Background

Modern homes host a large number of electrical appliances, equipment and devices often resulting in higher demands for electrical supply and larger amperage electrical panels. To assure the safety and durability of new and expanded electrical systems the City of Carmel-by-the-Sea requires that electrical plans for new or expanded systems include load calculations demonstrating that the panel(s) installed in the building are sufficient to support the planned loads on the system. This Job Aid provides a worksheet that can be included in electrical system permit submittals for residential construction to verify the panels' ability to meet the intended loads.

Residential Electrical Load Calculation Worksheet

Instructions

Review the electrical load sources in the table that follows and check all that apply to the home, including, for new construction, the proposed electrical vehicle supply equipment required by CGBSC Sec. 4.106.4. Fill in the corresponding wattage for each item checked, and then add up all of the checked items to determine the total wattage used. Wattages shown are estimates. For a more precise analysis, use actual values based on the nameplate ratings or consult with an electrical design professional.

Project Address: _____ BP Application # _____

Applicant Name: _____ Phone #: _____

Electrical Contractor Name: _____ Phone #: _____

Check All Applicable	Description of Load	Volt-Amps on Nameplate Rating	Volt-Amps used
General Lighting / Power Load			
√	Total square footage times 3	3 volt-amps/sf	
√	Kitchen Small Appliance Branch Circuits (min. 2)	1,500 volt-amps/circuit	
√	Laundry Circuit (min. 1)	1,500 volt-amps	
Appliances and Equipment Except Air Conditioner(s)			
	Microwave		
	Trash Compactor		
	Dishwasher		
	Disposal		
	Electric Oven		
	Electric Range		
	Electric Clothes Dryer		
	Electric Clothes Washer		
	Electric Water Heater		
	Evaporative Cooler		
	Electric Vehicle Supply Equipment (EVSE)		
Sub-Total Volt-Amps Used (add up V-A used for everything checked			
Proceed to Page 2 of Worksheet			

Sub-Total Volt-Amps Used (From Page 1)	
	- 10,000
Subtotal (A) =	
	X 0.40
Subtotal (B) =	
	+ 10,000
Subtotal (C) =	
Heating and Air-Conditioning (Largest of the following shall be included):	+
1. Air conditioning and cooling (100% of nameplate (NP) rating) =	
2. Heat pump without supplemental heating (100% NP Rating) =	
3. Heat pump with supplemental electric heat (100% NP plus 65%) =	
4. Electrical space heating , 4 separate units (65% NP rating) =	
5. Electrical space heating ≥ 4 separate units (40% NP rating) =	
6. Electrical thermal storage and other 100% NP rating =	
Total Current Demand (Volt-Amps) =	
Divided By 240 (volts) =	
Total Amps Required for Service Conductors and Panel =	
Rating of Proposed Electrical Service or Subpanel (Amps) =	
Panel Upgrade Required (circle answer)?	Y / N
If the total demand is less than the rating of the existing electrical service or subpanel, then a panel upgrade is not required. If the total demand is greater, then an EVSE permit will only be issued if a panel upgrade is included in the work. New/upgrade panels may require the service lateral to be placed underground.	

Affidavit of Compliance

By my signature, I attest that the information provided in this worksheet is true and accurate.

Job Address: _____ BP Application # _____

Name of Electrical Contractor: _____

Signature of Electrical Contractor: _____ Date: _____

Note: This form is a voluntary compliance alternative and you may wish to hire a qualified individual or company to perform a thorough evaluation of your electrical service capacity in lieu of this methodology. Use of this electrical load calculation worksheet is at the user's risk and carries no implied guarantee of accuracy. Users of this form are advised to seek professional assistance in determining the electrical capacity of a service panel.

Single Family Dwelling Load Calculation – Step-by-Step Example (Optional Method) CEC 220.82

Given:

Square foot area of home – 2800 square feet (sf)
14 kW range
3 kW water heater
5 kW clothes dryer
1.5 kW dishwasher
15 kW central heat
29 amp, 240 volt air conditioning

Step 1:

Multiply the sf area by 3 volt-amperes (VA) per sf
2800 sf X 3 VA = 8,400 VA

Step 2:

Add 1,500 VA for each 2-wire, 20-amp small appliance branch circuit and the laundry circuit
1,500 VA X 3 = 4,500 VA

Step 3:

Add in the appliance loads at nameplate value.

Range	14,000 VA
Water heater	3,000 VA
Clothes dryer	5,000 VA
Dishwasher	1,500 VA

Step 4:

Add all appliance loads together:
8,400 + 4,500 + 14,000 + 3,000 + 5,000 + 1,500 = 36,400 VA

Step 5:

Subtract 10,000 VA from the total VA (this will be added back in later)
36,400 – 10,000 = 26,400 VA

Step 6:

Multiply the remainder (26,400 VA) times 40%
26,400 X .40 = 10,560 VA

Step 7:

Add the two values from step 5 and 6 together to find the general load.
10,000 + 10,560 = 20,560 VA

Step 8:

Compare the heating load to the AC load and take the larger of the two loads
AC load at 100% = 29 amps X 240 volts = 6,960 VA
Heat load at 65% = 15,000 VA X .65 = 9,750 VA **(largest load)**

Step 9:

Add the general load to the largest of the AC or heating load
General load = 20,560 VA
Heating load = 9,750 VA
Total load = 30, 310 VA

Step 10:

Divide the total load in VA by the voltage
30,310 / 240 = **126 amps (min. panel capacity)**