



Wood Shear Wall Tie-Down Anchoring Devices

Directions to establish consistency in the design and detailing of the anchorage components throughout the different manufacturers and to ensure proper installation of safe and reliable systems in buildings.

CODE REFERENCE

2016 California Building Code (CBC)

BACKGROUND

In recent years engineered tie-down anchoring systems for wood shear walls have been utilized on multi-level wood framed buildings. These innovative anchorage systems are typically comprised of a continuous rod or cable, plate, cage, and shrinkage compensating device. There are no industry standards for design, detailing or installation.

FINDINGS

The use of tie-down anchoring devices based on rods or cables are allowed to be installed in the multi-story wood framed buildings of any height and number of stories permitted by the California Building Code (CBC) when the following conditions are satisfied.

1. The prefabricated tie-down anchoring components such as rods, plates, cages, shrinkage compensators, and other items used in the design to resist uplift load shall be evaluated and approved by the current ICC evaluation report. (As an equivalent alternative to the evaluation report, a detailed calculation of the tie-down anchoring components based on the proposed sizes and material properties may be submitted for review except for the shrinkage compensators and coupler nuts.)
2. Complete design and corresponding calculations demonstrating that the applied loads per the current CBC can be transferred through all components of the tie-down anchoring components from the shear wall to the foundation or the rigid base shall be submitted for review to the Building Division.
3. The adequacy of the connected wood members to resist the applied loading, such as axial or combined axial and bending shall be analyzed.
4. Expected wood shrinkage shall be analyzed per CBC Sec. 2304. In addition, the calculations and/or an ICC report demonstrating the adequacy of the shrinkage compensator device shall be provided for review.
5. Total Vertical Movement:
Maximum total vertical movement shall not exceed 0.2 inch between connectors/restraints (for Allowable Stress Design). The accumulation of the vertical movement shall include rod or cable elongation, bearing plate-grain deformation, looseness due to take up/shrinkage compensating devices, and other components of the tie-down system resisting the uplift forces.
6. Combining and/or mixing of continuous tie-down systems and conventional hold-downs within a common shear wall is prohibited.

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7. Job-specific dimensioned shear wall elevations shall be provided to show the complete tie-down system connection details, the location and size of rod/cable, bearing plates, shrinkage compensating device, coupler nut, floor blocking, and anchor bolt.
 8. Structural observation shall be provided by the engineer of record and stipulated on the plans. Structural observation is provided to verify the shear wall boundary nailing, the hold-down hardware, and the location of the shrinkage compensating devices are installed in substantial conformance to the intended design.
 9. All plans and calculations for the tie-down system shall bear the stamp and signature of a civil or structural engineer licensed by the State of California.
 10. Tie-down systems shall not be considered for deferred submittal.