DESIGN OF ANCHORED BARS FOR SEISMIC LOADINGS

by

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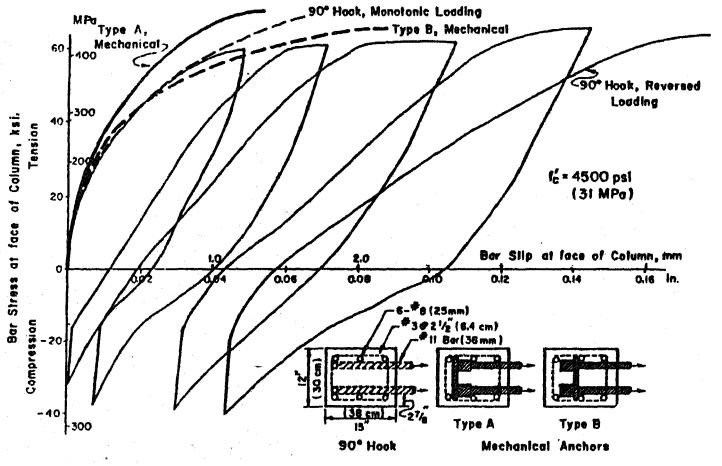
A program of research has been conducted at The University of Texas at Austin to examine the capacity of reinforcement anchored in typical beam-column joints. The objective of the research was to define some of the parameters which influence the development length requirements of anchored bars and to outline the detailing procedures which may help to maintain the anchorage capacity of reinforcing bars subjected to severe cyclic loads.

A total of 60 tests has been run to evaluate the mechanism of stress transfer from a bent bar to the surrounding concrete under monotonic loading, repeated cyclic loading, and loading reversals. Hooked bars were tested in normal weight and lightweight aggregate concrete. Tests were also conducted to determine the behavior of bars with mechanical anchors in place of hooks. In addition, tests of straight bar anchorages were compared with the mechanical and hooked bar anchorages.

Typical test results are shown below for four tests of #11 anchored bars (36 mm) in which the column geometry (size and reinforcing) were the same. In two tests, mechanical anchors (4x4 in. plates) were used. In one the plates were placed at the back side of the column (Type A) and in the other at about the center of the column (Type B). As can be seen, the behavior under unidirectional loads was about the same. Under repeated loads, the stiffness was reduced and the slip at failure increased considerably, indicating a gradual bond deterioration with cycling.



Using test results similar to those described above, the factors to be considered in detailing anchored bars in beam-column joints have been examined. Guidelines have been developed for design of bars anchored in a joint to ensure that the performance of members framing into the joint can be realized.

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