

# The mechanical performance of concrete shear key for prefabricated structures

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### Abstract

The mechanical performance of concrete connection plays an important role in the response of precast concrete structures. Unlike conventional small concrete shear key which is mainly to help with alignment at installation, large concrete shear keys have been often designed in recent engineering practice to improve joint shear resistance. However, the mechanical properties of large concrete shear keys have not been properly studied. This paper utilizes experimental and numerical methods to investigate both direct shear and flexural bending properties of shear keys. Four types of shear keys comprised of trapezoidal shape, semi-spherical shape, dome shape and wave shape are investigated, which are found to strongly influence the mechanical properties of the keyed joint. Laboratory shear test found unlike conventional shear key, with increased tenon size failure moves to concrete mortise. A detailed numerical model is built to help understand stress developed at the key joint. Flexural bending tests are carried out to evaluate the flexural bending properties of these key joints. Through comparing with theoretical derivation for plain flat joint, similar bending moment resistances from the keyed joints are measured with that of plain flat joint, but larger rotation angles are recorded probably because more damages at the key joint. Among the four different joint patterns, shear key with smoothed pattern could effectively relief concrete damages.

### Palabras clave

Palabras clave de autor: [concrete shear key](#); [direct shear](#); [flexural bending](#)

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