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CODE

17.6.2.1.1 A_{Nc} is the projected concrete failure area of a single anchor or of an anchor group that is approximated as the base of the rectilinear geometrical shape that results from projecting the failure surface outward $1.5h_{ef}$ from the centerlines of the anchor, or in the case of an anchor group, from a line through a row of adjacent anchors. A_{Nc} shall not exceed nA_{Nco}, where n is the number of anchors in the group that resist tension.

17.6.2.1.2 If anchors are located less than $1.5h_{ef}$ from three or more edges, the value of h_{ef} used to calculate A_{Nc} in accordance with 17.6.2.1.1, as well as for the equations in 17.6.2.1 through 17.6.2.4, shall be the greater of (a) and (b):

(a) $c_{a,max}/1.5$
(b) $s/3$, where s is the maximum spacing between anchors within the group.

COMMENTARY

R17.6.2.1.2 For anchors located less than $1.5h_{ef}$ from three or more edges, the CCD Method (refer to R17.5.1.3), which is the basis for the equations in 17.6.2.1 through 17.6.2.4, gives overly conservative results for the tensile breakout strength (Lutz 1995). This occurs because the ordinary definitions of A_{Nc}/A_{Nco} do not correctly reflect the edge effects. This problem is corrected by limiting the value of h_{ef} used in the equations in 17.6.2.1 through 17.6.2.4 to $(c_{a,max})/1.5$, where $c_{a,max}$ is the greatest of the influencing edge distances that do not exceed the actual $1.5h_{ef}$. In no case should $(c_{a,max})/1.5$ be taken less than one-third of the maximum spacing between anchors within the group. The limit on h_{ef} of at least one-third of the maximum spacing between anchors within the group prevents the use of a calculated strength based on individual breakout volumes for an anchor group configuration. This approach is illustrated in Fig. R17.6.2.1.2. In this example, the proposed limit on the value of h_{ef} to be used in calculations where $h_{ef} = (c_{a,max})/1.5$, results in $h_{ef} = h'_{ef} =$ **100 mm**. For this example, this would be the proper value to be used for h_{ef} in calculating the resistance even if the actual embedment depth is greater.

The requirement of 17.6.2.1.2 may be visualized by moving the actual concrete breakout surface, which originates at the actual h_{ef}, toward the surface of the concrete parallel to the applied tensile load. The value of h_{ef} used in 17.6.2.1 through 17.6.2.4 is determined when (a) the outer boundaries of the failure surface first intersect a free edge; or (b) the intersection of the breakout surface between anchors within the group first intersects the surface of the concrete. For the example shown in Fig. R17.6.2.1.2, point "A" shows the intersection of the assumed failure surface for limiting h_{ef} with the concrete surface.

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