Planning & Building Agency
Building Safety Division
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Residential Electrical Services, Alterations, and Relocated Loads

- **All dwelling unit service equipment must have a surge-protective device (SPD) installed—applies to new or replaced services.**
- **All new utility connections are required to be installed below grade by Santa Ana Municipal Code 41-626(b). When replaced at existing one and two family dwellings, only listed combination overhead and underground feed service boxes may be used to connect to an overhead utility drop. See handout ELC-04.**
- **The effective ampacity of a residential electrical service can be altered by several different system modifications. The original, installed ampacity is to be maintained with limited exceptions.**
- **The process of relocating existing loads to new subpanels or equipment must comply with several specific Code requirements.**

Surge-Protective Devices

1. The 2022 California Electrical Code (CEC) requires all dwelling units to have an SPD installed for any new or replaced service. These shall be of SPD Type 1 or Type 2. CEC Section 230.67, Article 242

Service Alterations

2. The California Energy Code (CAEC) increasingly adds required electrical appliance loads and requirements to the electrical service equipment. It is important to maintain the ability of the property owner to install non-fuel appliances.
3. A **maximum de-rating of 15%** of the Service Main overcurrent protective device (OCPD) [circuit breaker or fuse] will be allowed.
4. No de-rating is allowed that would reduce the Main OCPD to less than 100A—the minimum service rating required by CEC 230.79(C)
5. Service load calculations using CEC Article 220, Part III are required to demonstrate that de-rated service has sufficient ampacity for the total load.
6. For the service load calculations, note that Electric Vehicle Charging Station (EVCS) loads are NOT to be demanded and must be included at 100% VA rating of the charger. Please refer to handout ELC-20 “Residential Load Calculation for Electric Vehicle Charging.”

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Relocating Existing Loads

7. When ALL loads are relocated from the Main Service Panel, the feeder and OCPD supplying the equipment to which the loads are relocated must provide the full, 100% ampacity of the Service Main OCPD.
8. When a subset of main panel loads are relocated to a 'backup loads panel' or similar, a panel schedule with load calculations shall be provided for that panel. CEC 220 Part III
    a) The feeder and OCPD supplying the backup loads panel must have an ampacity greater than the backup loads calculation.
    b) Utility power must be able to supply 100% of the backup loads.
    c) Any one load cannot exceed the sustained power output rating of the non-utility backup source(s). CEC 702.4(B)(1)
9. The ampacity of relocated load conductors must be adjusted for ambient temperature and number of current-carrying conductors in a conduit. CEC 310.15(A, B, C(1))
    a) Conductors routed on the exterior will need to be adjusted for a maximum ambient temperature of 96°-104°F. CEC 310.15(B)(1)
    b) More than 9 current-carrying conductors in a 24" or longer conduit will generally require an increase in wire gauge due to reduced ampacity. CEC 310.15(C)(1)
    c) The adjusted conductor ampacity must be equal to or greater than the circuit ampacity (OCPD). CEC 240.4
10. Arc-fault circuit-interrupter (AFCI) protection must be provided for relocated circuits when the extending raceway(s) is greater than 6 feet. This applies to **all** dwelling unit 120-volt 15A and 20A branch circuits except those supplying outlets and devices <u>exclusively</u> in bathrooms, garages, attics, crawl spaces, and outdoors. CEC 210.12(A)
11. <u>Multi-wire circuits must be preserved</u>. When multi-wire circuits are relocated, they must be grouped, tagged, and otherwise identified as to the two ungrounded and single grounded (neutral) conductors. 2-pole circuit breakers are required for each relocated multi-wire circuit. CEC 210.4(B,D)