

When Is It Permissible to Reduce Roof Live Loads?

NCSEA Advocacy Committee – Code Officials & Government Agencies Subcommittee

Reduction in roof live loads is allowed per the 2012 International Building Code (IBC), section 1607.12.2 for ordinary flat, pitched and curved roofs, and awnings and canopies other than of fabric construction supported by a skeleton structure. For occupiable roofs, such as roof gardens or assembly purposes, the roof live load may be reduced per section IBC 1607.10 as these relate to floor loads. Unoccupied landscaped roofs shall not be reduced and shall incorporate a minimum 20 pounds per square foot of live load with additional landscaping materials included as dead loads and shall be computed on the basis of saturation of the soil. Live loading for awnings and canopies may be reduced and shall be designed for a minimum live load per Table 1607.1 in addition to snow and wind loads per the code.

Except as noted above, it is permissible to reduce roof live loads per IBC 1607.12.2.1 as shown here:

$$L_r = L_o R_1 R_2 \quad \text{(Equation 16-26)}$$

where: $12 \leq L_r \leq 20$

For SI: $L_r = L_o R_1 R_2$

where: $0.58 \leq L_r \leq 0.96$

L_o = Unreduced roof live load per square foot (m^2) of horizontal projection supported by the member (see Table 1607.1).

L_r = Reduced roof live load per square foot (m^2) of horizontal projection supported by the member.

The reduction factors R_1 and R_2 shall be determined as follows:

$$R_1 = 1 \text{ for } A_t \leq 200 \text{ square feet (18.58 m}^2\text{)} \quad \text{(Equation 16-27)}$$

$$R_1 = 1.2 - 0.001A_t \text{ for } 200 \text{ square feet} < A_t < 600 \text{ square feet} \quad \text{(Equation 16-28)}$$

For SI: $1.2 - 0.011A_t$ for $18.58 \text{ square meters} < A_t < 55.74 \text{ square meters}$

$$R_1 = 0.6 \text{ for } A_t \geq 600 \text{ square feet (55.74 m}^2\text{)} \quad \text{(Equation 16-29)}$$

where:

A_t = Tributary area (span length multiplied by effective width) in square feet (m^2) supported by the member, and

$$R_2 = 1 \text{ for } F \leq 4 \quad \text{(Equation 16-30)}$$

$$R_2 = 1.2 - 0.05 F \text{ for } 4 < F < 12 \quad \text{(Equation 16-31)}$$

$$R_2 = 0.6 \text{ for } F \geq 12 \quad \text{(Equation 16-32)}$$

where:

F = For a sloped roof, the number of inches of rise per foot (for SI: $F = 0.12 \times \text{slope}$, with slope expressed as a percentage), or for an arch or dome, the rise-to-span ratio multiplied by 32.