

## CODE

## COMMENTARY

(b) If  $c_{a2} < 1.5c_{a1}$ , then  $\psi_{ed,V} = 0.7 + 0.3 \frac{c_{a2}}{1.5c_{a1}}$  (17.7.2.4.1b)

**17.7.2.5 Breakout cracking factor,  $\psi_{c,V}$** 

**17.7.2.5.1** Modification factor for the influence of cracking in anchor regions at service load levels and presence or absence of supplementary reinforcement,  $\psi_{c,V}$ , shall be determined as follows:

- (a) For anchors located in a region of a concrete member where analysis indicates no cracking at service load levels,  $\psi_{c,V}$  shall be permitted to be 1.4.
- (b) For anchors located in a region of a concrete member where analysis indicates cracking at service load levels,  $\psi_{c,V}$  shall be in accordance with Table 17.7.2.5.1.

**Table 17.7.2.5.1—Modification factor where analysis indicates cracking at service load levels,  $\psi_{c,V}$**

Condition	$\psi_{c,V}$
Anchors without supplementary reinforcement or with edge reinforcement smaller than a No. 13 bar	1.0
Anchors with reinforcement of at least a No. 13 bar or greater between the anchor and the edge	1.2
Anchors with reinforcement of at least a No. 13 bar or greater between the anchor and the edge, and with the reinforcement enclosed within stirrups spaced at not more than 100 mm	1.4

**17.7.2.6 Breakout thickness factor,  $\psi_{h,V}$** 

**17.7.2.6.1** Modification factor for anchors located in a concrete member where  $h_a < 1.5c_{a1}$ ,  $\psi_{h,V}$  shall be calculated by Eq. (17.7.2.6.1)

$$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0 \quad (17.7.2.6.1)$$

**17.7.3 Concrete pryout strength of anchors in shear,  $V_{cp}$  or  $V_{cpg}$** 

**17.7.3.1** Nominal pryout strength,  $V_{cp}$  of a single anchor or  $V_{cpg}$  of an anchor group satisfying 17.5.1.3.1, shall not exceed (a) or (b), respectively.

- (a) For a single anchor

$$V_{cp} = k_{cp} N_{cp} \quad (17.7.3.1a)$$

- (b) For an anchor group

$$V_{cpg} = k_{cp} N_{cpg} \quad (17.7.3.1b)$$

where

**R17.7.2.6 Breakout thickness factor,  $\psi_{h,V}$** 

**R17.7.2.6.1** For anchors located in a concrete member where  $h_a < 1.5c_{a1}$ , tests (fib 2011; Eligehausen et al. 2006b) have shown that the concrete breakout strength in shear is not directly proportional to the member thickness  $h_a$ . The factor  $\psi_{h,V}$  accounts for this effect.

**R17.7.3 Concrete pryout strength of anchors in shear,  $V_{cp}$  or  $V_{cpg}$** 

**R17.7.3.1** Fuchs et al. (1995) indicates that the pryout shear resistance can be approximated as one to two times the anchor tensile resistance with the lower value appropriate for  $h_{ef}$  less than 65 mm. Because it is possible that the bond strength of adhesive anchors could be less than the concrete breakout strength, it is necessary to consider both 17.6.2.1 and 17.6.5.1 to calculate pryout strength.