

3. SPECIFIED LOADS

3.1 Definitions

- D Specified dead load for the weight of the truss itself plus the weight of all materials of construction incorporated into the building to be supported permanently by the truss.
- L Specified live load due to intended use and occupancy; snow, ice and rain.
- W Specified live load due to wind.
- E Specified live load due to earthquake
- α Load factor, applied to a specified load which, for the limit state under consideration, takes into account the variability of the loads and load patterns and analysis of their effects.

The load factors for strength limit states design are as follows:

$$\alpha_D = 1.25$$

$$= 0.85 \text{ in cases of uplift or overturning}$$

$$\alpha_L = 1.50$$

$$\alpha_W = 1.50 \text{ for wind}$$

For serviceability limit states, all of the load factors are taken as 1.0

- χ Importance factor, applied to all factored loads other than dead load to take into account the consequences of collapse as related to the use and occupancy of the building.

$$\chi = 1.00$$

$$\chi = 0.80 \text{ for LHO farm trusses}$$

For serviceability limit states $\chi = 1.0$

- ψ Load combination factor, applied to factored loads other than dead loads to take into account the reduced probability of a number of loads from different sources acting simultaneously.

$$\psi = 1.0 \text{ when only one of L, W acts}$$

$$= 0.7 \text{ when L and W act together}$$

Factored load means the product of a specified load and its load factor.

$$\text{Factored dead load} = \alpha_D D$$

$$\text{Factored live load} = \alpha_L L$$

- 1) **Factored Load Combinations Not Including Earthquake.** For load combinations, not including earthquake, the factored load combination shall be taken as:

$$\alpha_D D + \gamma \psi [\alpha_L L + \alpha_W W]$$

- 2) **Factored Load Combinations Including Earthquake.** For load combinations including earthquake, the factored load combinations shall be taken as:

$$1.0D + \chi(1.0E); \text{ and either}$$

- a) For storage and assembly occupancies, $1.0D + \chi (1.0L + 1.0E)$; or

- b) For all other occupancies, $1.0D + \chi (0.5L + 1.0E)$

3.2 Specified Live Loads

3.2.1 Housing and Small Buildings (Part 9 of NBCC95)

- 1) Roof trusses meeting the housing and small building requirements of Part 9 of the NBCC95, with clear spans between bearings less than or equal to 12.19m, (40 feet) and a top chord slope $\geq 1/6$, shall be designed using a roof load not less than 60% of the appropriate ground snow load plus rain load as listed in the NBCC95 Appendix C.
- 2) Roof trusses meeting the housing and small building requirements of Part 9 of the NBCC95, with clear spans between bearings greater than 12.19m (40 feet) or a top chord slope $< 1/6$ shall be designed as per Section 3.2.2.
- 3) The minimum specified top chord live load shall be 1.0 kPa (21 psf)

3.2.2 Commercial Roof Trusses (Part 4 of NBCC95)

- 1) Commercial roof trusses shall be designed using a roof live load not less than 80% of the appropriate ground snow load plus rain load as listed in NBCC95 Appendix C, except where:
 - (a) Wind exposure conditions specified by Section 4.1.7 of NBCC95 are fulfilled, hence 60% of the ground snow load plus rain load may be used as the roof load, or
 - (b) The roof slope is greater than 30 degrees, hence the roof snow load can be reduced by a slope factor as specified by Section 4.1.7 of NBCC95, or
 - (c) The roof slope is greater than 15 degrees and slippery roof conditions specified by Section 4.1.7 of NBCC95 are fulfilled, hence the roof snow load can be reduced by a slope factor as specified in that Section, or
 - (d) The snow load is specified in writing by an authority having jurisdiction.
- 2) Commercial roof trusses shall be designed to meet the requirements of full and partial loading as specified by Section 4.1.6 and 4.1.7 or NBCC95.
- 3) Commercial roof trusses shall be designed to meet the requirements of unbalanced, sliding and drifting snow loads, as given in Section 4.1.7 of the NBCC95.
- 4) Commercial roof trusses with slopes of 15 degrees or less need not be designed for unbalanced snow loads.
- 5) The minimum specified top chord live load shall be 1.0 kPa. (21 psf)
- 6) The minimum specified live load for attics with limited accessibility shall be .5 kPa (10 psf) as per Table 4.1.6.3 NBCC95 unless specified otherwise by an authority having jurisdiction.
- 7) Commercial roof trusses shall be designed for wind loading in accordance with Section 4.1.8 NBCC95.
- 8) For wind analysis of commercial roof trusses the minimum reference velocity pressure shall be based on the probability of being exceeded once in 30 years for strength and once in 10 years for deflection. Appropriate wind loads are as listed in NBCC95 Appendix C.

3.2.3 Low Human Occupancy (Farm)

- 1) LHO roof trusses shall be designed using a roof live load not less than 80% of the appropriate ground snow load plus rain load as listed in NBCC95 Appendix C, except where:
 - (a) Wind exposure conditions specified by Section 4.1.7 of NBCC95 are fulfilled, hence 60% of the ground snow load plus rain load may be used as the roof load, or
 - (b) The roof slope is greater than 30 degrees, hence the roof snow load can be reduced by a slope factor as specified by Section 4.1.7 of NBCC95, or
 - (c) The roof slope is greater than 15 degrees and slippery roof conditions specified by Section 2.2.2.2 of NBCC95 are fulfilled, hence the roof snow load can be reduced by a slope factor as specified in that section, or
 - (d) The snow load is specified in writing by an authority having jurisdiction.
- 2) LHO roof trusses shall also be designed to meet the requirements of unbalanced, sliding and drifting snow loads as given in Section 4.1.7 of NBCC95.
- 3) LHO roof trusses referenced in 2.2.2.1 of the NBCC95 with slopes of 15 degrees or less need not be designed for unbalanced snow loads.
- 4) The minimum specified top chord live load shall be 1.0 kPa. (21 psf)
- 5) LHO roof trusses shall be designed for wind load in accordance to Section 4.1.8 of NBCC95.
- 6) For wind analysis of LHO roof trusses the minimum reference velocity pressure shall be based on the probability of being exceeded once in 10 years.

3.2.4 Residential Floor Trusses (Part 4 of NBCC95)

- 1) The minimum residential specified live load for bedrooms shall be 1.4 kPa. (30 psf)
- 2) The minimum residential specified live load for other than bedrooms shall be 1.9 kPa. (40 psf)
- 3) Floor trusses must be designed to satisfy the most critical loading conditions of full or partial loading.

3.2.5 Commercial Floor Trusses (Part 4 of NBCC95)

- 1) The minimum specified live load for commercial assembly areas that follow the guidelines given in Table 4.1.6.3 of NBCC95 shall be 2.4 kPa. (50 psf)
- 2) The minimum specified live load for commercial assembly areas and/or other areas that follow the guidelines given in Table 4.1.6.3 of NBCC95 shall be 4.8 kPa. (100 psf)
- 3) Floor trusses must be designed to satisfy the most critical loading conditions of full or partial loading.
- 4) The specified load due to possible concentrations of loads resulting from the use of area of floors, shall not be less than that listed in Table 4.1.6.10 of NBCC95 applied over an area of 750 mm (30 in) x 750 mm (30 in) located as to cause the maximum effect.

3.3 Specified Dead Loads

3.3.1 Roof Dead Loads

The following minimum dead loads specified in Table 3.3.1 shall be used for all designs unless specified by an authority having jurisdiction.

Table 3.3.1 Minimum Dead Loads, kPa (psf)

Occupancy	TC Dead Load		BC Dead Load	
	<1:6 (2/12)	≥1:6 (2/12)	With Ceiling	Without Ceiling
Residential (Part 9)	N/A	0.15 (3)	0.34 (7*)	N/A
Commercial (Part 4)	0.5 (10)	0.25 (5)	0.34 (7)	0.25 (5)
Farm (Part 4)	0.5 (10)	0.20 (4)	0.34 (7)	0.20 (4)

*This in combination with 3 psf BCLL for a total of 10 psf as per NBCC Section 9.4.2.4

3.3.2 Floor Dead Loads

- 1) The minimum dead loads specified below shall be used for all designs unless specified otherwise by an authority having jurisdiction.
- 2) The minimum top chord dead load shall be 0.5 kPa (10 psf)
- 3) The minimum bottom chord dead load shall be 0.25 kPa (5 psf)
- 4) In areas of a building where partitions, other than permanent partitions shown on design drawings, or, where partitions might be added in the future, allowance shall be made for the weight of such partitions.

The partition weight allowance for the above shall be determined from the actual or anticipated weight of the partitions placed in any probable position, but shall not be less than 1.0 kPa (20 psf) over the area of floor being considered.

- 5) A non-bearing partition wall may be neglected in the design provided:
 - a) Live load of supporting truss system results from residential occupancy and is not less than specified in 3.2.4.
 - (b) Floor trusses are not spaced over 610 mm o/c (24 in o/c)
 - (c) Top chord panel length of supporting truss system does not exceed 750 mm (30 in) for lumber-on-flat trusses.
 - (d) Partition weight does not exceed 0.88 kN/m (60 plf)
 - (e) Partition wall is not to be parallel to the trusses.