

Dynamic tensile tests were conducted at rapid, intermediate, and slow rates of strain on specimens of No. 11 reinforcing bars of Grades 60 and 75 A615 billet steel. Asrolled bars, machined bars, butt-welded splices, Thermit splices, and Cadweld splices were prepared. The asrolled and machined specimens were tested primarily to determine the tensile strength characteristics of the Grades 60 and 75 bars for use when assessing how effective the various spliced specimens were when tested. All tests were conducted in a 200,000-pound-capacity dynamic loader.

Under all loading rates, the breaking strength for all three splice types was greater than the 125 percent of nominal yield required by standards set forth by the American Concrete Institute, the American Welding Society, and the Concrete Reinforcing Steel Institute.

Apparently, however, the heat produced by the three splicing methods appreciably reduced the ductility of all spliced bars. The strains in the bars when any of the splice types failed were generally less than 25 percent of the maximum strain achieved by the as-rolled or machined bars at rupture. Very few of the spliced bars met ASTM standards for minimum elongations of 7 and 5 percent, respectively, for Grades 60 and 75 bars. The butt-welded splices, Thermit splices, and Cadweld splices all performed satisfactorily under rapid rates of loading. However, it is believed that better quality control can be achieved at a lesser cost using either a Thermit or Cadweld splice in lieu of a butt-welded splice.

The Grade 60 bars were more ductile than the Grade 75 bars and were also more sensitive to the influence of the strain rate on the dynamic strength of the bars tested.

An optical tracker was used to measure postyield strains for all the specimen types. This device made it possible, especially in the rapid strain rate tests, to measure successfully the strains across the various spliced specimens.