

RESIDENTIAL ELECTRICAL PANEL UPGRADE

Introduction

This information is intended to provide general guidance on the installation electrical main panel upgrade on single family residences.

This handout summarizes information contained in the 2016 California Electrical Code, (CEC) and is not intended to replace it. If conditions are encountered that are not covered, please consult the appropriate codes.

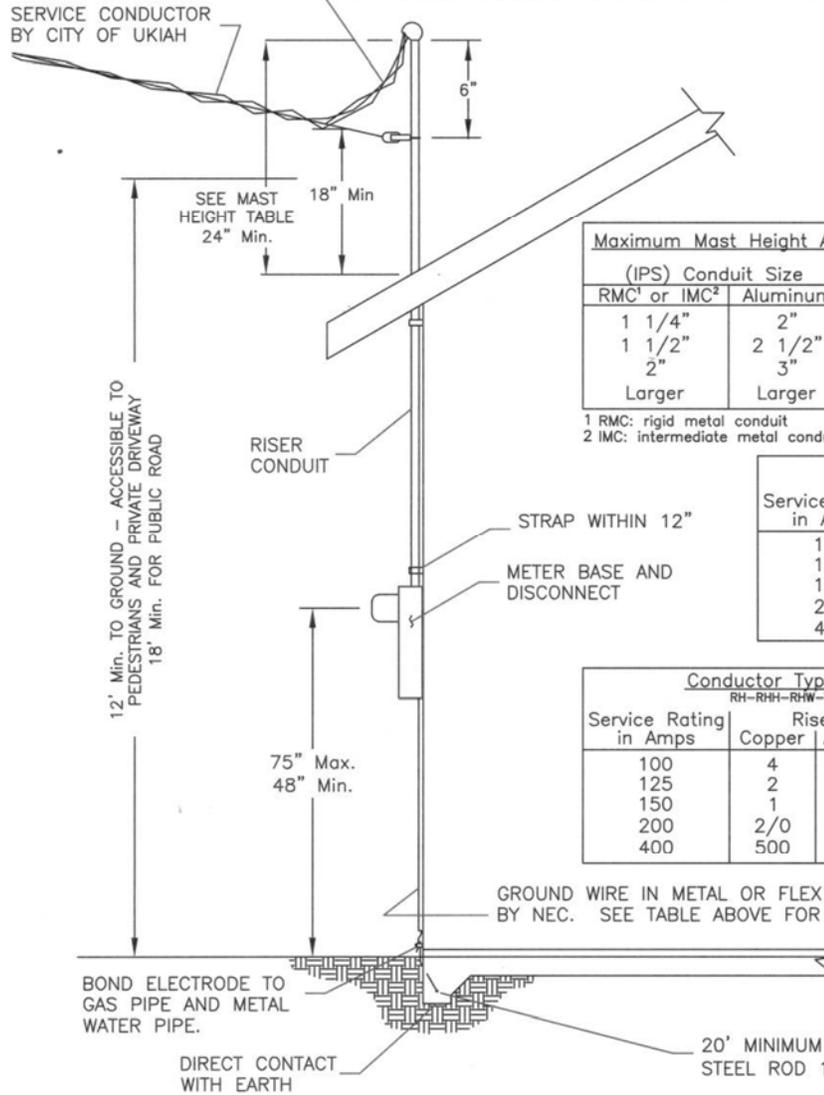
- All electrical panel installations and replacements require a permit and final inspection.

General Requirements

- Approved weatherproof service head, 12' min. height above grade and the drip loop shall be 18" min. above roof.
- Service drop to have a single point of contact to riser.
- Provide 18" of free conductor from service head for attaching to service drop.
- Clearance for service head and service drop. 2016 CEC 230.24
 - Areas above roofs 8' min. for 3' from edge of roof.
 - Areas above sidewalks accessible to pedestrian's 12' min.
 - Areas over residential driveways 12' min.
 - Areas over commercial driveways 18' min.
- If service conduit is installed with a lock nuts, provide a bonding bushing or device and bond to the enclosure.
- A 100 AMP service will require 1 ¼ conduit, 3 - #4 min. copper. 200 AMP requires 1 ½ conduit and 3 - 2/0 min. copper.

- Mounting supports shall be within 12" of every service head, gooseneck, or connection to a raceway or enclosure and at intervals not exceeding 30". 2016 CEC 230.51(A).
- Where driven ground rods are used, two rods are required, or a verification that the system meets the less than the 25 ohm requirement. Ground rods shall be separated by 6 feet min. 2016 CEC 250.52 (5)(A)(B) 250.53 (A)(1)(2)(B)(G)
- Bond from service to metal cold water pipe and gas piping shall be min #6 copper. 2016 CEC 250.66 250.94 (4) 250.104
- Bonding jumper at water heater from hot, cold, and gas shall be min #6 copper. 2016 CEC 250.140
- Bonding jumper to communication ground shall be min #8 copper. 2016 CEC 830.100
- Load calculations are generally not required for a service upgrade unless additional load is being added or the inspector determines that calculations are necessary.
- Clear working space in front of the panel shall be 30" wide by 36" deep with a minimum headroom clearance of 6'6". 2016 CEC 110.26(A)(1)(2)(3)
- Overcurrent devices (breakers) shall be readily accessible and shall be installed so the handle of the switch or breaker is not more than 6'7" above the floor or working platform. 2016 CEC 240.24
- Circuit breakers shall be listed and approved types for panels (the brand of breakers must be specifically approved for use with the panel as stated on the panel's label). 2016 CEC 110.3(B)
- A multi-wire circuit (3-wire, 240 volt circuit) to a single duplex receptacle requires a handle-tie on the circuit breakers. This is commonly the case where a single duplex receptacle serves both the garbage disposal and the dishwasher. 2016 CEC 210.4(B)
- Panel shall be permanently labeled. 2016 CEC 110.21(B) 110.22

CUSTOMER TO INSTALL AND PROVIDE A MINIMUM LENGTH OF 18" OF SERVICE ENTRANCE CONDUCTORS AT THE WEATHERHEAD



Maximum Mast Height Above Roof Without Bracing		
(IPS) Conduit Size	Maximum Height Above Roof Without Bracing	
RMC ¹ or IMC ²	Aluminum	
1 1/4"	2"	42"
1 1/2"	2 1/2"	42"
2"	3"	54"
Larger	Larger	78"

1 RMC: rigid metal conduit
2 IMC: intermediate metal conduit

Riser Conduit Sizes		
Service Rating in Amps	Conductor in Riser	
	Copper	Aluminum
100	1 1/4"	1 1/4"
125	1 1/4"	1 1/4"
150	1 1/4"	1 1/2"
200	1 1/2"	2"
400	2 1/2"	4"

Conductor Types and Sizes (AWG)				
Service Rating in Amps	Riser		Ground	
	Copper	Aluminum	Copper	Alum
100	4	2	8	6
125	2	1/0	8	6
150	1	2/0	6	4
200	2/0	4/0	4	2
400	500	700	1/0	3/0

Note:

DRIVEN GROUND ROD
3/4"x 8' GALVANIZED PIPE
or 5/8"x 8' STEEL OR IRON ROD
or 1/2"x 8' NON FERROUS ROD

CONSTRUCTION STANDARD					CITY OF UKIAH	
RESIDENTIAL SERVICE ATTACHMENT AND METER LOCATION DETAIL, 400 AMP MAX.					ELECTRIC UTILITY DEPARTMENT	
SCALE:	DATE:	REVISIONS: 2 Aluminum Grounds			DRAWING NO.	
23APRIL18	JL	JL		SHEET 1 OF 1	RSA-0610-01	
DATE	DRAWN	DESIGNED	CHECKED	APPROVAL	REVISION	1