house so things can be 100% when you exit the room.

Plate screws should be vertical in all plates.

Switched plugs: turn receptacle upside down (ground hole up). Don't forget to break the tab on the hot side (bottom half switched). All outlets on outside walls must be gasketed.

Do not install anything that is broken, someone is going to have to go back and replace it. Too much time lost.

Caulk all exterior fixtures and panels. Label legibly all service and sub panels, so that anyone can read it. This can also prevent a turndown. Use EZ Electric's sub panel label.

#14 wire-----15 amp breaker

#12 wire-----20 amp breaker

#10 wire-----30 amp breaker

#8 wire-----40 amp breaker

#6 wire-----50 amp breaker

#4 wire-----70 amp breaker

#2 wire-----100 amp breaker

#1/0 wire-----125 amp breaker

Dishwasher/disposal breakers and any breakers controlling 2 circuits on the same plug. Must have tie bar.

Jacuzzi circuit must be on GFI breaker or plugged into GFI receptacle.

3-wire homeruns must be split between phases. If you don't understand what that means, ask your foreman or field manager. Install larger amp breakers at bottom of sub panel for heat displacement. Fill sub panel with smaller amp breakers in the higher spots.

Metal blank covers on ufer and ground clamps must be clearly labeled with permanent marking pen in Dublin.

Put the GFI stickers on all applicable outlets.

Place all smoke detector and GFI literature behind device (unless otherwise directed).

Before you walk away: make sure everything is installed
look behind every door

look in closets
look in all cabinets
make sure the panels are labeled
straighten all plates
make sure screw slots are vertical
leave the house as you found it
put your trash in the dumpster or designated trash
area

HOT CHECK is when you check to see if everything is working properly and that all installations are of good quality, everything is level, nothing loose etc. Check everything 100%. Fill out EZ Electric Trim & Hot Check Form.

I'm sure there have been things that have been missed in this pamphlet. So you can be assured that it will be updated, but remember that this is only a guide. It is up to you, the wireman, to have the pride in your own workmanship to produce a product that we can all be proud of.

Good Luck,

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Picture "1"

