
PREFABRICATED WOOD CONSTRUCTION CONNECTORS: 2022 CBC

Disciplines: Structural

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PURPOSE

This Interpretation of Regulations (IR) clarifies load capacity, design, installation, and fabrication requirements for prefabricated wood construction connectors for construction projects under the jurisdiction of DSA.

SCOPE

The provisions of this IR apply to prefabricated metal connectors used to attach wood structural members to other wood structural members, structural steel, masonry, or concrete members including foundations. Application of this IR is permitted for prefabricated concrete anchorage devices, including cast-in-place anchors and post-installed anchors used in conjunction with wood construction connectors.

Requirements for metal plate connectors for wood trusses are not addressed in this IR. Refer to CBC Section 2303.4.6 and *IR 23-4: Metal-Plate-Connected Wood Trusses*. This IR does not address manufactured seismic force-resisting systems (e.g., shear walls, moment frames, etc.). DSA approval shall be obtained for these systems on a case-by-case basis using the alternate design, materials, and method of construction procedure in accordance with the California Administrative Code (CAC), Section 4-304; California Building Code (CBC), Section 104.11; and American Society of Civil Engineers (ASCE) Standard 7, Section 12.2.1.1.

BACKGROUND

Modern light-frame wood construction practice commonly utilizes prefabricated connectors, which are addressed in CBC Section 2304.10. Such connectors are typically fabricated from cold-formed steel components and are often proprietary products with load capacities determined by testing. Wood construction design is generally governed by the provisions of CBC Chapter 23 and the American Wood Council's (AWC) National Design Specification (NDS). The design of cold-formed steel components is subject to the provisions of the American Iron and Steel Institute (AISI) Standard S100.

1. LISTING REQUIREMENTS

1.1 Prefabricated connectors shall be listed in a current and valid evaluation report issued by an evaluation agency recognized by DSA in accordance with *IR A-5: Acceptance of Products, Materials, and Evaluation Reports*.

1.2 Joist hanger vertical capacities, torsional moment capacities, and deflection characteristics shall be determined in accordance with American Society for Testing and Materials (ASTM) Standard D7147 per CBC Sections 2303.5 and 2304.10.4.

2. ALLOWABLE LOAD CAPACITIES

In accordance with IR A-5, DSA permits the design of manufactured wood construction

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connectors based on 100 percent of listed load capacities in comparison with load combinations excluding seismic loads and 80 percent of listed load capacities in comparison with load combinations including seismic loads. In addition, connector design may be based on 100 percent of the listed load capacities in comparison with load combinations including seismic loads in the following conditions:

2.1 Listed load capacities are derived based on calculation of all applicable limit states in accordance with the provisions of AWC NDS, AISI S100, and any other applicable material design standard adopted by the CBC.

2.2 Listed load capacities are established on the basis of cyclic test results in accordance with IR A-5 Section 4.2. This includes cast-in-place proprietary bolts in concrete for light-frame construction that have undergone cyclic testing in accordance with the International Code Council Evaluation Service (ICC-ES) AC399 (e.g., Simpson SSTB and SB anchors).

3. DESIGN REQUIREMENTS

3.1 Load duration factors and time effect factors shall be determined in accordance with AWC NDS Section 2.3 and Appendix N, respectively, and the evaluation report, as applicable. In accordance with AWC NDS Section 11.3.2, these factors do not apply when the capacity is controlled by metal strength or the strength of concrete/masonry.

3.2 Wood member properties such as minimum specific gravity and maximum moisture content shall comply with applicable CBC provisions and all requirements of the connector manufacturer and evaluation report.

3.3 Cast-in-place anchors and post-installed anchors for shear wall hold-down hardware shall comply with American Concrete Institute (ACI) 318, Chapter 17.

Exception: Cast-in-place proprietary anchors in concrete for light-frame wood construction (i.e., specialty inserts such as Simpson SSTB and SB anchors) are not subject to these provisions in accordance with ACI 318 Section 17.1.5.

3.4 Post-installed anchor design shall also comply with CBC Section 1617A.1.19.

4. INSTALLATION REQUIREMENTS

4.1 All connectors, including shear wall hold-down anchors, shall be installed in accordance with the applicable evaluation report and manufacturer's published information.

4.2 Fasteners must comply with all requirements (e.g., nail gauge and length, corrosion-resistant coatings, etc.) of the manufacturer and of the evaluation report. Per CBC Section 2304.10.6, when fasteners are installed in contact with preservative-treated or fire-retardant-treated wood, the protective coating or corrosion-resistant material shall be compatible with the treatment chemicals used in the wood and comply with the manufacturer's recommendations.

4.3 Connectors shall not be field bent, except as specifically permitted by the evaluation report and the manufacturer's instructions.

4.4 Connection details shall be designed to minimize the potential for splitting of wood members. In the event of splitting, a DSA-approved repair procedure is required.

4.5 Post-installed anchor testing shall also comply with CBC Section 1910A.5.

5. CONNECTOR FABRICATION

Connector fabrication shall meet the quality control requirements of ICC-ES AC13, Acceptance Criteria for Joist Hangers and Similar Devices, Section A6.0. Connectors shall meet the following requirements:

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5.1 Connector steel shall be corrosion-resistant material (e.g., stainless steel) or shall have a protective coating (e.g., post-fabrication hot-dipped galvanized coating G90 minimum, etc.). Paint may be used as a protective coating in lieu of galvanization when the connector is not exposed to weather or to corrosive elements. Per CBC Section 2304.10.6, when connectors are installed in contact with preservative-treated or fire-retardant-treated wood the protective coatings or corrosion-resistant materials shall be compatible with the treatment chemicals used in the wood and comply with the manufacturer's recommendations (e.g., G185 for dry service environment with ACZA chemicals, Type 316L stainless steel for severe conditions, etc.). In addition, connectors shall show no fracturing in either the protective coating or the base metal.

5.2 Each prefabricated connector must bear a stamp or adhered label showing the name of the manufacturer, model number, and evaluation report number.

REFERENCES:

2022 California Code of Regulations (CCR) Title 24

Part 1: California Administrative Code (CAC), Section 4-304

Part 2: California Building Code (CBC), Sections 104.11, 1617A.1.19, 1910A.5, 2303.4.6, 2303.5, 2304.10, 2304.10.4 and 2304.10.6.

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