
STANDATA interpretation 23-BCI-003/23-FCI-002

Building/Fire

Occupant loads

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Purpose

To provide a consistent method for calculating occupant loads for assembly occupancies under the National Building Code – 2023 Alberta Edition (NBC(AE)) and National Fire Code – 2023 Alberta Edition (NFC(AE)).

Discussion

Over the years, it has been identified occupant loads may be calculated differently from one jurisdiction to another. This created confusion for both the business owner and the authority having jurisdiction (AHJ) during enforcement.

The intent statement for occupant loads issued for the National Building Code of Canada (NBC) clarify the calculation of occupant loads is to limit the probability of overcrowding, which could lead to delayed egress during an emergency evacuation and to determine the minimum design load to calculate egress and exit capacity. The intent statement is also used to determine the required calculations when rooms or areas are intended for different occupant loads at different times.

The intent statement for occupant loads in the National Fire Code of Canada (NFC) indicate it is to limit the probability that a room will contain too many occupants, which could lead to overcrowding or insufficient capacity of the means of egress.

This indicates the intent of occupant loads in both the NBC and NFC is to limit the probability that delays in evacuation or movement of persons to a safe place in an emergency which could lead to harm to a person.

The NBC(AE) and NFC(AE) have been written to harmonize with the NBC and NFC. Design occupant loads are the responsibility of and provided by the registered architectural professional or designer.

For buildings which require a registered architectural professional or designer, incorporating the exit occupant load into the design of is the responsibility of the registered architectural professional in accordance with the practice of architecture under the *Architects Act* and its Regulations. A design occupant load must be indicated for other professionals to properly design other required systems.

To provide further clarity, code requirements that relate to the design occupant load include the:

- 1) number and/or size of exits provided;
- 2) number of washrooms required;
- 3) need for a fire alarm system;
- 4) need for a fire sprinkler system;
- 5) need for exit signs;

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- 6) need for emergency lighting;
- 7) need for special door hardware;
- 8) need to provide barrier-free accessibility;
- 9) need to comply with the requirements for a high building;
- 10) direction of door swing, and
- 11) design ventilation capacity.

Code References

NBC(AE) Division A, Article 1.4.1.2.

1.4.1.2. Defined Terms

Assembly occupancy (Group A) means the *occupancy* or the use of a *building*, or part thereof, by a gathering of persons for civic, political, travel, religious, social, educational, recreational or like purposes, or for the consumption of food or drink.

Authority having jurisdiction means a safety codes officer in the building discipline exercising authority pursuant to designation of powers and terms of employment in accordance with the Safety Codes Act.

Coordinating registered professional means a *registered professional* retained to coordinate the design and *field reviews* of the *registered professionals of record* required for the *project*.

Designer means the person responsible for the design.

Floor area means the space on any *storey* of a *building* between exterior walls and required *firewalls*, including the space occupied by interior walls and *partitions*, but not including *exits*, *vertical service spaces*, and their enclosing assemblies.

Licensed interior designer means an individual who is authorized to engage in that portion of the practice of architecture that is defined as interior design under the Architects Act and its Regulations.

Registered architectural professional means an individual who is authorized to engage in the practice of architecture under the Architects Act and its Regulations.

Registered professional means an individual who qualifies as a

- (a) *registered architectural professional*,
- (b) *registered engineering professional*, or
- (c) *licensed interior designer*.

Registered professional of record means a *registered professional* retained to be responsible for the integrity and completeness of the design and *field reviews* of one or more of the following elements of a *project*:

- (a) architectural,
- (b) structural,
- (c) mechanical,
- (d) electrical, and
- (e) geotechnical.

(See Note A-1.4.1.2.(1).)

Occupancy means the use or intended use of a *building* or part thereof for the shelter or support of persons, animals or property.

Occupant load means the number of persons for which a *building* or part thereof is designed.

NBC(AE) Article 3.4.2.6.**3.4.2.6. Principal Entrances**

- 1) For the purposes of this Section, at least one door at every principal entrance to a *building* providing access from the exterior at ground level shall be designed in accordance with the requirements for *exits*.
- 2) In a *building* that is not *sprinklered* throughout in accordance with Sentence 3.2.5.12.(1), the principal entrance serving a dance hall or a licensed beverage establishment with an *occupant load* more than 250 shall provide at least one half of the required *exit* width.

NBC(AE) Article 3.1.17.1.**3.1.17.1. Occupant Load Determination**

- 1) The *occupant load* of a *floor area* or part of a *floor area* shall be based on
 - a) the number of seats in an *assembly occupancy* having fixed seats,
 - b) 2 persons per sleeping room in a *dwelling unit*, or
 - c) the number of persons for which the area is designed, but not less than that determined from Table 3.1.17.1. for *occupancies* other than those described in Clauses (a) and (b), unless it can be shown that the area will be occupied by fewer persons.
- 2) If a *floor area* or part thereof has been designed for an *occupant load* other than that determined from Table 3.1.17.1., a permanent sign indicating that *occupant load* shall be posted in a conspicuous location.
- 3) For the purposes of this Article, *mezzanines*, tiers and balconies shall be regarded as part of the *floor area*.

If a room or group of rooms is intended for different *occupancies* at different times, the value to be used from Table 3.1.17.1. shall be the value which gives the greatest number of persons for the *occupancies* concerned.

NFC(AE) Division A, Article 1.4.1.2.**1.4.1.2. Defined Terms**

Assembly occupancy (Group A) means the *occupancy* or the use of a *building*, or part thereof, by a gathering of persons for civic, political, travel, religious, social, educational, recreational or like purposes, or for the consumption of food or drink.

Occupancy means the use or intended use of a *building* or part thereof for the shelter or support of persons, animals or property.

Occupant load means the number of persons for which a *building* or part thereof is designed.

Authority having jurisdiction means a safety codes officer in the fire discipline exercising authority pursuant to designation of powers and terms of employment in accordance with the Safety Codes Act. (See Note A-1.4.1.2.(1).).

NFC(AE) Article 2.1.4.1.**2.1.4.1. Posting**

- 1) Where a sign, notice, placard or information is required to be posted, it shall be

- a) clearly legible, and
- b) except as provided in Sentence (2), permanently mounted in a conspicuous or prominent location in proximity to the situation to which it refers.

Where the situation for which posting is required is of a temporary nature, permanent mounting need not be provided.

NFC(AE) Article 2.7.1.3.

2.7.1.3. Occupant Load

- 1) The maximum permissible *occupant load* for any room shall be calculated on the basis of the lesser of
 - a) 0.4 m² of net floor space per occupant, or
 - b) the *occupant load* for which *means of egress* are provided.

(See Note A-2.7.1.3.(1).)

- 2) The number of occupants permitted to enter a room shall not exceed the maximum *occupant load* calculated in conformance with Sentence (1).

A-2.7.1.3.(1) The NFC uses two criteria to determine the maximum permissible occupant load in existing buildings: the exit capacity, and the total clear floor space per person. Assuming that exit capacity is sufficient, the value of 0.4 m²/person ensures that a crowd of people will be able to move steadily toward the exits. Table 3.1.17.1. of Division B of the NBC should not be used to determine the maximum permissible occupant load for rooms or spaces in existing buildings. NBC Table 3.1.17.1. is intended to allow a building designer to calculate a minimum occupant load for the purpose of designing certain building features, such as means of egress and fire alarm systems. The designer may choose to design for more or fewer persons, in which case the actual design occupant load must be posted in a conspicuous location. In an existing building, the process must be calculated in reverse, from the measured exit capacity, or other building features, to a maximum permissible occupant load. The result of the calculation may not be, and is not intended to be, consistent with values obtained using NBC Table 3.1.17.1.

Net floor space referred to in Clause 2.7.1.3.(1)(a) is the floor space in a room excluding areas occupied by structural features and fixtures, such as tables, furnishings or equipment. In certain assembly occupancies, where the number and type of furnishings may change according to the nature of the function taking place, it may be appropriate to calculate maximum occupant loads for each of the different functions anticipated.

It should also be noted that Article 2.1.3.1. of this Code requires fire alarm systems to be installed in conformance with the NBC. This means that if the occupant load determined by Sentence 2.7.1.3.(1) exceeds that for which a fire alarm system is required by the NBC, a fire alarm system must be provided in the building.

NFC(AE) Article 2.7.1.4.

2.7.1.4. Signs

- 1) In *assembly occupancies* with *occupant loads* exceeding 60 persons, the *occupant load* shall be posted in conspicuous locations near the principal entrances to the room or *floor area*.
- 2) Signs required by the NBC(AE) to indicate the *occupant load* for a *floor area* shall be posted in conspicuous locations near the principal entrances to the *floor area*. (See Note A-2.7.1.4.(2).)
- 3) Signs required in Sentences (1) and (2) shall have lettering not less than 50 mm high with a 12 mm stroke.

A-2.7.1.4.(2) Sentence 3.1.17.1.(2) of Division B of the NBC(AE) requires that the occupant load used in the design of a floor area be posted if it differs from that determined by Table 3.1.17.1. of Division B of the NBC(AE).

Application

This interpretation applies to the calculation of occupant loads in accordance with the NBC(AE) and NFC(AE).

Interpretation

All stakeholders should be aware of the requirements used to calculate design occupant loads (based on the NBC(AE)) and the maximum permissible occupant loads (based on the NFC(AE)) and engage with the appropriate AHJs accordingly. In any jurisdiction, a collaborative approach between all stakeholders is necessary to reach an occupant load capacity for any use or application.

In all cases, the lowest number for the maximum occupant load must be used.

The maximum occupant load of a room or floor area for an assembly occupancy, or licensed beverage establishment, shall be the **lowest** number derived by Criteria #1, #2, #3, and #4.

1. CRITERIA #1 – FIRE ALARM

- A building is required to have a fire alarm system, as per NBC(AE), when the building is sprinklered, or contains
 - a total occupant load more than 300, other than in open seating areas,
 - an occupant load more than 150 above or below the first storey, other than in open air seating areas,
 - a school, college, or child care facility, including daycare facility for children, with an occupant load more than 40,
 - a licensed beverage establishment or a licensed restaurant, in accordance with Alberta Gaming, Liquor and Cannabis, with an occupant load more than 150, or
 - an occupant load more than 300 below an open-air seating area.

If the building is not provided with a fire alarm system, the occupant load is restricted to the total occupant load described above.

2. CRITERIA #2 – BUILDING DESIGN OCCUPANT LOAD

- The building and the assembly occupancies must be designed to accommodate the maximum design occupant load to ensure structural sufficiency, adequate ventilation for health, and sufficient number of washrooms are provided.

3. CRITERIA #3 – DENSITY AND NET FLOOR SPACE

- Net floor space is the amount of floor area when the gross floor area of a room intended for assembly is taken and is then deducted by all area occupied by structures, equipment, and furniture. Parts of the floor area used for circulation such as an aisle serving entrances and exits, aisles to kitchens, bars and washrooms, must also be deducted. In general, the net floor space in an assembly occupancy is where the public is expected to assemble and, in case of emergency, be able to move to an exit safely and in a timely manner. The area occupied by each person in the net floor space must not be less than 0.4 m².

4. CRITERIA #4 - EXIT CAPACITY

- The exits must be in compliance with the NBC(AE) requirements, some of which include but is not limited to:

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- Distance between exits must be at least one half the diagonal dimension of the room. Where two exit doors are too close to each other, they are considered a single exit, with an exit width equal to the combined actual opening size of each door.
- Where there is only one (1) exit, the maximum occupant load for the room is 60 persons.
- If there is more than one (1) exit, every exit shall be considered as contributing not more than ½ the required exit capacity. If there are only two exits, the maximum occupant load is limited to 2 x the capacity of the more restricted exit.
- Exit doors must swing in the direction of exit travel.
- All egress doors in a room with more than 60 people must swing in the direction of travel to an exit.
- Access through an open kitchen is not acceptable as a public access to exit.
- Features for exits, particularly for existing buildings, must be in compliance (e.g., flame spread rating, emergency lights, exit lights, door hardware, etc.) to be considered as contributing to exit widths.
- In a building that is not sprinklered throughout, the principal entrance serving a dance hall or a licensed beverage establishment with an occupant load more than 250 shall provide at least one half of the required exit width.

Exit capacity is calculated by the width of the exit divided by one of the factors listed below:

Location	Factor
<ul style="list-style-type: none"> • Ramps with slopes not more than 1 in 8 • Doorways • Corridors and Passageways 	6.1mm/person
<ul style="list-style-type: none"> • Stairs with steps whose rise is not more than 180mm and run not less than 280mm 	8mm/person
<ul style="list-style-type: none"> • Ramps with slope more than 1 in 8 • Stairs other than above 	9.2mm/person

Appendix “A” provides a check sheet.

Special Circumstances:

For the uses and activities not covered in NBC(AE) Table 3.1.17.1. or this Interpretation, the owner should consult with a professional proficient in designing with occupant loads and apply to the AHJ for minimum requirements.

In the event an occupant load has never been issued to an owner or tenant of a building or there has been a change of ownership, change of name or renovations conducted to a business as of May 1, 2024, the NBC(AE) and NFC(AE) will apply regardless of the age of the building. Owners or tenants may be required to obtain a current design occupant load from a registered architectural professional. Contact your local AHJ.

Posting of Occupant Loads

Article 2.7.1.4. of the NFC(AE) requires the occupant loads to be posted for any areas in a building classified as an assembly occupancy with a maximum occupant load exceeding 60 people. This number reflects the maximum permissible occupant load calculated using the NFC(AE) and the signage must be in a conspicuous location near the principal entrance with lettering not less than 50 mm high with a 12 mm stroke.

In some cases where the design occupant load differs from that calculated with Table 3.1.17.1. of the NBC(AE), an owner is required to provide a sign indicating the occupant load. In these cases, the design occupant load and

the maximum permissible occupant load should be the same. For example, an assembly occupancy may be able to accommodate a very large number of persons for the maximum permissible occupant load, but the design occupant load restricts the maximum occupant load to 300 because the building does not have a fire alarm system. In this case, it would be inappropriate for the fire AHJ to use a higher number because of the missing life safety system.

However, there may be extenuating circumstances for having different numbers for the design occupant load and the maximum permissible occupant load, whereby both the building and fire AHJs should be consulted to determine the acceptable occupant load.

This INTERPRETATION is applicable throughout the Province of Alberta.

Unless stated otherwise, all Code references in this STANDATA are to Division B of the National Building Code - 2023 Alberta Edition or the National Fire Code - 2023 Alberta Edition.

Issued by the Provincial Building Administrator and the Provincial Fire Administrator	
<i>[Original signed]</i> Paul Chang Provincial Building Administrator	<i>[Original signed]</i> Tina Parker Provincial Fire Administrator

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Appendix “A”

Maximum Permissible Occupant Load Determination Check Sheet*

*Check sheet is an example that may be used or altered for use by the AHJ.

Applicant Name and Title:

Address, including postal code:

Contact phone numbers:

Email:

Building Name:
Business Name (if different than above):
Building Address:
Business Address (if different than above):
Business Owner (if different from Applicant Name):
Business Phone:
Previous Business Name (if applicable):
Email:
Occupancy type (theater, restaurant, pub, etc.):

OFFICE USE:

<p>Associated Permits:</p> <p>DP:</p> <p>BP:</p> <p>Special Event Permit:</p>
Is there a previous Occupant Load on file: Y/N If yes, number of persons:
AGLC requirement: Y/N
Any special circumstances associated with event (i.e., multiple event locations requiring multiple occupant loads):

Criteria #1

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Fire Alarm System Provided: Y/N
 If yes, maximum number of persons:

Criteria #2

Building design to accommodate maximum occupant load attached: Y/N
 If yes, maximum number of persons:

Room/Area or Furniture Layout #1 (name) _____
 Gross Floor Area: _____ m² Criteria #2 – Design Occupant Load: _____ persons

Criteria #3- Density Net floor space (m2) _____ / 0.4 m² per person = _____ persons
 Provide calculation of net floor space in a separate page.

Criteria #4 – Exit Capacity

Capacity Exit A width(mm) _____ / factor _____(mm per person) = _____ persons
 Capacity Exit B width(mm) _____ / factor _____(mm per person) = _____ persons
 If only two exits, total exit capacity = 2 times the lesser of A or B = _____ persons

Capacity Exit C width(mm) _____ / factor _____(mm per person) = _____ persons
 (Provide additional pages if necessary)

Where more than two exits provided, total exit capacity (A + B + C) = _____ persons.
 Note: No one exit can take more than half the required exit capacity.

(Least Number from Criteria #1, 2, 3, and 4) = Maximum Occupant Load = _____

Room/Area or Furniture Layout #2 (name) _____
 Gross Floor Area: _____ m² Criteria #2 – Design Occupant Load: _____ persons

Criteria #3- Density Net floor space (m2) _____ / 0.4 m² per person = _____ persons
 Provide calculation of net floor space in a separate page.

Criteria #4 – Exit Capacity

Capacity Exit A width(mm) _____ / factor _____(mm per person) = _____ persons
 Capacity Exit B width(mm) _____ / factor _____(mm per person) = _____ persons
 If only two exits, total exit capacity = 2 times the lesser of A or B = _____ persons

Capacity Exit C width(mm) _____ / factor _____(mm per person) = _____ persons
 (Provide additional pages if necessary)

Where more than two exits provided, total exit capacity (A + B + C) = _____ persons.
 Note: No one exit can take more than half the required exit capacity.

(Least Number from Criteria #1, 2, 3, and 4) = Maximum Occupant Load = _____