

CODE

COMMENTARY

17.5.2.2.1 For groups of adhesive anchors subject to sustained tension, Eq. (17.5.2.2) shall be satisfied for the anchor that resists the highest sustained tension.

17.5.2.3 If both N_{ua} and V_{ua} are present, interaction effects shall be considered using an interaction expression that results in calculated strengths in substantial agreement with results of comprehensive tests. This requirement shall be considered satisfied by 17.8.

17.5.2.4 Anchors shall satisfy the edge distances, spacings, and thicknesses in 17.9 to preclude splitting failure.

17.5.2.5 Anchors in structures assigned to Seismic Design Category C, D, E, or F shall satisfy the additional requirements of 17.10.

17.5.2.6 Attachments with shear lugs used to transfer structural loads shall satisfy the requirements of 17.11.

17.5.3 Strength reduction factor ϕ for anchors in concrete shall be in accordance with Tables 17.5.3(a), 17.5.3(b), and 17.5.3(c). Strength reduction factor ϕ for anchor reinforcement shall be 0.75.

The 0.55 factor used for the additional calculation for sustained tension is correlated with **ACI 355.4M** test requirements and provides satisfactory performance of adhesive anchors under sustained tensile loads in accordance with **ACI 355.4M**. Product evaluation according to ACI 355.4M is based on sustained tensile loads being present for 50 years at a standard temperature of 21°C and 10 years at a temperature of 43°C. For longer life spans (for example, greater than 50 years) or higher temperatures, lower factors should be considered. Additional information on use of adhesive anchors for such conditions can be found by consulting with the adhesive manufacturer.

Adhesive anchors are particularly sensitive to installation direction and load type. Adhesive anchors installed overhead that resist sustained tension are of concern because previous applications of this type have led to failures (**National Transportation Safety Board 2007**). Other anchor types may be more appropriate for such cases. For adhesive anchors that resist sustained tension in horizontal or upwardly inclined orientations, it is essential to meet test requirements of ACI 355.4M for sensitivity to installation direction, use certified installers, and require special inspection. Inspection and installation requirements are provided in **Chapter 26**.

R17.5.2.2.1 The check for anchor groups is limited to the highest loaded anchor in the group, analogous to the design for pullout.

R17.5.3 The ϕ -factors for the anchor steel strength in Table 17.5.3(a) are based on using f_{uta} to determine the nominal strength of the anchor (refer to 17.6.1 and 17.7.1) rather than f_{ya} , as used in the design of reinforced concrete members. Although the ϕ -factors for use with f_{uta} appear low, they result in a level of safety consistent with the use of higher ϕ -factors applied to f_{ya} . The ϕ -factors for shear, which are smaller than for tension, do not reflect basic material differences but rather account for the possibility of a non-uniform distribution of shear in connections with multiple anchors.