

CANADIAN ELECTRICAL CODE

SUBJECT: Section 8 – Circuit Loading and Demand Factors

Rule 8-100 Current Calculations

120/208 V, 3-wire feeders from a 120/208 V, 3 phase, 4-wire supply

To obtain the voltage divisor for calculating the minimum ampacity of 120/208 V, 3-wire feeders, use the voltage between a phase and the identified conductor (120V) multiplied by two ($120 \times 2 = 240\text{V}$).

The voltage divisor for calculating the minimum ampacity of the 120/208 V, 3-phase, 4-wire service conductors is, of course, $1.73 \times 208 \text{ V}$.

Rule 8-102 Voltage Drop

Voltage drop within circuit conductors is a situation where the operating voltage at electrical equipment is less than the output voltage of the power supply due to the resistance of the circuit and the size of the load. Inductive loads (i.e. motors, ballasts, etc.) that operate at voltage below its rating can overheat resulting in shorter equipment operating life and increased cost, as well as inconvenience for the customer. Under-voltage for sensitive electronic equipment such as computers, laser printers, copy machines, etc. can cause the equipment to lock up or suddenly power down resulting in data loss, increased cost and possible equipment failure. Resistive loads (heaters, incandescent lighting) that operate at under-voltages simply will not provide the expected rated power output.

Subrule (1) sets the minimum acceptable voltage drop for a branch circuit and/or feeder. For a branch circuit or a feeder, it is recommended that the conductors be sized to prevent a maximum voltage drop of 3%. The maximum total voltage drop for a combination of both branch circuit and feeder should not exceed 5%.

Subrule (2) provides the parameters for determining the demand load. It is important to note that where the connected load is not known, 80% of the rating of the overload or overcurrent devices protecting the branch circuit will be used to calculate voltage drop. For example, where a branch circuit consisting of one or more receptacles are fed from a 15 A breaker the connected load will be presumed to be 12 A.

For guidelines on the proper selection of wire or cable or for calculating voltage drop, Table D3 is provided. In addition, there are several Internet web sites that provide voltage drop calculators; just select your preferred search engine and type in “voltage drop calculator”. You should also

Issue of this STANDATA is authorized by
the Administrator



SAFETY CODES COUNCIL

A handwritten signature in black ink, appearing to read 'René Leduc'.

René Leduc

The logo for Alberta Municipal Affairs, with the word 'Alberta' in a large, bold, sans-serif font and 'MUNICIPAL AFFAIRS' in a smaller font below it.

consult the cable manufacturer to determine the appropriate size and characteristics of the wire/cable for a specific application.

Rule 8-202 Apartment and Similar Multi-family Buildings

Calculating Additional Loads in Excess of 1500 W

To determine the minimum ampacity of service conductors or feeder conductors in accordance with Rule 8-202(1)(a)(vi), the nameplate rating of each load with a rating greater than 1500 W is to be used in the calculations.

Rule 8-400 Branch Circuits and Feeders Supplying Automobile Heater Receptacles

The minimum ampacity of service or feeder conductors for a building should be calculated by using Rules 8-202 to 8-208 as applicable for the type of occupancy, and separately calculating the load for the automobile heater receptacles according to Rule 8-400. These two figures, each with its own demand factor already applied, are then added together to determine the total load.

Where the parking lot receptacles are supplied from individual dwelling units of an apartment or similar multi-family building, the above method of calculating total demand should also be applied. The 75% demand factor in Rule 8-202(3)(d) is not to be applied, because a demand factor is included in the load as determined in compliance with Rule 8-400.

For the application of Rule 8-106(4), an automobile heater receptacle load may be considered similar to an "electric space heating" load. In applying this rule, ensure the air conditioning load will not be operated in conjunction with the heating equipment and or with the automobile heater receptacle load.