

PREFABRICATED WOOD I-JOIST: 2025 CBC

Disciplines: Structural

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PURPOSE

This Interpretation of Regulations (IR) clarifies design, detailing, quality control, and quality assurance requirements for the acceptance of prefabricated wood I-joists used on construction projects under DSA jurisdiction.

SCOPE

This IR is applicable to prefabricated wood I-joist, which are structural members manufactured with sawn or structural composite lumber flanges and structural panel webs. The webs consist of either plywood or oriented strand board bonded to the flanges with exterior-type adhesives, forming an “I” cross-sectional shape. In this IR, prefabricated wood I-joists are simply referred to as joists. This IR does not apply to open web trusses, which are addressed by *IR 23-8: Manufactured Wood-Chord-Metal-Web Trusses*.

BACKGROUND

California Building Code (CBC) Section 2303.1.2 defines minimum standards and quality requirements for prefabricated wood I-joists. Additionally, the American Wood Council (AWC) National Design Specification (NDS), Chapter 7 defines design requirements for wood I-joists.

1. ACCEPTANCE CRITERIA

Joists must have a valid evaluation report in accordance with *IR A-5: Product and Material Acceptance Based on a Valid Evaluation Report*.

1.1 The evaluation report must indicate compliance with each of the following:

1.1.1 2024 International Building Code (IBC) or 2025 CBC.

1.1.2 American Society for Testing and Materials (ASTM) D5055: Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

1.1.3 International Code Council Evaluation Service (ICC-ES) AC14: Acceptance Criteria for Prefabricated Wood I-Joist.

1.2 The acceptable evaluation report will also require the joist manufacture maintain quality control and quality assurance programs complying with the requirements of ICC-ES AC14 and ASTM D5055. See Section 4 below for additional information.

1.3 In accordance with CBC Section 2303.5, hangers used with wood I-joists must comply with ASTM D7147: Standard Specification for Testing and Establishing Allowable Loads of Joist Hangers. The joist hanger evaluation report must indicate compliance with ICC-ES AC13: Acceptance Criteria for Joist Hangers and Similar Devices.

2. DESIGN REQUIREMENTS

Joists shall be designed in accordance with NDS Chapter 7 and their evaluation report.

2.1 Joists shall only be specified for use in dry conditions and must be protected from weather exposure during construction.

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2.2 Design for flexure, shear, and bearing shall be based on capacities determined in accordance with ASTM D5055 and as listed in the evaluation report.

2.3 Deflection must be computed in accordance with the evaluation report and comply with CBC Table 1604A.3, the evaluation report, and any applicable recommendations published by the joist manufacturer.

2.3.1 NDS Section C7.4.5 notes the typically recommended deflection limit of span divided by 480 for floor joist under live load.

2.3.2 As discussed in NDS Section C7.4.5, when long-term loads (i.e., dead load plus sustained live loads) stress the member beyond 50 percent of the design moment capacity, the design shall account for long-term deflection, including the effects of creep, in accordance with NDS Section 3.5.2 with the following deflection limits:

2.3.2.1 Floor members and roof members in bays with low slope as defined in American Society of Civil Engineers (ASCE) Standard 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7), Section 8.3: Span divided by 240.

2.3.2.2 Roof members in bays not defined in Section 2.3.2.1 above: Span divided by 180.

2.3.3 Regardless of the proportion of long-term loads, the design of roofs with low slope per ASCE 7 Section 8.3 shall comply with the deflection limits of Section 2.3.2 above. While these limits reduce the potential for flat spots where water can collect on the roof, they do not ensure ponding will not occur. Additional evaluation per CBC Section 1611A may still be required.

2.4 Joist blocking panels may be used for shear transfer if allowed by the evaluation report. Shear transfer capacity shall be limited to the allowable value specified in the evaluation report. Shear transfer nailing (i.e., size and spacing) must be determined by calculations and comply with the joist manufacturer's requirements.

2.5 Lateral support of the joist bottom flange may be required when it is in compression (e.g., wind uplift loads, cantilevers, etc.).

3. DETAILING REQUIREMENTS

Construction details must comply with the joist manufacturer's detailing and construction requirements.

3.1 Lateral and rotational supports must be provided at points of bearing per NDS Section 7.3.5.3 and located no more than 12-inches from bearing points at supports using joist hangers.

3.1.1 Lateral and rotational support is permitted to be provided by joist hangers that have been tested for torsional moment capacity in compliance with ICC-ES AC13 Section 3.4.

3.1.2 Hangers specifically designed to support only prefabricated wood I-joists are exempt from torsional moment capacity testing per ICC-ES AC13 Section 3.4.1; therefore, such hangers will not be considered effective for preventing joist rotation unless the evaluation report specifically documents qualification by this testing.

3.1.3 When used to provide rotational support, the depth of the hanger relative to the joist depth must meet any limitations dictated by their qualification per Section 3.1.1 above.

3.2 Bridging must be provided in accordance with the evaluation report and the manufacturer's published requirements. Additional bridging may be required per Section 2.5 above.

3.3 Connection details must be designed to minimize the potential for splitting of joists and other wood members. In the event of splitting, the design professional shall prepare and submit to DSA a repair procedure for review and approval on a project-specific basis. The following are typical conditions where splitting is prone to occur:

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3.3.1 Solid sawn lumber joist flange connections at bearing locations (e.g., wall top plates).

3.3.2 Fasteners of tie straps or other connector hardware.

3.3.3 Web stiffeners.

3.3.4 Joist flange or web filler that is a part of a wall anchorage system.

3.3.5 Joist flange receiving diaphragm nailing.

3.3.6 Shear transfer nailing at joist blocking panels.

3.4 End distance, edge distance, and spacing of nails in tie straps or other connector hardware must comply with the evaluation report and joist manufacturer's published limitations.

3.5 The material and dimensions of web stiffeners must comply with the manufacturer's published requirements.

3.6 Connection details that are part of the anchorage system and load path resisting out-of-plane seismic wall forces must meet the requirements of ASCE 7 Section 12.11.2.2.

3.7 When receiving diaphragm nailing, the minimum thickness and width of the joist flange must comply with the applicable CBC and AWC Special Design Provisions for Wind and Seismic (SDPWS) requirements. Flange dimensions must be coordinated with fastener edge distance, spacing, and penetration requirements. Refer to SDPWS Table 4.2A, 4.2B, or 4.2C as applicable.

3.8 The design shall not permit premanufactured framing clips used for shear transfer to be fastened into the side face of joist flanges fabricated of laminated veneer lumber.

4. QUALITY CONTROL AND QUALITY ASSURANCE

Continuous special inspection of joist fabrication is not required.

4.1 Joists shall be fabricated in a facility that complies with the following:

4.1.1 ASTM D5055 Sections 8, 9, and 10.

4.1.2 ICC-ES AC14 Section 3.0 and Appendix A.

4.1.3 Quality Assurance Guidelines for Prefabricated Wood I-joists as printed in ICC-ES AC14 Appendix B and promulgated by the Wood I-Joist Manufacturers Association. Compliance with an alternative quality assurance standard will be considered by DSA; ICC-ES approval of such an alternative standard is recommended.

4.2 Unannounced audits performed by a third-party auditor of a qualified inspection agency are required in accordance with ICC-ES AC14. All quality control reports resulting from such audits must be retained by the joist manufacturer and made available to DSA upon request.

REFERENCES:

2025 California Code of Regulations (CCR) Title 24

Part 2: California Building Code (CBC), Table 1604A.3 and Sections 1611A, 2303.1.2, 2303.5.

This IR is intended for use by DSA staff and by design professionals to promote statewide consistency for review and approval of plans and specifications as well as construction oversight of projects within the jurisdiction of DSA, which includes State of California public schools (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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