LOAD CALCULATIONS FOR ROW-HOUSING – RULE 8-200 2) (DUPLEXES, TRIPLEXES, QUADRUPLEXES, TOWNHOUSES, AND SINGLE DWELLINGS WITH SECONDARY SUITE)

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The following bulletin provides guidance on the application of rules pertaining to the 2024 BC Electrical Code. The requirements of local municipal authorities having jurisdiction may vary. Installers should consult with local authorities having jurisdiction, prior to undertaking work, to determine their requirements.

Scope:

This Bulletin provides clarification on rule 8-200 2), the calculation of the minimum ampacity of **service or feeder** conductors supplying two or more dwelling units of row-housing and includes single dwellings with secondary suites. (Note: Where it is intended to incorporate a secondary suite in a single dwelling, installers are advised to consult with the local authority having jurisdiction for Building Code requirements.)

Code definitions related to Rule 8-200 2)

Single dwelling– a dwelling unit consisting of a detached house, one unit of a row house, or one unit of a semi-detached, duplex, triplex or quadruplex house.

Dwelling unit – one or more rooms for the use of one or more persons as a housekeeping unit with cooking, eating, living, sleeping, and sanitary facilities (see Suite).

Suite — a single room or series of rooms of complementary use operated under a single tenancy, including dwelling units and individual guest rooms in motels, hotels, boarding houses, rooming houses, and dormitories.

Row-housing – This is not defined in the BC Electrical Code nor the BC Building Code. The local authority having jurisdiction for the BC Building Code may have by-laws that provide a definition. Typical examples of row-housing include: Duplexes, triplexes, quadruplexes, townhouses, and single dwellings with a suite.

When calculating the minimum ampacity of a service or feeder conductors supplying two or more dwelling units of row housing, 8-200 2) requires the use of a greater value from 8-200 1) a) or b), and application of the demands from 8-202 3) a) i) to v) plus the requirements of Rule 8-202 3) b) to e).

For buildings where units are 80m^2 or more:

- **24,000 W** is the minimum allowed load used in the calculation.
- Where the calculated load exceeds **24,000 W**, the calculated load value must be used.

For buildings where units are less than 80m^2.

- **14,400 W** is the minimum allowed ampacity of the feeder or service.
- where the calculated load exceeds **14,400 W**, the calculated load value must be used.

In addition to the minimum conductor ampacity, the calculation determines the required rating of the busbar in a multi-gang meter base where one is used.

Note: In the 26th edition of the 2024 Canadian Electrical Code, Rule 8-202 3) d) does not address calculations of combined electric vehicle supply equipment (EVSE) loads when electric vehicle loads are supplied from panelboards of individual dwelling units. 8-202 3) a) excludes EVSE loads however only EVSE loads not supplied by a panelboard within a dwelling unit were added back into the calculation for 8-202 3) d). When EVSE loads supplied from a dwelling unit panel board are not added back into the total calculated load, there is a safety concern as it may result in the selection of consumer service equipment with an inadequate rating and may be non-compliant with other rules such as 8-104.

The Section 8 technical sub-committee is aware of this oversight and is working on a correction. As CSA's intent for Rule 8-202 3) Item d) was to apply to installations when electric vehicle supply equipment is either supplied from a panelboard installed in a dwelling unit or from a panelboard installed outside of a dwelling unit, we will be continuing to enforce the rule as we have in the past and with the knowledge that the correction is being made by CSA.

In the next edition of the code, Rule 8-202 3) d) is expected to read as "except as permitted by Rule 8-106 10) or Rule 8-106 11), any electric vehicle supply equipment loads shall be added with a demand of 100%; and"

EXAMPLES RULE 8-200(2)

Note: The objective is to provide examples of how to combine multiple units of row housing to arrive at the minimum allowable ampacity of the main service or feeder. To simplify examples, the load calculation in accordance with 8-200 1) for the individual units is not shown.

Example 1:

A duplex under 80m^2 per unit. Service voltage- 120/240 volts. Each unit is calculated in accordance with Rule 8-200 1). The following method is also used for a SFD with a suite, a triplex, a quadruplex or townhouses where the units are fed from a common service or feeder.

Each unit of a duplex is 75m^2, with typical loads equaling 13,125 W and a baseboard heat load of 4,000W. The result is a calculated total of 17,125 W. Rule 8-200 2) directs us to 8-200 1) where the calculated load in this example has been determined to be 17,125W/240V – 72A. This calculated value is greater than the minimum 60A for units that are less than 80m^2 from 8-200 1) b) ii). Therefore, this calculated value is used in the calculation.

Next, apply **demand factors** from 8-2023) a) i) to v) plus 8-2023)b) d) & e).

Calculated load= 17,125 W

Rule	Demand Application		Result
8-202 3) a)	17,125 W – 4,000 W (heat)	=	13,125 W
8-202 3) a) i)	1 unit@100%	=	13,125 W
8-202 3) a) ii)	1 unit@ 65% (.65 X 13,125 W)	=	8,531 W
8-202 3) a) & b)	Heat 2 @ 4,000 W	=	8,000 W
	Total	=	**29,656 W**

Service conductors shall have a minimum ampacity of (29,656 W/240V) = 124 amps

Example 2:

A duplex over 80m2 per unit. Service voltage = 120/240 volts Each unit is calculated in accordance with Rule 8-200(1). The following method is also used for a SFD with a suite, a triplex, a Quadruplex, or townhouses where the units are fed from a common service or feeder.

Each unit of a duplex is 85m^2 with 4,000 W of baseboard heat. Rule 8-200 2) directs us to 8-200 1) where the calculated load for this example is 17,125 W, (17,125/240) = 71.35 amps. This calculated value is less than the minimum 100A for units that are 80m^2 or greater from 8-200 1) b) ii). The minimum of 100A from 8-200 1) b) i) is to be used in the calculation.

Next, apply **demand factors** from 8-202 3) a) i) to v) plus 8-202 3) b), c), & d).

100A – 24,000 W

Rule	**Demand Application**		**Result**
8-202 3) a)	24.000W – 4,000W (heat)	=	20,000 W
8-202 3) a) i)	1 unit@ 100%	=	20,000 W
8-202 3) a) ii)	1 unit @ 65% (.65 X 20,000 W)	=	13,000 W
8-202 3) a) & b)	Heat 2 @ 4,000 W	=	8,000 W
	Total	**=**	**41, 000 W**

Service conductors shall have a minimum ampacity of (41,000 W / 240 V) = 171 amps

Example 3:

A duplex with a calculated load over 100A per unit. Each unit is calculated in accordance with Rule 8-200 1). The following method is also used for a SFD with a suite, a triplex, a Quadruplex, or townhouses where the units are fed from a common service or feeder.

Example 3:

A duplex with a calculated load over 100A per unit. Each unit is calculated in accordance with Rule 8-200 1). The following method is also used for a SFD with a suite, a triplex, a Quadruplex, or townhouses where the units are fed from a common service or feeder.

Each unit of a duplex is 191 m2 with 12,000 W of baseboard heat. Rule 8-200 2) directs us to 8-200 1) where a calculated load is determined to be 27,375 W per unit

Rule	Demand Application		Result
	Heat (individual unit)	=	12,000 W
62-118 3) a)	1st 10,000 W @ 100%	=	10,000 W
62-118 3) b)	Balance 2000W @ 75%	=	1,500 W
	Heat per unit	=	11,500 W
	Basic calculated load for each unit, excluding heat demand of 11,500 W		
8-200 2) a) & b)	(27,375 W – 11,500 W)	=	15,875 W
	Note: see above for rule 62-116 calculation		
8-202 3) a) i)	1st unit @ 100%	=	15,875 W
8-202 3) a) ii)	2nd unit @ 65% (.65 X 15, 875 W)	=	10,318 W
	Subtotal (15,875 W + 10,318 W)	=	26, 193 W
8-202 3) b)	Total heating loads	=	24,000 W
62-118 3) a)	1st 10,000 W @ 100%	=	10,000 W
62-118 3) b)	Balance 14,000 W @ 75%	=	10,500 W
	Total calculated heating demand	=	**20,500 W**
Total calculated demand	(26,193 W + 20,500 W)	=	**46, 693W**

Example 4:

A 10-unit town house complex fed from a main electrical room

A 10-unit townhouse complex with one service to a meter stack, each unit is 85m^2, with 4,000 W of baseboard heat. A house load of 11 X 175 W street lights, 6 X 120 V, 20 A vehicle charging receptacles, and 1,000 W of heat. Calculated load for each unit, including heat, is 17,125 W.

The calculated load, 17,125 W = 72 amps @ 240 volts or 82.3 amps @ 208 volts, is less than 100 amp minimum, as per. 8-200 1) b) (over 80m2). Next, apply demand factors from 8-202 3) a) i) to v) plus 8-202 3) b), c) & d)

Rule	Demand Application		Results
8-200 2) a) & 1) b)	100 A X 240 V	=	24,000 W
8-200 2) & b)	24,000 W – 4,000 W heat	=	20,000 W
8-202 3) a) i)	1 unit @ 100%	=	20,000 W
8-202 3) a) ii)	2 units @ 65%	=	26,000 W
	2 units @ 40%	=	16,000 W
	5 units @ 25%	=	25,000 W
	Subtotal	=	**87,000 W**

Rule 62-118 3) Heat load = 10 X 4,000 W = 40,000 W

	1st 10,000 W @ 100%	=	10,000
	Remainder 30,000 W @ 75%	=	22,500 W
	Heat (subtotal)	=	**32,500 W**

Rule	Demand Application		Result
House Loads			
8-202 3) e)	Lights = 11 X 175 W @ 75%	=	1,444 W
8-202 3) e)	Heat 1,000 W @ 75%	=	750 W
8-202 3) d)	Chargers 6 X 120 V X 20 A @ 100%	=	14,400W
	Subtotal	=	16,594 W

8-104 6) a) House Load deemed Continuous = 16,594 W

therefore 16,594 /.80 = 20,743 W

Total demand

Units (from previous page)	=	87,000 W
Heat (from previous page)	=	32,500 W
House load	=	20,743 W
Total	=	**140,243 W**

The minimum ampacity of the service conductors is 584 A (140,243 W / 240V).

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References:
Safety Standards Act
Electrical Safety Regulation
Safety Standards General Regulation