



ELECTRICAL LOAD CALCULATION

Dwelling size: 5,400 sq ft.

Service voltage: 120/240V single-phase.

General lighting load: $5,400 \text{ sq ft} \times 3 \text{ VA/sq ft} = 16,200 \text{ VA}$

Small appliance circuits: 3,000 VA

Laundry circuit: 1,500 VA

Total before demand = 20,700 VA

Apply NEC 220.42 demand factor: first 3,000 VA at 100% = 3,000 VA; remaining 17,700 VA at 35% = 6,195 VA.

Net general lighting load = 9,195 VA.

Fixed appliances: disposal 900 VA, bath fan 750 VA, microwave 1,500 VA, dishwasher 1,700 VA, trash compactor 1,500 VA, freezer + refrigerator 3,000 VA.

Total fixed appliances = 8,350 VA.

NEC allows 75% demand for 4 or more appliances: $8,350 \times 0.75 = 6,262 \text{ VA}$.

Other loads: HVAC (3 systems @ 1,800 VA/ton) = 5,400 VA; electric dryer = 5,000 VA; elevator = 7,200 VA.

Total other loads = 23,000 VA.

Total service load (standard calculation): $9,195 \text{ VA} + 6,262 \text{ VA} + 23,000 \text{ VA} = 38,457 \text{ VA}$.

Amps at 240V = $38,457 \div 240 = 160.2 \text{ amps}$.

Dwelling demand load = 38,457 VA (160 amps).

In compliance with NEC 430.24, the largest motor load has been accounted for with the required 25% adder, and the 38 kW generator together with the 400-amp Kohler RXT ATS will automatically manage motor starting and running loads through its integrated load-shedding controls.

The proposed 38 kW Kohler generator, in combination with the 400-amp Kohler RXT service-entrance automatic transfer switch, will safely support the home's electrical demand by using Kohler's integrated load-management system. The generator provides approximately 160 amps of continuous capacity at 240 volts, and the ATS continuously monitors this output through its built-in current transformer. If total household demand approaches the generator's limit, the ATS automatically sheds designated nonessential loads—such as additional HVAC systems, electric cooking equipment, or other large appliances—while keeping essential circuits energized at all times. As generator capacity becomes available, the ATS restores these loads in priority order. This coordinated operation ensures that the 38 kW generator can reliably power the residence without exceeding its rated capacity, while maintaining compliance with UL 1008 and NEC requirements.

GAS LOAD CALCULATION

Dwelling size: 5,400 sq ft.

Gas appliances: 3) gas HVAC systems, 2) Navien NPE-180A2 tankless water heaters, 48" Wolf gas range, 3) Gas fireplaces, and 1) Kohler 38RCLC natural gas standby generator.

HVAC gas heating load: 2) 5-ton gas furnaces at approximately 100,000 BTU/hr each = 200,000 BTU/hr; 1) 3-ton gas furnace at approximately 60,000 BTU/hr = 60,000 BTU/hr.

Total HVAC gas heating load = 260,000 BTU/hr.

Domestic hot water: 2) Navien NPE-180A2 condensing tankless water heaters, each rated at 150,000 BTU/hr input.

Total water heating load = 300,000 BTU/hr.

Cooking equipment: 48" Wolf gas range with combined burner and oven output $\approx$ 144,200 BTU/hr.

Generator: Kohler 38RCLC standby generator requires 492 cubic feet per hour of natural gas at full load, equal to approximately 492,000 BTU/hr.

Fireplaces: 3) Gas fireplaces, each rated 49,000 BTU/hr.

Total fireplace load = 147,000 BTU/hr.

Total connected gas load (normal service): 260,000 BTU/hr + 300,000 BTU/hr + 144,200 BTU/hr + 492,000 BTU/hr + 147,000 BTU/hr = 1,343,200 BTU/hr ($\approx$ 1,343 cfh).

Non-coincidental load: the three fireplaces are decorative appliances and are not intended to be used during generator operation. For generator-outage conditions, the diversified simultaneous load excludes the fireplaces.

Total diversified load with generator running:= 1,196,200 BTU/hr ($\approx$ 1,196 cfh).

The existing gas meter at the alley is an AC-250 class meter rated for approximately 250 cfh ($\approx$ 250,000 BTU/hr), which is below the required connected load of 1,343 cfh; the gas utility will upgrade the meter and regulator to meet the calculated demand.