

## Shear Behavior of High-Volume Fly Ash Concrete as Replacement of Portland-Cement in RC Beam

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### Abstract

Utility of portland cement becomes an important issues in the recent decades. The production of portland cement gives amount of carbon dioxide in the air and contributes to the global warming issues. One of the methods to suppress the global warming issues is the use of fly ash to replace the utility of portland cement in concrete. An experimental program was conducted to study the shear strength of high-volume fly ash concrete as replacement portland cement of Reinforced Concrete (RC) beams. Eight beam specimens were tested in this study. Two beams used normal concrete as control beams, while six others beams used High-Volume Fly Ash Concrete (HVFAC) as a replacement of portland cement by mass (two beams with 50 % of fly ash; two beams with 60 % fly ash; and two beams with 70 % of fly ash). The beams had a rectangular section of 150 mm x 260 mm and overall length of 2600 mm. The beams had longitudinal bars with diameter of 12 mm. Three bars were for bottom reinforcement and two bars for top reinforcement. The shear reinforcements used diameter of 6 mm with stirrups spacing of 100 mm were kept constant in the bending-test region, and there were no shear reinforcements in the shear-test regions. The beams were simply supported and loaded symmetrically under two-point-loading. The results showed that increase substitutions of fly ash as replacement of portland cement tend towards a reduction of shear strength and led the beams became brittle compare to the control specimens. Comparing all the series of HVFAC beams, it could be understood from the tested results that better results could be achieved by the beams with 50 % of fly ash due to the higher shear strength than the beam with 60 % and 70 % of fly ash.

**Keywords:** High-volume fly ash concrete; replacement of portland cement; reinforced concrete beams; shear strength; experimental study.

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