

## CODE

**25.4.4.4** For beam column joints, the total cross-sectional area of parallel tie reinforcement  $A_{tt}$  shall consist of ties or stirrups oriented parallel to  $\ell_{dt}$  and located within  $8d_b$  of the centerline of the headed bar toward the middle of the joint, where  $d_b$  is the nominal diameter of the headed bar.

## COMMENTARY

**R25.4.4.4** Reinforcement oriented parallel to the development length of the headed bars, located within the region defined in 25.4.4.4 (Fig. R25.4.4.4) contributes to anchorage strength in proportion to its area (Shao et al. 2016). This reinforcement serves to tie concrete near the head to concrete on the other side of the failure surface, thus mobilizing additional anchorage strength. With the exception of vertical joint reinforcement in the form of stirrups that are well anchored to the far side of the joint, reinforcement oriented perpendicular to the development length has been shown in a number of cases to be ineffective in improving the anchorage of headed deformed bars (Thompson et al. 2005, 2006a,b). Both legs of individual stirrups and ties parallel to the headed bars contribute to  $A_{tt}$ .