

Horizontal Diaphragm Design with Trus Joist® TJI® Joists

With the ever-increasing optimization of I-joist flange dimensions and properties, more focus has been placed on the performance of these products in horizontal diaphragm applications. Weyerhaeuser has performed a significant amount of full-scale horizontal diaphragm testing with Trus Joist® TJI® joists in accordance with ASTM E455 to validate diaphragm performance properties. Based on this testing, Weyerhaeuser has developed the following guidelines when TJI® joists are used as horizontal diaphragm framing members.

TJI® Joists as Prescriptive (NBC 2020, Part 9) Diaphragm Framing Members

TJI® joists are permitted as framing members in prescriptive floor and roof diaphragm construction in accordance with the NBC 2020, Part 9. When TJI® 110, 210, and 230 are used in floor diaphragm construction, the sheathing must be a minimum thickness of 19/32" and fastened with 8d (0.131" x 2½") nails.

TJI® Joists as Engineered Diaphragm Framing Members

TJI® joists may be used as framing members in blocked and unblocked diaphragms constructed with wood structural panels and designed using the procedures specified in CSA O86:24 Clause 11.6.3, subject to the limitations in Table 1 and Table 2. The factored shear resistance must be calculated using the equivalent framing member width and specific gravities given by Table 1 and must not exceed the maximum permitted factored shear resistance given by Table 2.

TABLE 1: TJI® JOISTS ENGINEERED DIAPHRAGM DESIGN INFORMATION

TJI® Joist Series	Equivalent Framing Member Width (in.)	Equivalent Specific Gravity (SG)	Closest Permitted Nail Spacing ^[1] (in.)		
			6d (0.113" x 2")	8d (0.131" x 2½")	10d (0.148" x 3")
TJI® 110 TJI® 210	1½	0.50	4	4	4
TJI® 230	2½	0.50	4	4	4
TJI® 360 TJI® 560 TJI® 560D	2½	0.50	3	3	4

[1] One row of nails is permitted along each sheathing panel end and edge. When nail spacing is less than 6" on-center, adjacent nails within a row must be offset (staggered). The closest permitted nail spacing given by Table 1 must not be exceeded. Sawn lumber framing members must be used in lieu of TJI® joist framing members where the required fastener spacing is less than the closest permitted nail spacing.

TABLE 2: TJI® JOISTS MAXIMUM PERMITTED FACTORED SHEAR RESISTANCE (PLF)

TJI® Joist Series	Blocked	Unblocked Case 1	Unblocked Case 3	Unblocked Cases 2, 4, 5, 6 ^[1]
TJI® 110 TJI® 210	650	390	295	250 ^[2]
TJI® 230	730	435	330	280 ^[2]
TJI® 360 TJI® 560 TJI® 560D	1,040	435	330	330

TJI® joists are intended for dry use applications.

Some TJI® joist series may not be available in your region.

[1] For TJI® 110, 210, and 230, the factored shear resistance calculated in accordance with CSA O86:24 Clause 11.6.3 shall be multiplied by a factor of 0.85 unless sub-floor adhesives, which have been qualified as Class 1/8 in., Type P/O per ASTM D3498-19, are used in combination with mechanical fasteners attachment.

[2] The factored shear resistance may be multiplied by a factor of 1.18 where sub-floor adhesives, which have been qualified as Class 1/8 in., Type P/O per ASTM D3498-19, are used in combination with mechanical fasteners attachment.

If you have any questions, please contact your Weyerhaeuser representative.