this standard. Design should be based on the load combination causing the most unfavorable effect. In some cases this may occur when one or more loads are not acting. No safety factors have been applied to these loads, because such factors depend on the design philosophy adopted by the particular material specification.

Wind and earthquake loads need not be assumed to act simultaneously. However, the most unfavorable effects of each should be considered separately in design, where appropriate. In some instances, forces due to wind might exceed those due to earthquake, while ductility requirements might be determined by earthquake loads.

Load combinations 7 and 8 address the situation in which the effects of lateral or uplift forces counteract the effect of gravity loads. This eliminates an inconsistency in the treatment of counteracting loads in allowable stress design and strength design and emphasizes the importance of checking stability. The reliability of structural components and systems in such a situation is determined mainly by the large variability in the destabilizing load (Ellingwood and Li 2009), and the factor 0.6 on dead load is necessary for maintaining comparable reliability between strength design and allowable stress design. The earthquake load effect is multiplied by 0.7 to align allowable stress design for earthquake effects with the definition of E in Section 11.3 of this Standard, which is based on strength principles.

Most loads, other than dead loads, vary significantly with time. When these variable loads are combined with dead loads, their combined effect should be sufficient to reduce the risk of unsatisfactory performance to an acceptably low level. However, when more than one variable load is considered, it is extremely unlikely that they will all attain their maximum value at the same time (Turkstra and Madsen 1980). Accordingly, some reduction in the total of the combined load effects is appropriate. This reduction is accomplished through the 0.75 load combination factor. The 0.75 factor applies only to the variable loads because the dead loads (or stresses caused by dead loads) do not vary in time.

Some material design standards that permit a one-third increase in allowable stress for certain load combinations have justified that increase by this same concept. Where that is the case, simultaneous use of both the one-third increase in allowable stress and the 25 percent reduction in combined loads is unsafe and is not permitted. In contrast, allowable stress increases that are based upon duration of load or loading rate effects, which are independent concepts, may be combined with the reduction factor for combining multiple variable loads. In such cases, the increase is applied to the total stress, that is, the stress resulting from the combination of all loads.

In addition, certain material design standards permit a one-third increase in allowable stress for load combinations with one variable load where that variable is earthquake load. This standard handles allowable stress design for earthquake loads in a fashion to give results comparable to the strength design basis for earthquake loads as defined in Chapter 12 of this Standard.

Exception 1 permits the companion load S appearing in combinations (4) and (6) to be the balanced snow load defined in Sections 7.3 for flat roofs and 7.4 for sloped roofs. Drifting and unbalanced snow loads, as principal loads, are covered by combination (3).

When wind forces act on a structure, the structural action causing uplift at the structure–foundation interface is less than would be computed from the peak lateral force, due to area averaging. Area-averaging of wind forces occurs for all structures. In the method used to determine the wind forces for enclosed structures, the area-averaging effect is already taken into account in the data analysis leading to the pressure coefficients C_p (or (GC_p)). However, in the design of tanks and other industrial structures, the wind force coefficients, C_f, provided in the standard do not account for area-averaging. For this reason, Exception (2) permits the wind interface to be reduced by 10% in the design of nonbuilding structure foundations and to self-anchored ground-supported tanks. For different reasons, a similar approach is already provided for seismic actions by ASCE 7-05 Section 12.13.4 and in Section 12.4.2.2, exception 2.

Exception (3) given for Special Reinforced Masonry Walls, is based upon the combination of three factors that yield a conservative design for overturning resistance under the seismic load combination:

1. The basic allowable stress for reinforcing steel is 40% of the specified yield.
2. The minimum reinforcement required in the vertical direction provides a protection against the circumstance where the dead and seismic loads result in a very small demand for tension reinforcement.
3. The maximum reinforcement limit prevents compression failure under overturning.

Of these, the low allowable stress in the reinforcing steel is the most significant. This exception should be deleted when and if the standard for design of