4. For each specimen there is no greater than a 20 percent decrease in the initial effective damping over the cycles of test specified in item 4 of Section 17.8.2.2.
5. All specimens of vertical-load-carrying elements of the isolation system remain stable where tested in accordance with Section 17.8.2.5.

17.8.5 Design Properties of the Isolation System

17.8.5.1 Maximum and Minimum Effective Stiffness

At the design displacement, the maximum and minimum effective stiffness of the isolated system, $k_{D\max}$ and $k_{D\min}$, shall be based on the cyclic tests of item 2 of Section 17.8.2.2 and calculated using Eqs. 17.8-3 and 17.8-4:

$$k_{Dmax} = \frac{\sum |F_D^+|_{max} + \sum |F_D^-|_{max}}{2D_D} \tag{17.8-3}$$

$$k_{D\min} = \frac{\sum |F_D^+|_{\min} + \sum |F_D^-|_{\min}}{2D_D} \tag{17.8-4}$$

At the maximum displacement, the maximum and minimum effective stiffness of the isolation system, $k_{M\max}$ and $k_{M\min}$, shall be based on the cyclic tests of item 3 of Section 17.8.2.2 and calculated using Eqs. 17.8-5 and 17.8-6:

$$k_{M\max} = \frac{\sum |F_M^+|_{\max} + \sum |F_M^-|_{\max}}{2D_M} \tag{17.8-5}$$

$$k_{M\min} = \frac{\sum |F_M^+|_{\min} + |F_M^-|_{\min}}{2D_M} \tag{17.8-6}$$

The maximum effective stiffness of the isolation system, $k_{D\max}$ (or $k_{M\max}$), shall be based on forces from the cycle of prototype testing at a test displacement equal to D_D (or D_M) that produces the largest value of effective stiffness. Minimum effective stiffness of the isolation system, $k_{D\min}$ (or $k_{M\min}$), shall be based on forces from the cycle of prototype testing at a test displacement equal to D_D (or D_M) that produces the smallest value of effective stiffness.

For isolator units that are found by the tests of Sections 17.8.2.2, 17.8.2.3, and 17.8.2.4 to have force-deflection characteristics that vary with vertical load, rate of loading, or bilateral load, respectively, the values of $k_{D\max}$ and $k_{M\max}$ shall be increased and the values of $k_{D\min}$ and $k_{M\min}$ shall be decreased, as necessary, to bound the effects of measured variation in effective stiffness.

17.8.5.2 Effective Damping

At the design displacement, the effective damping of the isolation system, β_D, shall be based on the cyclic tests of item 2 of Section 17.8.2.2 and calculated using Eq. 17.8-7:

$$\beta_D = \frac{\sum E_D}{2\pi k_{D\max} D_D^2} \tag{17.8-7}$$

In Eq. 17.8-7, the total energy dissipated per cycle of design displacement response, ΣE_D, shall be taken as the sum of the energy dissipated per cycle in all isolator units measured at a test displacement equal to D_D and shall be based on forces and deflections from the cycle of prototype testing at test displacement D_D that produces the smallest values of effective damping.

At the maximum displacement, the effective damping of the isolation system, β_M, shall be based on the cyclic tests of item 2 of Section 17.8.2.2 and calculated using Eq. 17.8-8

$$\beta_M = \frac{\sum E_M}{2\pi k_{M\max} D_M^2} \tag{17.8-8}$$

In Eq. 17.8-8, the total energy dissipated per cycle of design displacement response, ΣE_M, shall be taken as the sum of the energy dissipated per cycle in all isolator units measured at a test displacement equal to D_M and shall be based on forces and deflections from the cycle of prototype testing at test displacement D_M that produces the smallest value of effective damping.