An ACI Standard

Qualification of Precast Concrete Diaphragm Connections and Reinforcement at Joints for Earthquake Loading (ACI 550.4M-18) and Commentary (ACI 550.4RM-18)

Reported by Joint ACI-ASCE Committee 550

ACI 550.4M-18

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ACI 550.4M prescribes testing and evaluation requirements for mechanical connections and reinforcement at joints intended for use under the design provisions of ASCE/SEI 7 and ACI 318M for precast concrete diaphragms subject to earthquake loading. These mechanical connections and reinforcement at joints transfer the vertical and in-plane forces between the precast concrete members that comprise the diaphragm, and between the diaphragm and vertical elements of the seismic force-resisting system of the structure. The response of precast concrete diaphragms under earthquake loading depends not only on the strength of the connections and the reinforcement at joints, but also on their stiffness and deformation capacities. The seismic forces specified in ASCE/SEI 7 for the design of precast concrete diaphragms, including chords and collectors, in structures assigned to Seismic Design Category (SDC) C, D, E, or F are tied to the shear overstrength provided by the connections and the reinforcement at joints. This overstrength depends, in turn, on the design methodology, elastic or ductile, used for the diaphragm. ACI 550.4M prescribes the experimental procedures needed to assess the stiffness, strength, and deformation capacity of mechanical connections and reinforcement at joints for diaphragm flange-to-flange connections, including chord connections, of double-tee (DT) beams for earthquake loadings and evaluation procedures to categorize connection performance for use with the design procedures specified for precast concrete diaphragms in ASCE/SEI 7 and ACI 550.5M. ACI 550.4M does not prescribe experimental procedures for assessing the same information for connections for hollow-core members used in the untopped condition.

Keywords: connection category; diaphragm connections; precast concrete; qualification criteria; seismic design; test method..

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