

## CODE

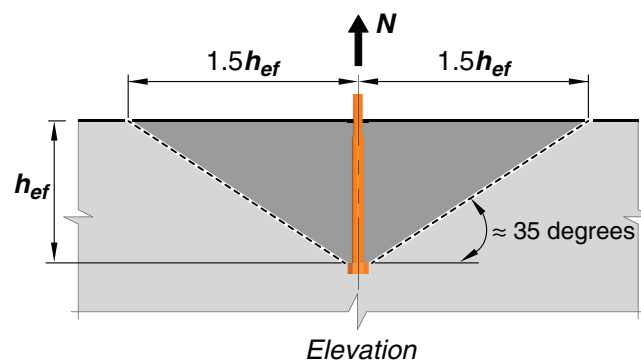
**17.5.1.3.1** Anchor group effects shall be considered whenever two or more anchors have spacing less than the critical spacing in Table 17.5.1.3.1, where only those anchors susceptible to the particular failure mode under investigation shall be included in the group.

**Table 17.5.1.3.1—Critical spacing**

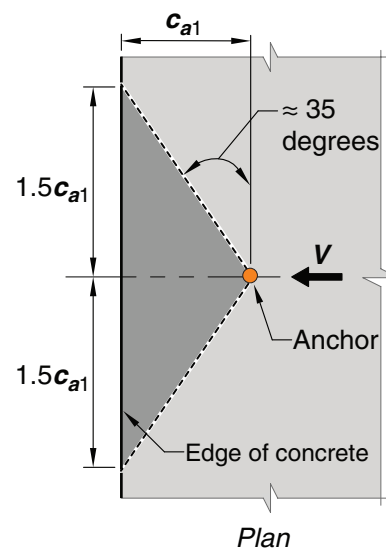
Failure mode under investigation	Critical spacing
Concrete breakout in tension	$3h_{ef}$
Bond strength in tension	$2c_{Na}$
Concrete breakout in shear	$3c_{a1}$

## COMMENTARY

17.5.1.3a and b). It is considered to be sufficiently accurate, relatively easy to apply, and capable of extension to irregular layouts. The CCD Method predicts the strength of an anchor or anchor group by using a basic equation for tension in cracked concrete, which is multiplied by factors that account for the number of anchors, edge distance, spacing, eccentricity, and absence of cracking. For shear, a similar approach is used. Experimental and numerical investigations have demonstrated the applicability of the CCD Method to adhesive anchors as well (Eligehausen et al. 2006a).



**Fig. R17.5.1.3a—Breakout cone for tension.**



**Fig. R17.5.1.3b—Breakout cone for shear.**

**17.5.1.4** Strength of anchors shall be permitted to be based on test evaluation using the 5 percent fractile of applicable test results for 17.5.1.2 (a) through (h).

**R17.5.1.4** Sections 17.5.1.2 and 17.5.2.3 establish the performance factors for which anchor design models are required to be verified. Many possible design approaches exist, and the user is always permitted to “design by test” using 17.5.1.4 as long as sufficient data are available to verify the model. Test procedures can be used to determine the single-anchor breakout strength in tension and in shear. The test results, however, are required to be evaluated on a basis statistically equivalent to that used to select the values for the concrete breakout method considered to satisfy provisions of 17.5.1.2. The basic strength cannot be taken