

1605.1.1 Stability. Regardless of which load combinations are used to design for strength, where overall structure stability (such as stability against overturning, sliding, or buoyancy) is being verified, use of the load combinations specified in Section 1605.2 or 1605.3 shall be permitted. Where the load combinations specified in Section 1605.2 are used, strength reduction factors applicable to soil resistance shall be provided by a *registered design professional*. The stability of retaining walls shall be verified in accordance with Section 1807.2.3.

1605.2 Load combinations using strength design or load and resistance factor design. Where strength design or load and resistance factor design is used, buildings and other structures, and portions thereof, shall be designed to resist the most critical effects resulting from the following combinations of factored loads:

$$1.4(D + F) \quad (\text{Equation 16-1})$$

$$1.2(D + F) + 1.6(L + H) + 0.5(L_r \text{ or } S \text{ or } R) \quad (\text{Equation 16-2})$$

$$1.2(D + F) + 1.6(L_r \text{ or } S \text{ or } R) + 1.6H + (f_1 L \text{ or } 0.5W) \quad (\text{Equation 16-3})$$

$$1.2(D + F) + 1.0W + f_1 L + 1.6H + 0.5(L_r \text{ or } S \text{ or } R) \quad (\text{Equation 16-4})$$

$$1.2(D + F) + 1.0E + f_1 L + 1.6H + f_2 S \quad (\text{Equation 16-5})$$

$$0.9D + 1.0W + 1.6H \quad (\text{Equation 16-6})$$

$$0.9(D + F) + 1.0E + 1.6H \quad (\text{Equation 16-7})$$

where:

f_1 = 1 for places of public assembly live loads in excess of 100 pounds per square foot (4.79 kN/m²), and parking garages; and 0.5 for other live loads.

f_2 = 0.7 for roof configurations (such as saw tooth) that do not shed snow off the structure, and 0.2 for other roof configurations.

Exceptions:

1. Where other factored load combinations are specifically required by other provisions of this code, such combinations shall take precedence.
2. Where the effect of H resists the primary variable load effect, a load factor of 0.9 shall be included with H where H is permanent and H shall be set to zero for all other conditions.

1605.2.1 Other loads. Where flood loads, F_a , are to be considered in the design, the load combinations of Section 2.3.2 of ASCE 7 shall be used. Where self-straining loads, T , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.3.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.3.3 of ASCE 7 shall be considered.

1605.3 Load combinations using allowable stress design. Load combinations for allowable stress design shall be in accordance with Section 1605.3.1 or 1605.3.2.

1605.3.1 Basic load combinations. Where *allowable stress design* (working stress design), as permitted by this code, is used, structures and portions thereof shall resist the most critical effects resulting from the following combinations of loads:

$$D + F \quad (\text{Equation 16-8})$$

$$D + H + F + L \quad (\text{Equation 16-9})$$

$$D + H + F + (L_r \text{ or } S \text{ or } R) \quad (\text{Equation 16-10})$$

$$D + H + F + 0.75(L) + 0.75(L_r \text{ or } S \text{ or } R) \quad (\text{Equation 16-11})$$

$$D + H + F + (0.6W \text{ or } 0.7E) \quad (\text{Equation 16-12})$$

$$D + H + F + 0.75(0.6W) + 0.75L + 0.75(L_r \text{ or } S \text{ or } R) \quad (\text{Equation 16-13})$$

$$D + H + F + 0.75(0.7E) + 0.75L + 0.75S \quad (\text{Equation 16-14})$$

$$0.6D + 0.6W + H \quad (\text{Equation 16-15})$$

$$0.6(D + F) + 0.7E + H \quad (\text{Equation 16-16})$$

Exceptions:

1. Crane hook loads need not be combined with roof live load or with more than three-fourths of the snow load or one-half of the wind load.
2. Flat roof snow loads of 30 psf (1.44 kN/m²) or less and roof live loads of 30 psf (1.44 kN/m²) or less need not be combined with seismic loads. Where flat roof snow loads exceed 30 psf (1.44 kN/m²), 20 percent shall be combined with seismic loads.
3. Where the effect of H resists the primary variable load effect, a load factor of 0.6 shall be included with H where H is permanent and H shall be set to zero for all other conditions.
4. In Equation 16-15, the wind load, W , is permitted to be reduced in accordance with Exception 2 of Section 2.4.1 of ASCE 7.
5. In Equation 16-16, 0.6 D is permitted to be increased to 0.9 D for the design of special reinforced masonry shear walls complying with Chapter 21.

1605.3.1.1 Stress increases. Increases in allowable stresses specified in the appropriate material chapter or the referenced standards shall not be used with the load combinations of Section 1605.3.1, except that increases shall be permitted in accordance with Chapter 23.

1605.3.1.2 Other loads. Where flood loads, F_a , are to be considered in design, the load combinations of Section 2.4.2 of ASCE 7 shall be used. Where self-straining loads, T , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.4.3 of ASCE 7 shall be considered.