DSA IR 23-1

PREFABRICATED WOOD CONSTRUCTION CONNECTORS: 2016, 2013, and 2010 CBC

Disciplines: Structural

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PURPOSE: This Interpretation of Regulations (IR) provides clarification of acceptable load capacities, design and installation requirements for prefabricated wood construction connectors for projects under the jurisdiction of the Division of the State Architect (DSA).

1. SCOPE:

1.1 Prefabricated metal connectors used to attach wood structural members to other wood structural members, or to structural steel, masonry, or concrete members (including foundations).

1.2 The application of Sections 2 through 7 of this IR is permitted for prefabricated concrete anchorage devices, including cast-in anchors and post-installed anchors used in conjunction with wood construction connectors. Post-installed anchor design and testing shall also comply with 2016 California Building Code (CBC), Section 1616A.1.19 (2013 CBC, § 1909A.1; 2010 CBC, § 1912A.1) and Section 1910A.5 (2013 CBC, § 1913A.7; 2010 CBC, § 1916A.7).

1.3 Requirements for metal plate connectors for wood trusses are addressed in 2016, 2013 and 2010 CBC, Section 2303.4.6 and DSA IR 23-4.

1.4 Manufactured seismic force-resisting systems (e.g., shear walls, moment frames, etc.) are not included within the scope of this IR. DSA approval must be granted for these systems on a case by case basis using the Alternate Means and Methods procedure per ASCE 7, Section 12.2.1 and as defined in CAC, Section 4-304 and CBC, Section 104.11.

2. LISTING REQUIREMENTS: Prefabricated connectors must be listed in a current and valid evaluation report issued by an evaluation agency recognized by DSA in accordance with IR A-5.

3. ALLOWABLE LOAD CAPACITIES: In accordance with IR A-5, DSA permits 100% of listed gravity and wind load capacities and 80% of listed seismic load capacities for manufactured wood construction connectors. One hundred percent (100%) of the listed seismic load capacities are permitted if the values listed in the evaluation report were established on the basis of cyclic test results. In addition, the following items are not subject to the 80% factor and may use 100% of the listed seismic load capacities:

- Listed load capacities derived based on values listed in AF&PA NDS, Section 2.3, *Adjustment of Reference Design Values*.
- Cast-in-place proprietary bolts in concrete for light-frame construction that have undergone cyclic testing in accordance with ICC-ES AC399, such as Simpson SSTB and SB anchors.

4. DESIGN REQUIREMENTS:

4.1 Load duration factors or “adjustment of reference design value” shall be determined in accordance with AF&PA NDS, Section 2.3 and the evaluation report, as applicable.

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

4.3 Cast-in-place proprietary hold-down bolts (e.g., SSTB, SB) in concrete for light-frame construction are not subject to the requirements of ACI 318, Chapter 17 per 17.1.2 (ACI 318, Appendix D per D.2.2 for 2013 and 2010 CBC). In addition, seismic force-resisting systems consisting of light-frame walls with shear panels are exempt from superstructure-to-foundation connection requirements per 2016 and 2013 CBC, Section 1616A.1.16 (2010 CBC, § 1615A.1.10).

5. INSTALLATION REQUIREMENTS:

5.1 All connectors, including holdowns, shall be installed in accordance with the applicable evaluation report and/or manufacturer's published information.

5.2 Fasteners must comply with all requirements (e.g., nail gauge and length, corrosion-resistant coatings) of the manufacturer and of the evaluation report. Per CBC, Section 2304.10.5.1 (2013 and 2010 CBC, § 2304.9.5.1), fastener protective coatings or corrosion-resistant materials shall be compatible with preservative treatment chemicals in the wood, when in contact with them, and comply with manufacturer’s recommendations.

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

5.4 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.

6. CONNECTOR FABRICATION: Connector fabrication shall meet the quality control requirements of ICC-ES AC13, Acceptance Criteria for Joist Hangers and Similar Devices, Section 6. Connectors shall meet the following requirements:

- Connector steel shall be corrosion-resistant material (e.g., stainless steel) or shall have a protective coating (e.g., G90 minimum, G185, post-fabrication hot-dipped galvanized coating, 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, such as preservative-treated wood. Per CBC, Section 2304.10.5.1 (2013 and 2010 CBC, § 2304.9.5.1), connector protective coatings or corrosion-resistant materials shall be compatible with preservative treatment chemicals in the wood, when in contact with them, and comply with 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.
- Each prefabricated connector must bear a stamp or adhered label showing the name of the manufacturer, model number, and evaluation report number.

7. TESTING REQUIREMENTS FOR JOIST HANGERS: Joist hanger vertical capacities, torsional moment capacities, and deflection characteristics shall be determined in accordance with ASTM D7147 (2013 CBC, § 1711A.1; 2010 CBC, § 1716A.1) per CBC, Sections 2303.5 and 2304.10.3 (2013 and 2010 CBC, § 2304.9.3).

REFERENCES:

California Code of Regulations (CCR) Title 24
Part 1: California Administrative Code (CAC), Section 4-304

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Part 2: California Building Code (CBC)
2016 CBC, Sections 104.11, 1616A.1.16, 1616A.1.19, 1910A.5, 2303.4.6, 2303.5, 2304.10.3, 2304.10.5.1
2013 CBC, Sections 104.11, 1616A.1.16, 1711A.1, 1909A.1, 1913A.7, 2303.4.6, 2303.5, 2304.9.3, 2304.9.5.1
2010 CBC, Sections 104.11, 1615A.1.10, 1716A.1, 1912A.1, 1916A.7, 2303.4.6, 2303.5, 2304.9.3, 2304.9.5.1
DSA Interpretation of Regulations (IR) A-5, 23-4
ASTM D7147-05
ICC-ES AC13
ICC-ES AC399

This Interpretation of Regulations (IR) is intended for use by the Division of the State Architect (DSA) staff and by design professionals to promote more uniform statewide criteria for plan review and construction inspection of projects within the jurisdiction of DSA which includes State of California public elementary and secondary schools (grades K–12), community colleges and state-owned or state-leased essential services buildings. This IR indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered by DSA.

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