

PREFABRICATED WOOD I-JOIST: 2016, 2013, and 2010 CBC

Disciplines:	Structural	History:	Revised 10-05-18 Revised 11-03-10 Revised 08-25-09 Revised 07-15-08 Issued 03-14-05 as AC 23-1
---------------------	------------	-----------------	--

PURPOSE: This Interpretation of Regulation (IR) provides clarification of qualification and quality control/assurance requirements for acceptance of prefabricated wood I-joists for use in projects submitted to the Division of the State Architect (DSA) for review. This IR does not apply to open web trusses.

1. **BACKGROUND:** A prefabricated wood I-joist is a structural member manufactured with sawn or structural composite lumber flanges and structural panel webs composed of either plywood or oriented strand board (OSB) bonded together with exterior-type adhesives, forming an “I” cross sectional shape.

2. **ACCEPTANCE CRITERIA:** I-joists may be accepted on DSA projects based on the following criteria:

2.1 I-joists must have a valid evaluation report issued by a qualified independent evaluation agency prescribed in DSA [IR A-5](#).

2.2 The evaluation report shall indicate compliance with all the following building codes and standards:

- 2015 IBC (2012 IBC for 2013 CBC projects; 2009 IBC for 2010 CBC projects).
- ASTM D5055.
- ICC-ES AC14.

2.3 The evaluation report shall also require a quality control/assurance program complying with the requirements of ICC-ES AC14 and ASTM D5055. See Section 5, below.

3. **DESIGN REQUIREMENTS:**

3.1 Joists shall only be used for dry conditions of use and must be protected from weather exposure during construction.

3.2 Joists shall be designed in accordance with AF&PA NDS, Chapter 7 and the appropriate evaluation report.

3.3 Lateral and rotational supports shall be provided at points of bearing per AF&PA NDS, Section 7.3.5 and shall be located no more than 1 foot from bearing point at supports using joist hangers. Lateral and rotational support is permitted to be provided by joist hangers that have been tested for torsional moment capacity per ASTM D7147 (2013 CBC, § 1711A.1; 2010 CBC, § 1716A.1) and are in compliance with acceptance criteria per ICC-ES AC13.

Note: Hangers specifically designed to support only prefabricated wood I-joists are exempt from torsional testing per ICC-ES AC13, Section 3.4.1. As a result, such hangers shall not be considered effective for preventing joist rotation.

3.4 Bridging shall be provided in accordance with manufacturer’s requirements and the product’s evaluation report. Additional bridging may be required to provide lateral

PREFABRICATED WOOD I-JOIST: 2016, 2013, and 2010 CBC

support for the bottom chord when it is in compression (e.g., wind uplift, large cantilevers, etc.).

3.5 Design flexure, shear and bearing shall be determined through ASTM D5055 procedures, and as listed in the evaluation report.

3.6 Deflection shall be computed per the evaluation report and shall not exceed limits defined in CBC, Table 1604A.3, evaluation report, or the manufacturer’s recommendation, whichever is more restrictive. As a reference, AF&PA NDS, Section C7.4.5 recommends a deflection limit of L/480 for floor joists live load.

In addition, AF&PA NDS, Section C7.4.5 recommends the consideration of long-term deflection, including the effects of creep, for cases with heavy dead loads. In particular, this should generally be considered when the long-term loading (i.e., dead load plus sustained live loads) will stress the member to 50% or more of the design moment capacity, especially for members in flat-roof applications that may be susceptible to ponding. A commonly used approach that DSA would accept for evaluating long-term deflection can be found in AF&PA NDS, Section 3.5.2 and should be limited to L/240 for floor members as well as roof members in bays susceptible to ponding and L/180 for roof members in bays not susceptible to ponding as defined in ASCE 7, Section 8.4. Even though these deflection limits help to minimize the potential for creating flat spots where water can collect on the roof, it does not ensure against ponding and may still require additional investigation per CBC, Section 1611A.

3.7 I-joist blocking panels may be used for shear transfer if allowed by the evaluation report. Shear transfer capacity is limited to the allowable shear capacity specified in the evaluation report. Shear transfer nailing (size and spacing) shall be determined by calculations and must conform to manufacturer’s requirements.

4. DETAILING CONSIDERATIONS: Follow the manufacturer’s detailing and construction requirements. Connection details shall be designed to minimize the potential for splitting of wood members and I-joists. In the event of splitting, a repair procedure shall be submitted to DSA for review and approval on a project-specific basis. The following are typical conditions where splitting is prone to occur:

- Solid sawn lumber flange connections at bearing locations (e.g., wall top plates).
- Tie strap or other connector hardware. **Note:** End distance and spacing of nails shall comply with manufacturer’s requirements.
- Web stiffeners. **Note:** Material and size shall comply with the manufacturer’s requirements.
- I-joist chord, or web filler, that is a part of a wall anchorage system. **Note:** Attachment shall meet the requirements of ASCE 7, Section 12.11.2.
- I-joist flange receiving diaphragm sheathing nails. **Note:** The minimum thickness and width of the flange shall meet applicable CBC requirements (i.e., edge distance, minimum nail penetration) per AWC SDPWS, Table 4.2A, 4.2B, and 4.2C (2010 CBC, Tables 2306.2.1(1), 2306.2.1(2), and 2306.3).
- Shear transfer nailing at I-joist blocking panels. **Note:** Premanufactured framing clips used for shear transfer shall not be fastened into the side face of I-joist flanges constructed of laminated veneer lumber.

5. I-JOIST QUALITY CONTROL/ASSURANCE: Continuous independent inspection of wood I-joist fabrication is not required. Only mills that qualify under an approved QA/QC

PREFABRICATED WOOD I-JOIST: 2016, 2013, and 2010 CBC

program shall provide I-joists. The quality assurance program shall meet the following requirements:

- ASTM D5055, Sections 8, 9, and 10.
- ICC-ES AC14, Appendix A.
- ICC-ES AC14, Appendix B, Quality Assurance Guidelines for Prefabricated Wood I-joists, promulgated by the Wood I-joists Manufacturers Association, or ICC-ES approved equivalent such as APA QA Policy, Performance Rated I-Joists.
- Unannounced audits by a third party auditor of a qualified inspection agency shall be performed per ICC-ES AC14. All quality control reports resulting from such audits must be maintained by the manufacturers and made available to DSA upon request.

References:

California Code of Regulations (CCR) Title 24
Part 2: California Building Code (CBC), Sections 1604A.3, 2303.1.2, 2303.5, 2306.2.1, 2306.3
DSA Interpretation of Regulations (IR) A-5
ASTM D5055-13 (-05 for 2013 and 2010 CBC)
ASTM D7147-05
ICC-ES AC13
ICC-ES AC14

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.

This IR is reviewed on a regular basis and is subject to revision at any time. Please check DSA's website for currently effective IRs. Only IRs listed on the webpage at www.dgs.ca.gov/dsa/Resources/IRManual.aspx at the time of plan submittal to DSA are considered applicable.