***If supplementary heat is not on at same time as heat pump, heat pump kVA need not be added to total.**

Totals

Net general load		19,280 VA
Heat pump and supplementary heat		15,510 VA
	Total	34,790 VA

Calculated Load for Service

$$34.79 \text{ kVA} \times 1000 \div 240 \text{ V} = 145 \text{ A}$$

Therefore, this dwelling unit would be permitted to be served by a 150-A service.

Examples D2(a) through D2(c) are sample calculations for one-family dwellings as defined in Article 100 under *dwelling, one-family (one-family dwelling)*. The optional method specified in 220.82 is the basis for these sample calculations. Although the samples were for one-family dwellings (also known in common nomenclature as single-family homes), this calculation can be used for the individual dwelling units of two-family and multifamily dwellings.

However, unlike the standard method, the optional calculation can be used only where the ungrounded service or feeder conductors have an ampacity of not less than 100 amperes regardless of the calculated load. The load can be less than 100 amperes, but the ungrounded conductors cannot have an ampacity of less than 100 amperes. The rationale behind this minimum conductor ampacity requirement is that with higher loads comes more diversity and that the significant demands permitted by 220.82 are appropriate only with service and feeder conductors having an ampacity not less than 100 amperes.

In Examples D4(a), D4(b), D5(a), and D5(b), the calculated load for each dwelling unit is less than 100 amperes; therefore, the standard calculation is used so that an ungrounded conductor having an ampacity of less than 100 amperes can be installed as a feeder conductor for the individual dwelling units.

The three-wire service or feeder conductors can be supplied from a single-phase 120/240-volt or three-phase 208Y/120-volt supply.

Example D3 Store Building

A store 80 ft by 60 ft, or 4,800 ft^2, has 30 ft of show window. There are a total of 80 duplex receptacles. The service is 120/240 V, single phase 3-wire service. Actual connected lighting load is 7,000 VA, all of which for this example is considered continuous. All calculations are rounded up or down as permitted in 220.5(B).

Calculated Load *(see 220.40)*

Δ **Noncontinuous Loads**

Receptacle Load *(see 220.47)*		
80 receptacles at 180 VA		14,400 VA
10,000 VA at 100%		10,000 VA
14,400 VA - 10,000 VA = 4,400 VA at 50%		2,200 VA
	Subtotal	12,200 VA

Continuous Loads

General Lighting*		
4,800 ft^2 at 1.9 VA/ft^2		9,120 VA
Show Window Lighting Load		
30 ft at 200 VA/ft *[see 220.14(G)]*		6,000 VA
Outside Sign Circuit *[see 220.14(F)]*		1,200 VA
	Subtotal	16,320 VA
	Subtotal from noncontinuous	12,200 VA
	Total noncontinuous loads + continuous loads =	28,520 VA

*In the example, the actual connected lighting load at 125% (7,000 VA × 1.25 VA) is less than the load from Table 220.42(A), so the required minimum lighting load from Table 220.42(A) is used in the calculation. Had the actual lighting load × 125% been greater than the value calculated from Table 220.42(A), the actual connected lighting load would have been used.

Minimum Number of Branch Circuits Required

General Lighting: Branch circuits need only be installed to supply the actual connected load *[see 210.11(B)]*.

$$7{,}000 \text{ VA} \times 1.25 = 8{,}750 \text{ VA}$$
$$8{,}750 \text{ VA} \div 240 \text{ V} = 36.45 \text{ A for 3-wire, 120/240 V}$$
$$8{,}750 \text{ VA} \div 120 \text{ V} = 72.92 \text{ A}$$

The lighting load would be permitted to be served by 2-wire or 3-wire, 15- or 20-A circuits with combined capacity equal to 36 A or greater for 3-wire circuits or 73 A or greater for 2-wire circuits. The feeder capacity as well as the number of branch-circuit positions available for lighting circuits in the panelboard must reflect the full calculated load of 9,120 VA. Lighting loads from Table 220.42(A) already include 125% for continuous load. See note at bottom of Table 220.42(A).

Show Window

$$6{,}000 \text{ VA} \times 1.25 = 7{,}500 \text{ VA}$$
$$7{,}500 \text{ VA} \div 240 \text{ V} = 31.25 \text{ A for 3-wire, 120/240 V}$$
$$7{,}500 \text{ VA} \div 120 \text{ V} = 62.5 \text{ A for 2-wire, 120 V}$$

The show window lighting is permitted to be served by 2-wire or 3-wire circuits with a capacity equal to 31 A or greater for 3-wire circuits or 63 A or greater for 2-wire circuits.

Receptacles required by 210.62 are assumed to be included in the receptacle load above if these receptacles do not supply the show window lighting load.

Receptacles

Receptacle Load:

$$14{,}400 \text{ VA} \div 240 \text{ V} = 60 \text{ A for 3-wire, 120/240 V}$$
$$14{,}400 \text{ VA} \div 120 \text{ V} = 120 \text{ A for 2-wire, 120 V}$$

The receptacle load would be permitted to be served by 2-wire or 3-wire circuits with a capacity equal to 60 A or greater for 3-wire circuits or 120 A or greater for 2-wire circuits.