iLevel® TRUS JOIST® commercial

TJI® L65, L90, H90, AND HS90 JOISTS

- Lightweight for Fast Installation
- Compatible with Standard Framing
- Available in Long Lengths
- Resists Bowing, Twisting, and Shrinking
- Works with Multiple Spans
- Limited Product Warranty

This literature is for legacy Trus Joist® products only and is not intended for use in current specification. Visit www.woodbywy.com for the most current Trus Joist® product offering and specification information.

#COM-2000 SPECIFIER'S GUIDE

WELCOME TO iLEVEL TRUS JOIST® COMMERCIAL

iLevel Trus Joist® Commercial is an exciting business within Weyerhaeuser—offering building solutions for a broad range of commercial applications; pioneering unique manufacturing technologies; and providing world-class service and technical support for architects, specifiers, and builders.

You'll still find all the reliable, innovative products that you've been using, including iLevel® Trus Joist® Commercial open-web trusses, iLevel® Trus Joist® Parallam® PSL beams and headers, TJI® joists, TimberStrand® LSL studs, and TJ-Beam® design software. And you'll work with one service-oriented supplier to get all of these products and the support you need to build smarter.

iLevel Trus Joist® Commercial. A family of brand-name building products...a source for innovative ideas and solutions...a supplier that's simpler to do business with.

The iLevel Trus Joist® Commercial TJI® Joist Advantage

TJI® joists are lightweight joists suitable for use in roofs and floors in residential, multifamily, institutional, and commercial applications. This product is available in multiple series so you can design the most cost-effective system. Other TJI® joist benefits include:

- **Dependable Delivery**—The iLevel Trus Joist® Commercial large network of plants in key market areas enables us to deliver materials quickly. Each plant is staffed with experienced personnel who can talk to you about any special requirements and help solve problems.
- **Minimum Waste**—TJI® joists are manufactured to resist twisting and shrinking, and they can be cut to size at the factory so there's virtually no time or material waste prior to installation.
- **Compatibility**—All TJI® joists fit into wood frame, masonry, or steel construction, and they can accommodate a wide variety of decking and ceiling materials—including wood, plywood, steel, and gypsum.
- **Easy Mechanical Access**—Knockout holes for ventilation and flexible conduit are provided in the web of the TJI® joists. The web can also be cut or drilled to accommodate larger ductwork (see pages 20–21), so costly suspended ceilings can often be eliminated.

ABOUT THIS GUIDE

The iLevel Trus Joist® Commercial TJI® L65, L90, H90, and HS90 Joist Specifier's Guide is one of several guides that offer technical information and design recommendations for iLevel Trus Joist® Commercial products. This guide provides architects, designers, and engineers with information regarding TJI® joists in commercial applications.

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Product Selection

This guide provides specifiers with technical information on the iLevel Trus Joist® Commercial TJI® Joist product line. However, you will often find that a variety of products can work in many applications when you consider span, wind or load-carrying capacity, and design constraints. Your local iLevel Trus Joist® Commercial representative, with support from our network of regional engineering offices, can assist you in choosing the best system for your specific application. Contact us for help with any of the following:

- Product selection
- Building department calculations
- Complete cost analysis
- System selection (system packages can include horizontal framing, main carrying beams, headers, wall framing, mansard framing, and accessories)

Products for Every Application

In addition to TJI® joists, iLevel Trus Joist® Commercial offers a variety of other engineered lumber products that are ideal for use in commercial projects. For more information, contact your iLevel Trus Joist® Commercial representative or visit www.iLevel.com to download literature for products such as iLevel® Trus Joist® Parallam® PSL beams, tapered TJI® joists, open-web trusses, and TimberStrand® LSL studs.

Unsurpassed Technical Support

iLevel Trus Joist® Commercial has one of the largest networks of sales representatives in the business. Their services include consultation, computer-assisted design and layout, delivery coordination, and installation review. They can suggest cost-reduction techniques and check special application requirements. In addition, they're backed by a staff of engineers who provide comprehensive technical support when needed. Special requests are accommodated wherever practical, and they offer cost analysis, engineering analysis, assistance with building code approvals—even the creation of special product applications for more creative designs. The goal of iLevel Trus Joist® Commercial technical support is to help the architect or specifier achieve quality design applications with the most cost-efficient product selection possible.

Our network of sales representatives offer a wide range of services to help guide your projects through planning and construction.

Innovation and Resource Efficiency

By making better use of every tree—including those that are smaller diameter—iLevel Trus Joist® Commercial can produce cost-effective, consistently available engineered lumber that reduces environmental impact. Using patented technologies, we can take a tree apart and put its fibers back together to take advantage of the wood's natural strength. The result is a quality wood product that offers superior strength and reliable performance.

ENGINEERING SERVICES

Upon request, iLevel Trus Joist® Commercial can provide the following services for the products described in this commercial TJI® Joist Specifier's Guide:

- A complete design package including shop drawings and detailed design calculations.
- Review and analysis of the application.
- Drawings or calculations sealed by a professional engineer.

Installation Review

Although responsibility for proper installation lies with the contractor-builder, iLevel Trus Joist® Commercial provides detailed suggestions and guidelines for installation. If requested, an iLevel Trus Joist® Commercial representative will visit the site to verify the contractor's understanding of proper installation. iLevel engineers also are available to help solve jobsite application problems.

Our engineering staff offers professional capabilities in the design and application of all iLevel® products.

Engineering Responsibility Position Statement

iLevel is a manufacturer of proprietary structural components.

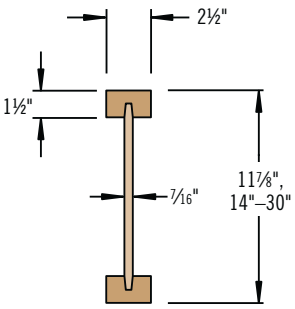
It employs a staff of engineers to aid in the development, manufacture, and marketing of its products. iLevel does not replace or accept the responsibility of the design professional of record for any structure.

iLevel accepts the delegation of engineering responsibility only for the products it manufactures, provided that the application conditions are specified by the design professional of record, or other responsible party when a design professional is not engaged. iLevel provides engineering in the design of its products and does not displace the need on any project for a design professional of record.

TJI® JOIST DESCRIPTIONS

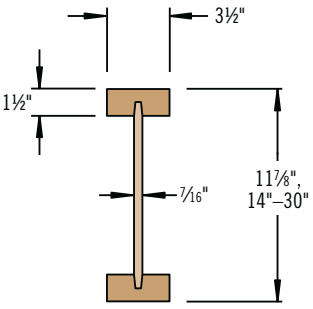
This guide covers four series of joists: TJI® L65, TJI® L90, TJI® H90, and TJI® HS90. These joists are primarily intended for commercial applications such as retail stores, office buildings, schools, restaurants, hotels, warehouses, and nursing homes. They are typically designed, manufactured, and sold by iLevel Trus Joist® Commercial for each specific job. Contact your iLevel Trus Joist® Commercial representative for more information.

TJI® joists are normally produced without camber. However, camber is available at 2,250' radius as a special order. Camber is not recommended for floors, or for multiple-span or cantilever applications.



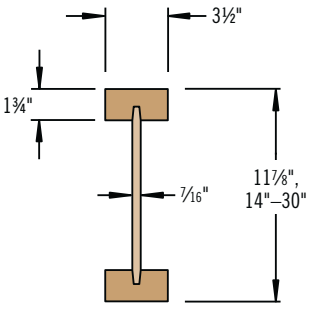
TJI® L65

Top and bottom flanges of 1½" x 2½" iLevel® Trus Joist® Microllam® LVL with 7/16" iLevel® Trus Joist® Performance Plus® web.



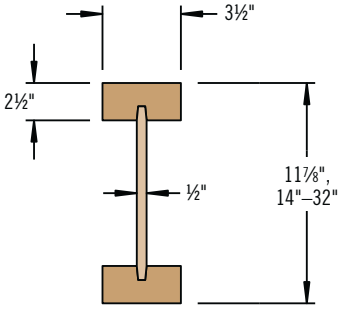
TJI® L90

Top and bottom flanges of 1½" x 3½" iLevel® Trus Joist® Microllam® LVL with 7/16" iLevel® Trus Joist® Performance Plus® web.



TJI® H90

Top and bottom flanges of 1¾" x 3½" iLevel® Trus Joist® Microllam® LVL with 7/16" iLevel® Trus Joist® Performance Plus® web.



TJI® HS90

Top and bottom flanges of 3½" x 2½" iLevel® Trus Joist® Microllam® LVL with ½" iLevel® Trus Joist® Performance Plus® web.

- For heavy loads and 8' on-center roof systems
- Increased bending strength and stiffness

Joist depths from 14" to 32" are available in 2" increments.

Building Codes and Product Acceptance: See ICC ES ESR-1153, ICC ES ESR-1387, HUD SEB No. 689 Rev.11, HUD MR 925k, L.A. City RR #25538 and RR #25202, DSA PA-048, and DSA PA-045

Joist Depth	Basic Properties						Reaction Properties[4][5]							
							End Reaction (lbs)				Intermediate Reaction (lbs)			
							Bearing Length				Bearing Length			
							1¾" (2½" for HS90)		3½"		3½"		5¼"	
							Web Stiffeners[6]		Web Stiffeners[6]		Web Stiffeners[6]		Web Stiffeners[6]	
	Joist Weight (lbs/ft)	Resistive Moment[1] (ft-lbs)	Vertical Shear[2] (lbs)	EI x 10⁶ (in.²-lbs)	EI[3] x 10⁶ TJI® Joist with Nailed Floor Sheathing (in.²-lbs)	EI[3] x 10⁶ TJI® Joist with Glue-Nailed Floor Sheathing (in.²-lbs)	No	Yes	No	Yes	No	Yes	No	Yes
TJI® L65 Joist														
11⅞"	3.3	6,750	1,925	450	512	561	1,375	1,745	1,885	1,925	2,745	3,120	3,365	3,735
14"	3.6	8,030	2,125	666	752	821	1,375	1,750	1,885	2,125	2,745	3,365	3,365	3,985
16"	3.9	9,210	2,330	913	1,025	1,116	1,375	1,750	1,885	2,330	2,745	3,490	3,365	4,105
18"	4.2	10,380	2,535	1,205	1,348	1,462	1,375	1,750	1,885	2,535	2,745	3,615	3,365	4,230
20"	4.4	11,540	2,740	1,545	1,722	1,864	N.A.	1,750	N.A.	2,740	N.A.	3,740	N.A.	4,355
22"	4.7	12,690	2,935	1,934	2,149	2,322	N.A.	1,750	N.A.	2,935	N.A.	3,860	N.A.	4,480
24"	5.0	13,830	3,060	2,374	2,632	2,838	N.A.	1,750	N.A.	3,060	N.A.	3,875	N.A.	4,605
26"	5.3	14,960	2,900	2,868	3,172	3,416	N.A.	1,750	N.A.	2,900	N.A.	4,725[7]	N.A.	5,345[8]
28"	5.5	16,085	2,900	3,417	3,772	4,056	N.A.	1,750	N.A.	2,900	N.A.	4,850[7]	N.A.	5,470[8]
30"	5.8	17,205	2,900	4,025	4,434	4,762	N.A.	1,750	N.A.	2,900	N.A.	4,975[7]	N.A.	5,590[8]
TJI® L90 Joist														
11⅞"	4.2	9,605	1,925	621	687	741	1,400	1,715	1,885	1,925	3,350	3,665	3,965	4,285
14"	4.5	11,430	2,125	913	1,005	1,079	1,400	1,875	1,885	2,125	3,350	3,825	3,965	4,440
16"	4.7	13,115	2,330	1,246	1,366	1,462	1,400	2,030	1,885	2,330	3,350	3,980	3,965	4,600
18"	5.0	14,785	2,535	1,635	1,786	1,908	1,400	2,030	1,885	2,515	3,350	3,980	3,965	4,600
20"	5.3	16,435	2,740	2,085	2,272	2,422	N.A.	2,190	N.A.	2,675	N.A.	4,140	N.A.	4,755
22"	5.6	18,075	2,935	2,597	2,824	3,006	N.A.	2,345	N.A.	2,830	N.A.	5,090	N.A.	5,705
24"	5.8	19,700	3,060	3,172	3,442	3,659	N.A.	2,345	N.A.	2,830	N.A.	5,405	N.A.	6,020
26"	6.1	21,315	2,900	3,814	4,132	4,387	N.A.	2,450	N.A.	2,900	N.A.	5,800[7]	N.A.	5,800[8]
28"	6.4	22,915	2,900	4,525	4,895	5,191	N.A.	2,450	N.A.	2,900	N.A.	5,800[7]	N.A.	5,800[8]
30"	6.6	24,510	2,900	5,306	5,732	6,073	N.A.	2,450	N.A.	2,900	N.A.	5,800[7]	N.A.	5,800[8]
TJI® H90 Joist														
11⅞"	4.6	10,960	1,925	687	755	810	1,400	1,715	1,885	1,925	3,495	3,810	4,100	4,420
14"	4.9	13,090	2,125	1,015	1,109	1,185	1,400	1,875	1,885	2,125	3,495	3,970	4,100	4,575
16"	5.2	15,065	2,330	1,389	1,512	1,610	1,400	2,030	1,885	2,330	3,495	4,130	4,100	4,735
18"	5.4	17,010	2,535	1,827	1,982	2,106	1,400	2,030	1,885	2,515	3,495	4,130	4,100	4,735
20"	5.7	18,945	2,740	2,331	2,522	2,676	N.A.	2,190	N.A.	2,675	N.A.	4,285	N.A.	4,890
22"	6.0	20,855	2,935	2,904	3,136	3,321	N.A.	2,345	N.A.	2,830	N.A.	5,235	N.A.	5,840
24"	6.3	22,755	3,060	3,549	3,825	4,046	N.A.	2,345	N.A.	2,830	N.A.	5,425	N.A.	6,155
26"	6.5	24,645	2,900	4,266	4,590	4,850	N.A.	2,450	N.A.	2,900	N.A.	5,800[7]	N.A.	5,800[8]
28"	6.8	26,520	2,900	5,059	5,436	5,737	N.A.	2,450	N.A.	2,900	N.A.	5,800[7]	N.A.	5,800[8]
30"	7.1	28,380	2,900	5,930	6,363	6,710	N.A.	2,450	N.A.	2,900	N.A.	5,800[7]	N.A.	5,800[8]
TJI® HS90 Joist														
11⅞"	6.0	16,050	2,320	900	941	973	1,835	2,320	2,150	2,320	3,995	4,650	4,690	5,345
14"	6.3	19,425	2,565	1,355	1,410	1,455	1,835	2,565	2,150	2,565	3,995	4,980	4,690	5,670
16"	6.6	22,550	2,790	1,876	1,948	2,005	1,835	2,790	2,150	2,790	3,995	4,980	4,690	5,670
18"	7.0	25,640	3,020	2,488	2,578	2,650	1,835	3,020	2,150	3,020	3,995	5,310	4,690	6,000
20"	7.3	28,695	3,250	3,195	3,306	3,394	N.A.	3,250	N.A.	3,250	N.A.	5,425	N.A.	6,330
22"	7.6	31,725	3,480	3,998	4,131	4,238	N.A.	3,475	N.A.	3,480	N.A.	5,425	N.A.	6,330
24"	7.9	34,730	3,710	4,901	5,059	5,186	N.A.	3,500	N.A.	3,710	N.A.	5,425	N.A.	6,655
26"	8.2	37,715	3,940	5,905	6,090	6,238	N.A.	3,500	N.A.	3,940	N.A.	6,985[7]	N.A.	7,675[8]
28"	8.5	40,680	4,165	7,014	7,228	7,400	N.A.	3,500	N.A.	4,165	N.A.	6,985[7]	N.A.	7,675[8]
30"	8.8	43,630	4,375	8,230	8,476	8,672	N.A.	3,500	N.A.	4,375	N.A.	7,310[7]	N.A.	8,005[8]
32"	9.1	46,560	4,375	9,555	9,834	10,057	N.A.	3,500	N.A.	4,375	N.A.	7,640[7]	N.A.	8,335[8]

- The stated allowable design properties are for loads of normal duration. Adjustments to the allowable design values shall be in accordance with the applicable code.

(1) **Caution:** Do not increase joist resistive moment properties by a repetitive-member-use factor; resistive moment properties reflect the latest ASTM standards.

(2) For possible increases in shear capacity see below.

(3) For deflection calculation only. Assumes 12" joist spacing (24" spacing for HS90 joists) with a 24" span-rated panel.

(4) Interpolation between bearing lengths is permitted for allowable design reactions.

(5) Allowable bearing lengths have been determined based on iLevel Trus Joist® Commercial products. Allowable bearing on supporting members shall be checked.

(6) Refer to page 16 for web stiffener details.

(7) 5¼" bearing length is required at intermediate reactions.

(8) 7" bearing length is required at intermediate reactions.

TJI® Joist Shear Design

When joists are used as simple-span members, the design shear is equal to the shear at the face of the support.

When joists **up to 24" in depth** are used as multiple-span members, the design shear is the calculated shear at the interior support reduced by the following:

$$R = \frac{W}{19.25} \leq 18\%$$

Where: R is the percent reduction
W is uniform load in plf

LOAD TABLES

TJI® L65 Allowable Uniform Load (PLF)

Span	Depth																			
	11⅞"		14"		16"		18"		20"		22"		24"		26"		28"		30"	
	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL
12'	320 / 252	368 / 401	354 / 350	407 / 442	388 / *	446 / 485	412 / *	474 / 515	416 / *	479 / 520	416 / *	479 / 520	416 / *	479 / 520	416 / *	479 / 520	416 / *	479 / 520	416 / *	479 / 520
14'	275 / 169	316 / 343	303 / 238	349 / 379	332 / 311	382 / 416	353 / *	406 / 441	357 / *	410 / 446	357 / *	410 / 446	357 / *	410 / 446	357 / *	410 / 446	357 / *	410 / 446	357 / *	410 / 446
16'	210 / 118	242 / 263	250 / 168	288 / 313	287 / 221	330 / 359	309 / 281	355 / 386	312 / *	359 / 390	312 / *	359 / 390	312 / *	359 / 390	312 / *	359 / 390	312 / *	359 / 390	312 / *	359 / 390
18'	153 / 76	191 / 204	198 / 109	228 / 247	227 / 144	261 / 284	256 / 184	294 / 320	277 / 229	319 / 347	277 / *	319 / 347	277 / *	319 / 347	277 / *	319 / 347	277 / *	319 / 347	277 / *	319 / 347
20'	114 / 51	152 / 152	160 / 73	184 / 200	184 / 98	211 / 230	207 / 125	238 / 259	230 / 157	265 / 288	250 / 191	287 / 312	250 / 228	287 / 312	250 / *	287 / 312	250 / *	287 / 312	250 / *	287 / 312
22'	86 / 39	115 / 115	126 / 56	152 / 165	152 / 75	175 / 190	171 / 97	197 / 214	190 / 121	219 / 238	209 / 148	241 / 262	227 / 178	261 / 284	227 / 210	261 / 284	227 / *	261 / 284	227 / *	261 / 284
24'	67 / 30	90 / 90	98 / 44	128 / 131	127 / 59	147 / 159	144 / 76	165 / 180	160 / 96	184 / 200	176 / 117	202 / 220	192 / 141	220 / 240	207 / 167	238 / 259	208 / 195	239 / 260	208 / *	239 / 260
26'	/ 71	71 / 71	78 / 35	104 / 104	106 / 47	125 / 136	122 / 61	141 / 153	136 / 77	157 / 170	150 / 94	172 / 187	163 / 114	188 / 204	177 / 135	203 / 221	190 / 158	218 / 237	192 / 183	221 / 240
28'	/ 57	57 / 57	/ 84	84 / 84	86 / 38	108 / 114	105 / 49	121 / 132	117 / 62	135 / 147	129 / 77	148 / 161	141 / 93	162 / 176	152 / 110	175 / 190	164 / 130	188 / 205	175 / 150	201 / 219
30'	/ 47	47 / 47	/ 69	69 / 69	70 / 31	94 / 94	92 / 40	106 / 115	102 / 51	117 / 128	112 / 63	129 / 141	122 / 77	141 / 153	132 / 91	152 / 166	142 / 107	164 / 178	152 / 125	175 / 191
32'	/ 39	39 / 39	/ 57	57 / 57	/ 78	78 / 78	76 / 34	93 / 101	90 / 43	103 / 112	99 / 53	114 / 123	108 / 64	124 / 135	116 / 76	134 / 146	125 / 90	144 / 157	134 / 104	154 / 168
34'	/ 32	32 / 32	/ 48	48 / 48	/ 65	65 / 65	/ 82	85 / 85	79 / 36	91 / 99	87 / 44	100 / 109	95 / 54	110 / 119	103 / 64	119 / 129	111 / 76	128 / 139	119 / 88	136 / 148
36'			/ 40	40 / 40	/ 55	55 / 55	/ 72	72 / 72	69 / 30	81 / 89	78 / 38	90 / 97	85 / 46	98 / 106	92 / 55	106 / 115	99 / 65	114 / 124	106 / 75	122 / 132
38'			/ 34	34 / 34	/ 47	47 / 47	/ 62	62 / 62	/ 73	79 / 79	70 / 32	80 / 87	76 / 39	88 / 95	82 / 47	95 / 103	89 / 55	102 / 111	95 / 65	109 / 119
40'					/ 40	40 / 40	/ 53	53 / 53	/ 66	68 / 68	/ 72	79 / 79	69 / 34	79 / 86	74 / 40	86 / 93	80 / 48	92 / 100	86 / 56	98 / 107

* Indicates that total load (TL) value controls.

- Green numbers refer to 115% total load (TL).

Load Table Instructions

To size floor joists:

- Check both total load (100% TL) and live load (100% LL). Total load values limit deflection to L/240. Live load values are based on a nailed floor system and the commercial deflection criteria shown on page 22. Live load (100% LL) values may be increased with a glue-nailed floor system; use iLevel® TJ-Beam® software or contact your iLevel Trus Joist® Commercial representative for assistance.

To size roof joists:

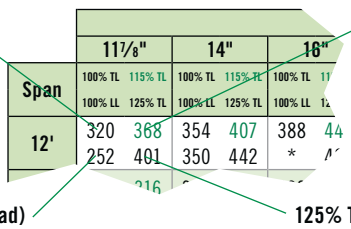
- Check the appropriate snow load area (115% TL) value or non-snow load area (125% TL) value to determine the maximum allowable total load. Both total load values limit joist deflection to L/180.
- **Consult local codes to verify deflection limits required for specific applications.**

General Notes

- Values shown are maximum allowable load capacities based on the following assumptions:
  - simple span; horizontal clear distance between supports.
  - glue-nailed floor.
  - uniformly loaded conditions with 2½" (3" for HS90) bearing length and web stiffeners. Other capacities may be possible with different criteria; use TJ-Beam® software or contact your iLevel Trus Joist® Commercial representative.
  - positive drainage in roof applications (¼" per foot slope minimum).
- Camber (2,250' radius) is available for simple-span applications only. **Contact your iLevel Trus Joist® Commercial representative for availability.**
- For span or loading conditions not covered by these tables (such as multiple spans or concentrated loads), use TJ-Beam® software or contact your iLevel Trus Joist® Commercial representative for assistance.

100% TL (Total Load)

Use this and the 100% LL to select floor member. This is the maximum allowable total load in pounds per linear foot of joist. Values are limited by deflection equal to L/240 at total load.



115% TL (Total Load)

Use this to select roof member in snow load areas. This is the maximum allowable total load in pounds per linear foot of joist. Values are limited by deflection equal to L/180 at total load.

100% LL (Live Load)

Use this and the 100% TL to select floor member. This number is the maximum allowable live load capacity in pounds per linear foot of joist. Value is based on the **Commercial Floor Deflection Limit** shown on page 22.

125% TL (Total Load)

Use this to select roof member in non-snow load areas. This is the maximum allowable total load in pounds per linear foot of joist. Values are limited by deflection equal to L/180 at total load.

TJI® L90 Allowable Uniform Load (PLF)

Span	Depth																			
	11⅞"		14"		16"		18"		20"		22"		24"		26"		28"		30"	
	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL
14'	275	316	297	341	320	368	320	368	342	393	365	419	365	419	387	445	410	471	410	471
	214	343	296	371	*	400	*	400	*	427	*	456	*	456	*	483	*	512	*	512
16'	240	276	260	299	280	322	280	322	299	344	319	367	319	367	338	389	358	412	358	412
	151	300	212	325	276	350	*	350	*	374	*	399	*	399	*	423	*	448	*	448
18'	203	245	231	265	248	286	248	286	266	306	283	326	283	326	301	346	318	366	318	366
	98	267	138	288	182	311	230	311	*	332	*	354	*	354	*	376	*	398	*	398
20'	152	203	208	239	224	257	224	257	239	275	255	293	255	293	271	311	287	330	287	330
	66	203	94	260	124	280	158	280	195	299	236	319	*	319	*	338	*	358	*	358
22'	116	155	167	217	203	234	203	234	217	250	232	267	232	267	246	283	260	300	260	300
	51	155	72	223	96	254	123	254	153	272	185	290	220	290	*	307	*	326	*	326
24'	91	121	131	175	176	209	186	214	199	229	212	244	212	244	225	259	239	275	239	275
	40	121	57	175	76	227	97	233	121	249	148	266	176	266	207	282	*	298	*	298
26'	72	97	105	140	141	178	172	198	184	211	196	226	196	226	208	239	220	253	220	253
	32	97	45	140	61	188	78	215	98	230	119	245	143	245	168	260	196	275	*	275
28'		78	85	113	114	152	148	173	167	192	182	209	182	209	193	222	205	235	205	235
		78	37	113	49	152	64	188	80	209	98	228	117	228	138	241	161	256	186	256
30'		64	69	93	94	125	122	151	146	168	160	184	170	195	180	207	191	220	191	220
		64	30	93	41	125	52	162	66	182	81	200	97	212	115	225	134	239	155	239
32'		53		77	78	104	101	132	128	147	141	162	153	176	166	191	179	205	179	206
		53		77	34	104	44	135	55	160	67	176	81	192	96	208	113	223	130	224
34'		44		65	65	87	85	114	107	130	125	143	136	156	147	169	158	182	168	194
		44		65	28	87	37	114	46	142	57	156	69	170	82	184	95	198	111	211
36'		37		55		74	72	96	91	116	111	128	121	139	131	151	141	162	151	173
		37		55		74	31	96	39	122	48	139	58	152	70	164	82	176	94	189
38'		32		47		63		82	78	104	97	115	109	125	118	135	126	145	135	156
		32		47		63		82	34	104	41	125	50	136	60	147	70	158	81	169
40'				40		54		71	67	90	83	103	98	113	106	122	114	131	122	140
				40		54		71	29	90	36	111	43	123	52	133	61	143	71	153
42'				35		47		62		78	72	94	88	102	96	111	103	119	111	127
				35		47		62		78	31	97	38	111	45	120	53	129	61	138

TJI® H90 Allowable Uniform Load (PLF)

Span	Depth																			
	11⅞"		14"		16"		18"		20"		22"		24"		26"		28"		30"	
	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL
14'	275	316	297	341	320	368	320	368	342	393	365	419	365	419	387	445	410	471	410	471
	230	343	*	371	*	400	*	400	*	427	*	456	*	456	*	483	*	512	*	512
16'	240	276	260	299	280	322	280	322	299	344	319	367	319	367	338	389	358	412	358	412
	163	300	229	325	*	350	*	350	*	374	*	399	*	399	*	423	*	448	*	448
18'	213	245	231	265	248	286	248	286	266	306	283	326	283	326	301	346	318	366	318	366
	106	267	150	288	197	311	*	311	*	332	*	354	*	354	*	376	*	398	*	398
20'	166	221	208	239	224	257	224	257	239	275	255	293	255	293	271	311	287	330	287	330
	72	221	102	260	135	280	172	280	212	299	*	319	*	319	*	338	*	358	*	358
22'	127	170	183	217	203	234	203	234	217	250	232	267	232	267	246	283	260	300	260	300
	55	170	79	236	105	254	134	254	166	272	201	290	*	290	*	307	*	326	*	326
24'	100	133	144	192	186	214	186	214	199	229	212	244	212	244	225	259	239	275	239	275
	43	133	62	192	83	233	106	233	132	249	161	266	191	266	*	282	*	298	*	298
26'	79	106	115	154	155	198	172	198	184	211	196	226	196	226	208	239	220	253	220	253
	34	106	50	154	66	207	86	215	107	230	130	245	156	245	183	260	212	275	*	275
28'		86	93	125	126	168	160	184	171	196	182	209	182	209	193	222	205	235	205	235
		86	40	125	54	168	70	200	87	213	107	228	128	228	151	241	175	256	202	256
30'		70	77	102	104	138	134	171	159	183	170	195	170	195	180	207	191	220	191	220
		70	33	102	44	138	58	179	72	199	88	212	106	212	126	225	146	239	169	239
32'		58		85	86	115	112	150	141	170	159	183	159	183	169	194	179	206	179	206
		58		85	37	115	48	150	60	185	74	199	89	199	105	211	123	224	142	224
34'		49		71	72	97	94	126	119	150	144	165	150	172	159	183	168	194	168	194
		49		71	31	97	40	126	51	159	63	180	75	187	89	199	105	211	121	211
36'		41		60		82	80	107	101	134	125	148	140	161	150	173	159	183	159	183
		41		60		82	34	107	43	135	53	160	64	175	76	188	89	199	103	199
38'		35		52		70	69	92	87	116	107	132	126	144	136	157	146	168	151	173
		35		52		70	29	92	37	116	46	143	55	157	66	170	77	183	89	188
40'		30		44		60		79	75	100	93	119	112	130	123	141	132	152	141	163
		30		44		60		79	32	100	39	124	48	142	57	154	67	165	77	177
42'				38		52		69	65	87	80	107	98	118	111	128	120	138	128	148
				38		52		69	28	87	34	107	42	128	49	139	58	150	68	160

* Indicates total load (TL) value controls.

▪ Green numbers refer to 115% total load (TL).

See Load Table Instructions and General Notes on page 6

LOAD TABLES

TJI® HS90 Allowable Uniform Load (PLF)

Span	Depth																	
	16"		18"		20"		22"		24"		26"		28"		30"		32"	
	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL	100% TL / 100% LL	115% TL / 125% TL
24'	232 / 108	267 / 290	251 / 139	289 / 314	270 / 173	311 / 338	289 / 210	333 / 361	291 / 250	335 / 364	291 / *	335 / 364	291 / *	335 / 364	291 / *	335 / 364	291 / *	335 / 364
26'	205 / 87	246 / 268	232 / 112	267 / 290	250 / 140	287 / 312	267 / 171	307 / 334	269 / 204	309 / 336	269 / 240	309 / 336	269 / *	309 / 336	269 / *	309 / 336	269 / *	309 / 336
28'	167 / 71	223 / 223	215 / 92	248 / 269	232 / 115	266 / 290	248 / 141	285 / 310	250 / 168	287 / 312	250 / 198	287 / 312	250 / 230	287 / 312	250 / *	287 / 312	250 / *	287 / 312
30'	138 / 58	184 / 184	180 / 76	231 / 240	216 / 95	249 / 270	231 / 117	266 / 289	233 / 140	268 / 291	233 / 166	268 / 291	233 / 193	268 / 291	233 / 222	268 / 291	233 / *	268 / 291
32'	115 / 49	153 / 153	150 / 63	200 / 200	190 / 80	233 / 253	217 / 98	249 / 271	218 / 118	251 / 273	218 / 140	251 / 273	218 / 163	251 / 273	218 / 188	251 / 273	218 / 214	251 / 273
34'	97 / 41	129 / 129	127 / 53	169 / 169	160 / 67	214 / 214	198 / 83	235 / 255	205 / 100	236 / 257	205 / 119	236 / 257	205 / 139	236 / 257	205 / 160	236 / 257	205 / 183	236 / 257
36'	82 / 35	110 / 110	108 / 45	144 / 144	137 / 58	182 / 182	169 / 71	222 / 225	194 / 86	223 / 243	194 / 102	223 / 243	194 / 119	223 / 243	194 / 138	223 / 243	194 / 157	223 / 243
38'	70 / 30	94 / 94	92 / 39	123 / 123	117 / 49	157 / 157	145 / 61	194 / 194	176 / 74	211 / 230	184 / 88	211 / 230	184 / 103	211 / 230	184 / 119	211 / 230	184 / 136	211 / 230
40'	/ 81	81 / 81	80 / 34	106 / 106	101 / 43	135 / 135	126 / 53	168 / 168	152 / 64	199 / 203	175 / 76	201 / 218	175 / 89	201 / 218	175 / 103	201 / 218	175 / 119	201 / 218
42'	70 / 70	69 / 29	93 / 93	88 / 37	118 / 118	109 / 46	146 / 146	133 / 56	177 / 177	158 / 66	191 / 208	166 / 78	191 / 208	166 / 90	191 / 208	166 / 104	191 / 208	
44'	61 / 61	81 / 81	77 / 32	103 / 103	96 / 40	128 / 128	116 / 49	155 / 155	139 / 58	179 / 185	159 / 68	182 / 198	159 / 80	182 / 198	159 / 91	182 / 198		
46'	54 / 54	71 / 71	68 / 28	91 / 91	84 / 35	113 / 113	103 / 43	137 / 137	123 / 51	163 / 164	144 / 60	175 / 190	152 / 70	175 / 190	152 / 81	175 / 190		
48'	48 / 48	63 / 63	80 / 80	75 / 31	100 / 100	91 / 38	121 / 121	109 / 45	145 / 145	128 / 54	162 / 171	145 / 62	167 / 182	145 / 72	167 / 182			
50'	42 / 42	56 / 56	71 / 71	66 / 28	89 / 89	81 / 34	108 / 108	97 / 40	129 / 129	114 / 48	149 / 152	133 / 56	160 / 174	140 / 64	161 / 175			

* Indicates that total load (TL) value controls.

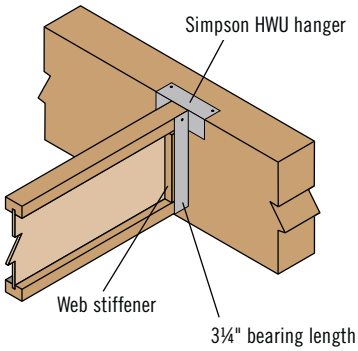
- Green numbers refer to 115% total load (TL).

See Load Table Instructions and General Notes on page 6

8' ON-CENTER ROOF SPAN TABLE

TJI® HS90 Joist 8' On-Center Roof Span

Joist Depth	12 PSF Dead Load	14 PSF Dead Load	16 PSF Dead Load
16"	***28'-3"***	***27'-7"***	***26'-11"***
18"	***31'-0"***	***30'-3"***	***29'-7"***
20"	***33'-9"***	***32'-11"***	***32'-0"***
22"	***36'-4"***	35'-6"	34'-3"
24"	38'-11"	38'-0"	36'-6"
26"	41'-4"	39'-11"	38'-8"
28"	42'-11"	41'-5"	40'-2"
30"	44'-5"	42'-11"	41'-7"
32"	45'-10"	44'-4"	42'-11"



General Notes

- Table assumes uniformly loaded, simple-span joists.
- Roof live load is 20 psf for spans less than 25', and 16 psf for spans 25' and greater.
- TJI® joists are spaced at 8' on-center.
- Spans are limited by total load deflection of L/180.
- Span is defined as horizontal clear distance between supports. Spans reflect 125% duration of load adjustment.
- Roof is assumed to be sloped ¼" per foot.
- Reaction based on 3¼" minimum bearing length and web stiffeners. See web stiffener information on page 16. HWU (Simpson) hanger required unless noted otherwise.
- ***Bold italic*** numbers indicate a 3" required bearing length, and a WPU (Simpson) hanger may be substituted.
- Fill all nail holes in hanger. Use 10d (3") common nails into joists and 16d (3½") common nails into header.

Legacy Literature
See Note on Front Cover

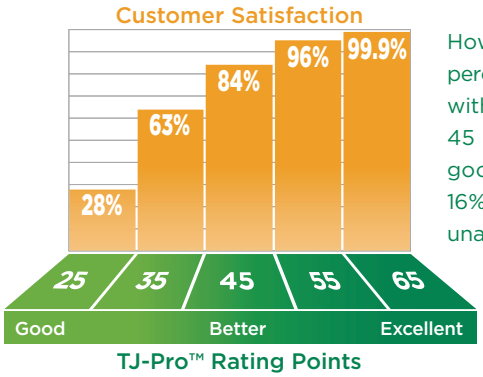
It's About Choice—

iLevel® Trus Joist® TJ-Pro™ Ratings are generated by a sophisticated computer model for predicting floor performance and evaluating the relationship between the cost and the "feel" of any given floor system. The methodology is based on extensive laboratory research, more than one million installations, and the combined expertise of some of the best engineers in the field. TJ-Pro™ Ratings go beyond deflection criteria to consider job-specific needs and expectations. In many cases, using TJ-Pro™ Ratings will offer systems that improve performance while actually reducing costs!

TJ-Pro™ Rating Advantages

- Works as part of iLevel® Trus Joist® TJ-Beam® and TJ-Xpert® software
- Provides a new method for accurately predicting floor performance
- Takes perceptions of the occupant into account
- Provides cost comparison

Perceived Floor Performance



How do most people perceive a floor assembly with a TJ-Pro™ Rating of 45 points? 84% find it good to excellent and 16% find it marginal to unacceptable.

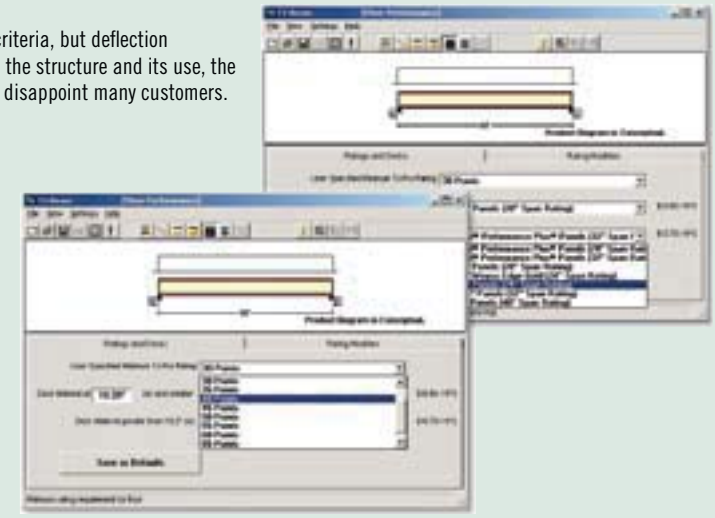
Design Smarter—Don't Over-Specify

The traditional way to specify a floor system is to use live load deflection criteria, but deflection explains only part of how a floor performs. Depending on factors unique to the structure and its use, the code minimum of L/360 (or even the more restrictive limits of L/480) may disappoint many customers.

TJ-Pro™ Ratings are a much better predictor of floor performance because they consider the many factors that affect floor performance, even taking into account the perceptions of the occupant. With so many variables, you can deliver an economical solution tailored to your customer's expectations.

Factors That Affect Floor Performance

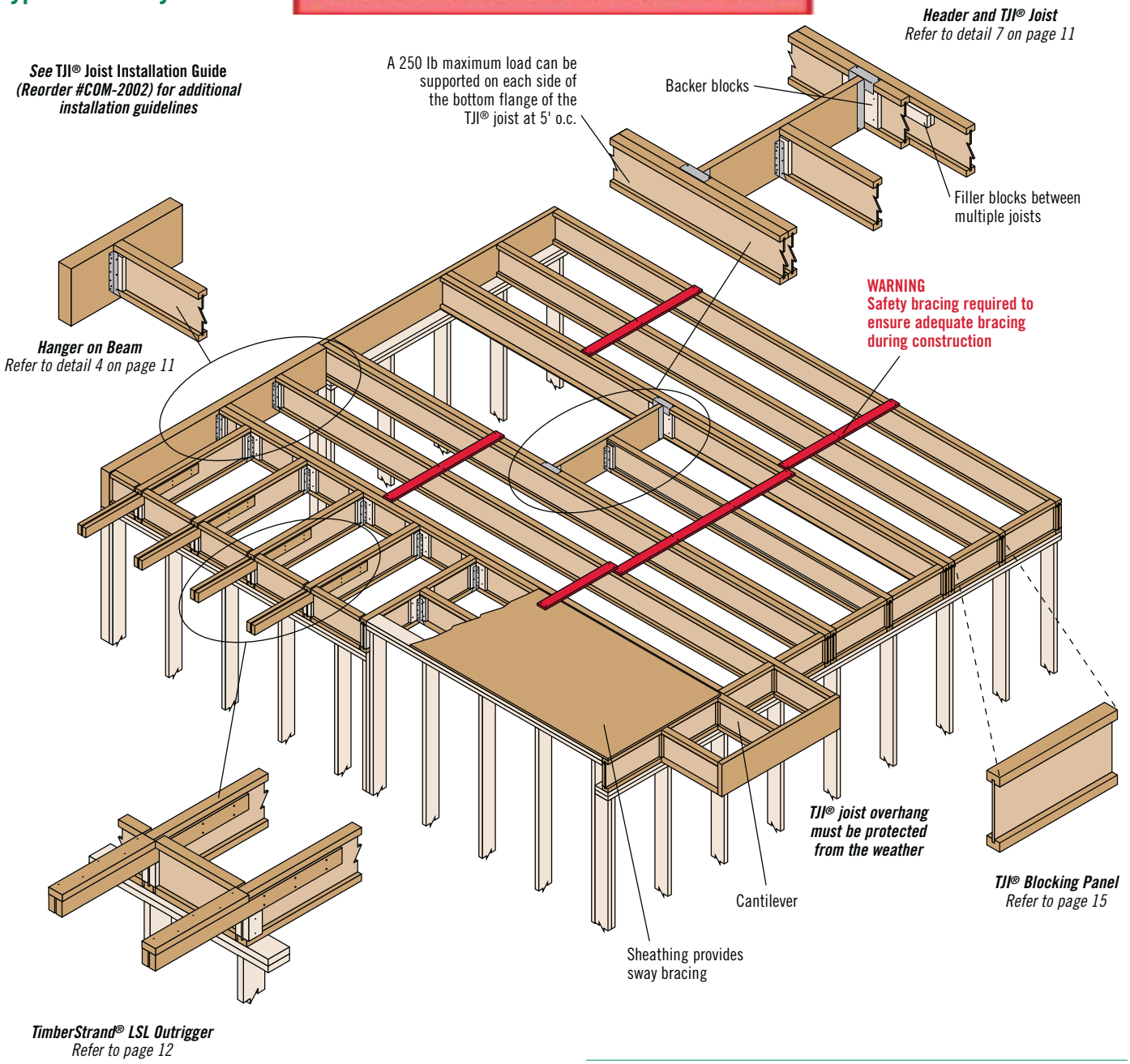
- TJI® joist series, depth, and spacing
- Deck thickness and quality
- Directly applied ceilings
- Location of partitions on floor
- Blocking
- Bearing conditions for the TJI® joists



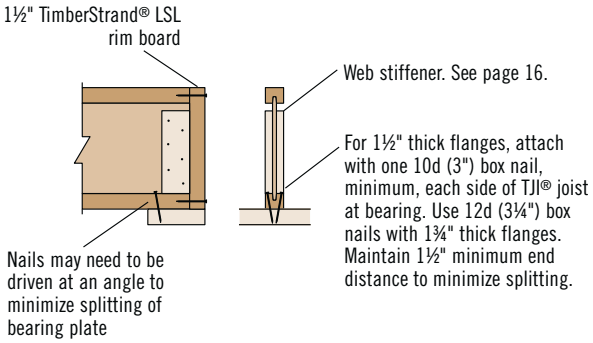
Get the Support You Need—

We're here to help you make the most of TJ-Pro™ Ratings, whether it's help with setup, tips and tricks, or selecting the best rating for your project. Call your iLevel Trus Joist® Commercial representative today.

Typical Floor System



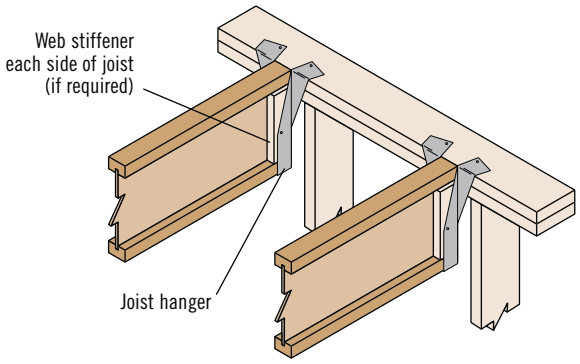
1 Nailing TJI® Joist to Bearing Plate



General Notes

- Details shown on pages 10–14 are conceptual. Attachments and connections shall be made to the supporting structure in accordance with the specific design requirements.
- TimberStrand® LSL rim board or TJI® blocking panels (or an equivalent alternative) must always be used to prevent rollover and to provide structural attachment of the deck sheathing to the supporting structure in accordance with the specific design requirements.

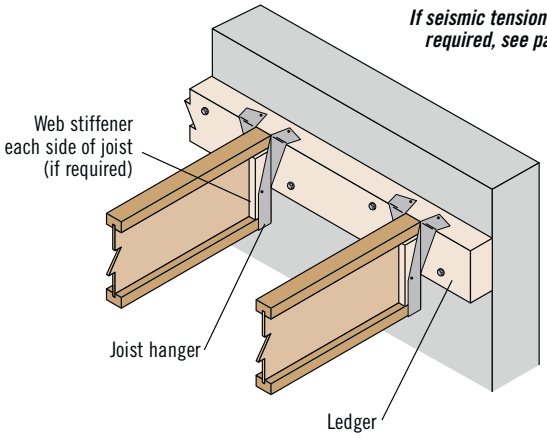
2 Hanger on Stud Wall



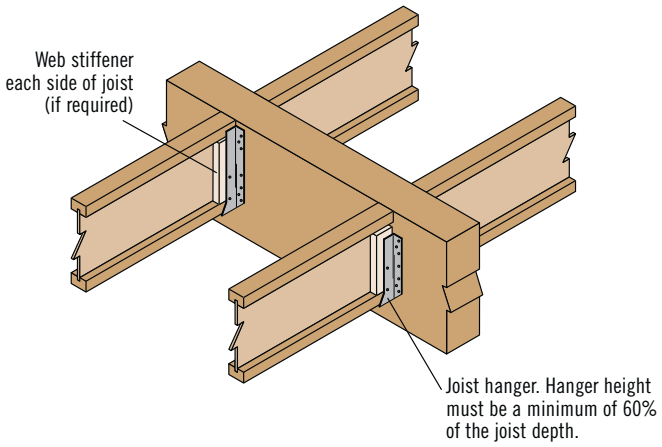
The potential for top plate rotation may reduce hanger capacities. Contact iLevel Trus Joist® Commercial for assistance.

3 Hanger on Ledger

If seismic tension ties are required, see page 18

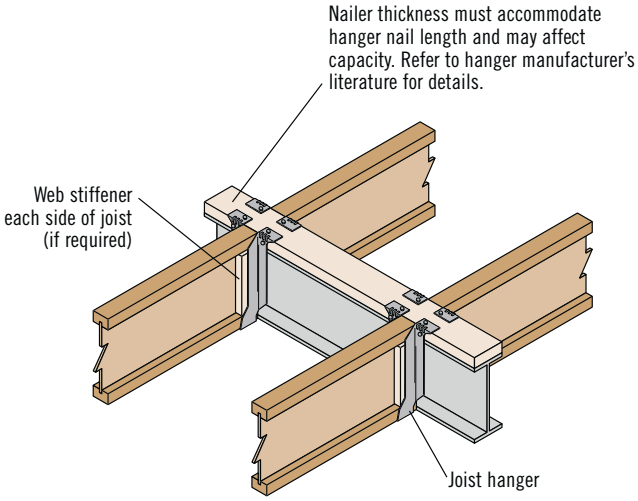


4 Hanger on Beam



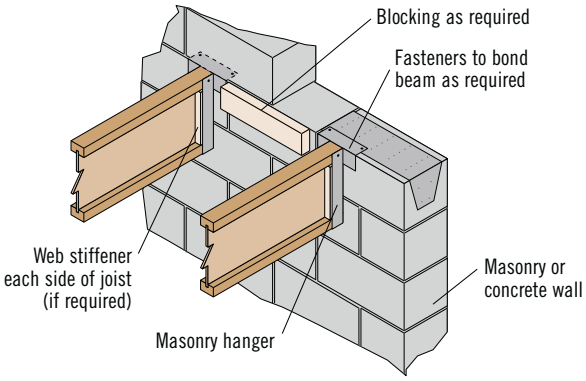
Web stiffeners are required if the sides of the hanger do not laterally support at least ⅛" of the TJI® joist top flange

5 Hanger on Steel Beam



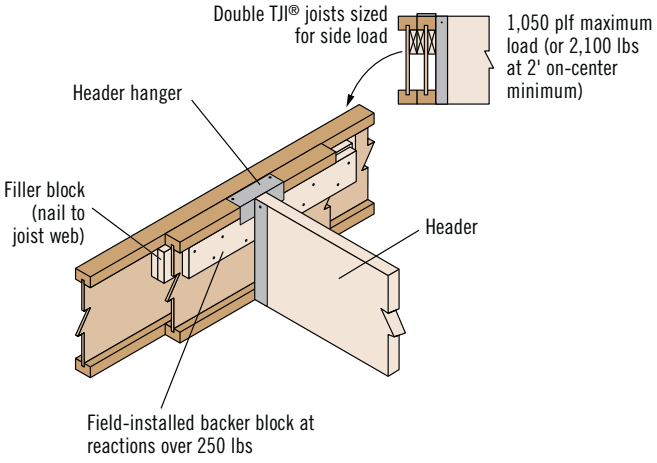
6 Hanger on Masonry Wall

If seismic tension ties are required, see page 18



Traditional masonry hangers will not support construction loads without a minimum amount of cured masonry construction above hanger level. Refer to hanger manufacturer's literature for information on the correct installation and use of masonry hangers.

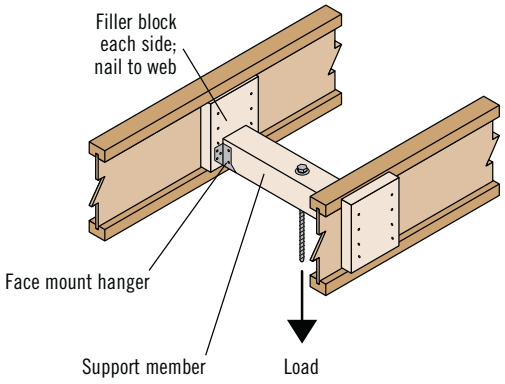
7 Side-Loaded Double Joist



When supported by a TJI® joist, maximum hanger capacity is approximately 2,000 lbs. Refer to hanger manufacturer's literature for details.

FLOOR DETAILS

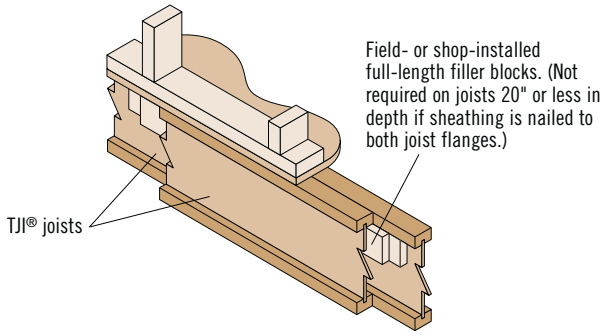
8 Support Detail



A 250 lb maximum load can be supported on each side of the TJI® joist bottom flange at 5' on-center, provided the load is included in normal design loads. Use this detail for loads exceeding these limits.

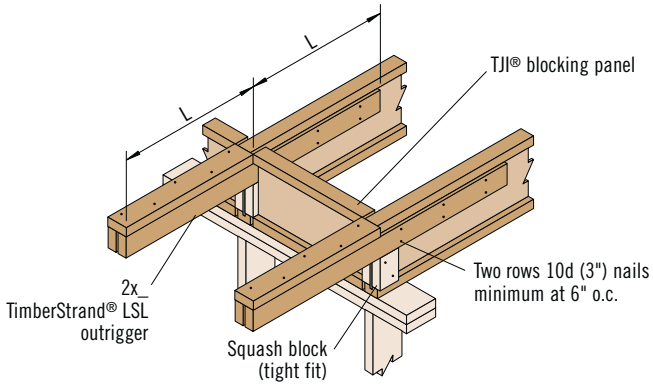
For additional information on supporting sprinkler systems, see the **Sprinkler System Installation Guide (Reorder #COM-1000).**

9 Top-Loaded Double Joist



OUTRIGGERS

10 TimberStrand® LSL Outrigger



Single or double outrigger can be used, depending upon load. See table and notes for capacity.

TimberStrand® LSL outriggers and TJI® joists are intended for dry-use applications

TimberStrand® LSL Double 2x_ Outrigger Capacities

Outrigger Length L	Allowable Uniform Loads (plf)								
	1.3E Grade						1.5E Grade		
	Two 2x4			Two 2x6			Two 2x8		
	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof
24"	393	452	***491***	393	452	***491***	393	452	***491***
30"	258	***358***	***389***	384	442	463(1)	384	442	463(1)
36"	149	239	239	378	386(1)	386(1)	378	386(1)	386(1)
42"	94	150	150	330(1)	330(1)	330(1)	330(1)	330(1)	330(1)
48"	63	101	101	244	289(1)	289(1)	289(1)	289(1)	289(1)
54"	44	71	71	172	257(1)	257(1)	257(1)	257(1)	257(1)
60"	32	52	52	125	200	200	231(1)	231(1)	231(1)
66"				94	150	150	210(1)	210(1)	210(1)
72"				72	116	116	191	193(1)	193(1)
78"				57	91	91	151	178(1)	178(1)
84"				46	73	73	121	165(1)	165(1)
90"				37	59	59	98	154(1)	154(1)
96"							81	129	129

(1) Values are limited by plate bearing stress, assuming a 3½" wide SPF plate ($F_{c\perp}$ = 425 psi). Other conditions may apply. Plate bearing stress shall not be increased for duration of load.

- ***Bold italic*** values may be increased 4% for repetitive-member use if three or more adjacent members are joined by load distributing elements and are spaced no more than 24" on-center.
- Single 2x_ outriggers are permitted with TJI® joists; use half of the allowable load shown for double outriggers.

Table is based on:

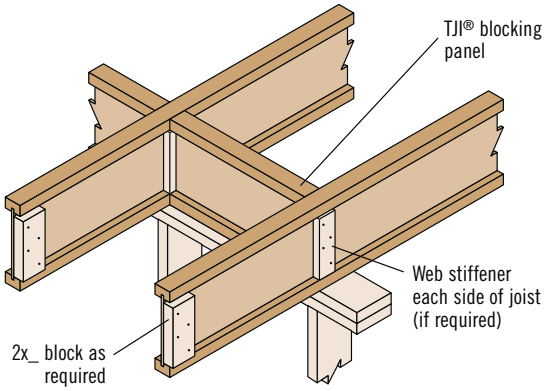
1.3E Grade	1.5E Grade
F_v = 400 psi	F_v = 400 psi
F_b = 1,700 psi(1)	F_b = 2,250 psi(1)
E = 1.3 x 10^6 psi	E = 1.5 x 10^6 psi

(1) For 12" depth. For other depths, multiply by $\left[\frac{12}{d}\right]^{0.092}$

Cantilever Deflection $\left(\frac{WL^4}{8EI}\right)$**:**

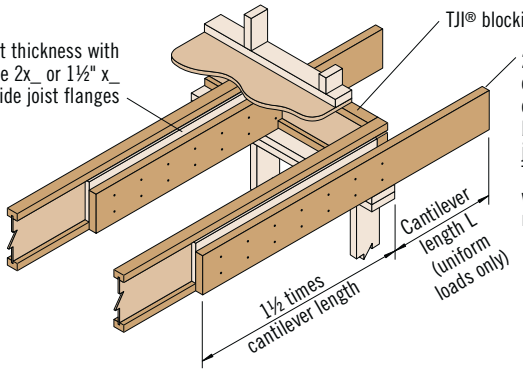
- 2L/480 at floor live load (live load = 0.80 x total load)
- 2L/240 at roof total load

11 TJI® Joist Cantilever



TJI® joists are intended for dry-use applications

12 TimberStrand® LSL Cantilever



TimberStrand® LSL cantilevers and TJI® joists are intended for dry-use applications

TimberStrand® LSL Single 2x_ Cantilever Capacities

Cantilever Length L	Allowable Uniform Loads (plf)														
	1.3E Grade						1.5E Grade								
	2x4			2x6			2x8			2x10			2x12		
	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof
24"	***243***	***279***	***304***	393	452	***491***	393	452	***491***	393	452	***491***	393	452	***491***
30"	129	***179***	***194***	***368***	***424***	***460***	384	442	463(1)	384	442	463(1)	384	442	463(1)
36"	75	119	119	***256***	***294***	***320***	378	386(1)	386(1)	378	386(1)	386(1)	378	386(1)	386(1)
42"	47	75	75	182	***216***	***235***	330(1)	330(1)	330(1)	330(1)	330(1)	330(1)	330(1)	330(1)	330(1)
48"	31	50	50	122	***165***	***180***	289(1)	289(1)	289(1)	289(1)	289(1)	289(1)	289(1)	289(1)	289(1)
54"	22	35	35	86	***131***	137	227	257(1)	257(1)	257(1)	257(1)	257(1)	257(1)	257(1)	257(1)
60"	16	26	26	63	100	100	165	231(1)	231(1)	231(1)	231(1)	231(1)	231(1)	231(1)	231(1)
66"				47	75	75	124	***196***	199	210(1)	210(1)	210(1)	210(1)	210(1)	210(1)
72"				36	58	58	96	153	153	193(1)	193(1)	193(1)	193(1)	193(1)	193(1)
78"				28	46	46	75	120	120	156	178(1)	178(1)	178(1)	178(1)	178(1)
84"				23	36	36	60	96	96	125	165(1)	165(1)	165(1)	165(1)	165(1)
90"				19	30	30	49	78	78	102	154(1)	154(1)	154(1)	154(1)	154(1)
96"							40	65	65	84	134	134	145(1)	145(1)	145(1)

(1) Values are limited by plate bearing stress assuming a 3½" wide SPF plate ($F_{c\perp}$ = 425 psi). Other conditions may apply. Plate bearing stress shall not be increased for duration of load.

- ***Bold italic*** values may be increased 4% for repetitive-member use if three or more adjacent members are joined by load distributing elements and are spaced no more than 24" on-center.
- Double 2x_ cantilevers are permitted with TJI® joists; contact your iLevel Trus Joist® Commercial representative for sizing and nailing information.

Table is based on:

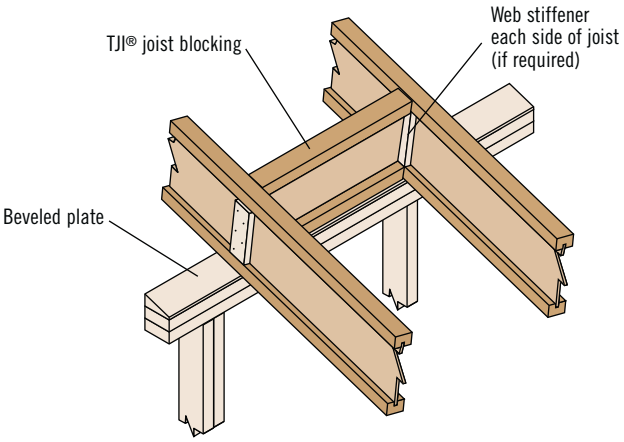
1.3E Grade	1.5E Grade
F_v = 400 psi	F_v = 400 psi
F_b = 1,700 psi(1)	F_b = 2,250 psi(1)
E = 1.3 x 10^6 psi	E = 1.5 x 10^6 psi

(1) For 12" depth. For other depths, multiply by $\left[\frac{12}{d}\right]^{0.092}$

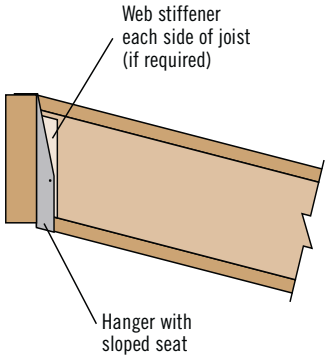
Cantilever Deflection $\left(\frac{WL^4}{8EI}\right)$**:**

- 2L/480 at floor live load (live load = 0.80 x total load)
- 2L/240 at roof total load

13 Slope Detail

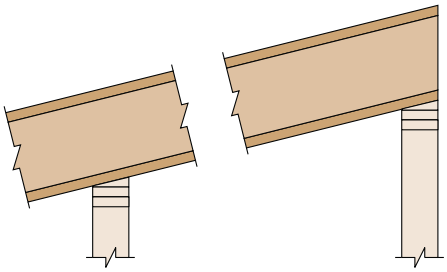


14 Slope Detail at High End



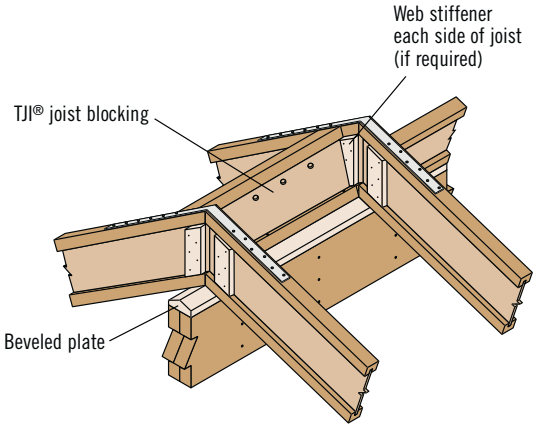
Sloped seat hangers required when slope exceeds ½" in 12". Hanger manufacturers may require sloped seat hangers at lesser slopes.

15 Beveled Plate Requirements



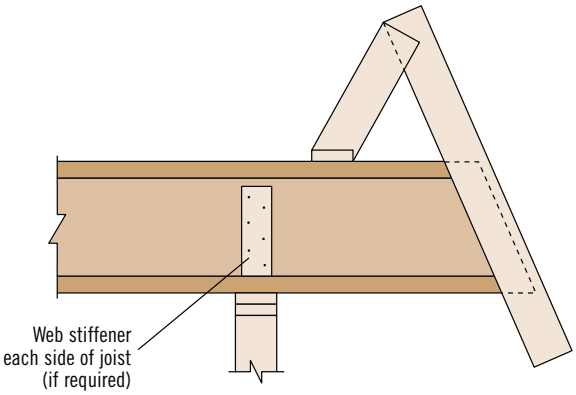
Required Bearing Length	Maximum Slope Without Beveled Plate
1¾"	½" in 12"
3½"	¼" in 12"
5½"	⅛" in 12"

16 Ridge Detail

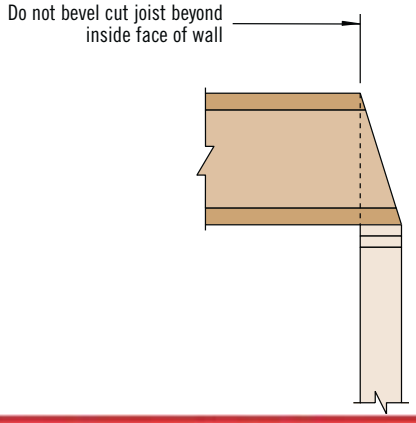


A strap and alternating blocking panels, or two rows of blocking panels, are required for lateral stability.

17 Cantilever with Mansard Framing

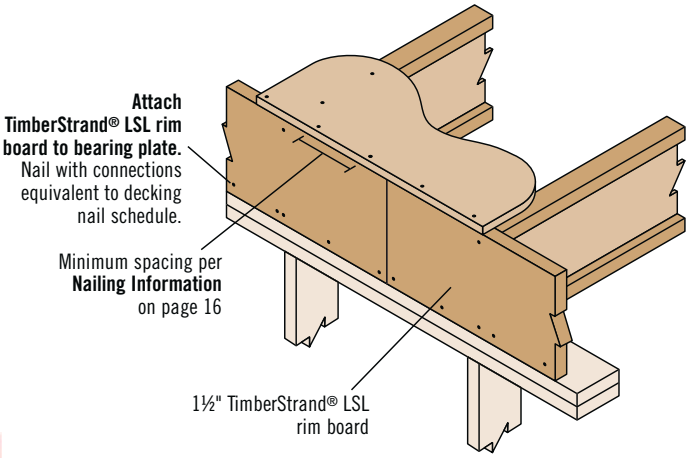


18 Bevel Cut or Fire Cut



TimberStrand® LSL rim board (up to 24" in depth) is available from iLevel Trus Joist® Commercial and may be used for:

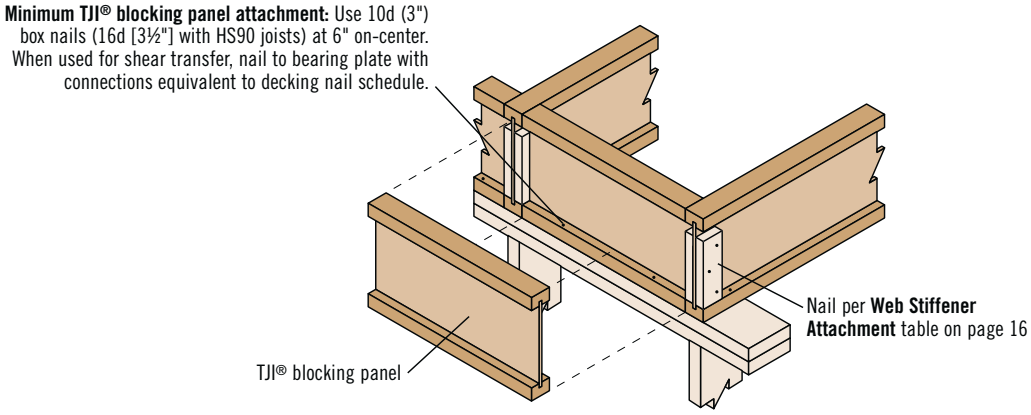
- Shear transfer (nailing must be established by design).
- Vertical load transfer.
- General closure.
- Helping to prevent rollover during joist installation.



Vertical load transfer

When used for vertical load transfer, the allowable load for 1½" TimberStrand® LSL rim board is 4,140 lbs. Load may not be increased for duration of load.

TJI® BLOCKING PANELS



TJI® blocking panels are available from iLevel Trus Joist® Commercial and may be used for:

- Shear transfer. Shear transfer capacity is 1,925 lbs per linear foot for TJI® L65, L90, and H90 joists; 2,320 lbs for HS90 joists. Nailing must be established by design.
- Vertical load transfer.
- General closure.
- Helping to prevent rollover during joist installation.

When TJI® blocking panels are used for vertical load transfer, the following values may be used:

Allowable Uniform Vertical Load Transfer (PLF)

TJI® Joist Series	TJI® Blocking Panel Depth						
	11⅞"–14"	16"–20"	22"	24"	26"	28"	30"
L65 and L90	2,700	2,700	2,400	2,100	1,750	1,450	1,150
H90	3,150	2,700	2,400	2,100	1,750	1,450	1,150
HS90	3,150	2,700	2,400	2,100	1,750	1,450	1,150

- Loads are for TJI® blocking panels or TJI® joists as rim board.
- Loads shown may not be increased for duration of load.

Concentrated vertical loads

The allowable concentrated vertical loads on TJI® blocking panels or rim joist can be determined by using the equation provided below. Loads exceeding the calculated value should be supported by squash blocks.

$$P_{allow} = W_{allow} \left[\frac{L_c + 2t_s + 2t_f}{12} \right]$$

Where:

P_{allow} = Allowable concentrated vertical load (lbs)

W_{allow} = Allowable uniform vertical load for blocking panel (plf)

L_c = Bearing length of column on blocking panel (in.)

t_s = Sheathing thickness (in.)

t_f = Effective flange thickness: ⅞" for TJI® L65 and TJI® L90, 1⅛" for TJI® H90, and 1¼" for TJI® HS90

Example:

4x4 post applied to 20" TJI® L65 joist through $^{23}/_{32}$" sheathing.

$$P_{allow} = 2{,}700 \left[\frac{3.5 + 2(^{23}/_{32}) + 2(^{7}/_{8})}{12} \right] = 1{,}505 \text{ lbs}$$

WEB STIFFENERS

The Importance of Web Stiffeners

Web stiffeners are available from iLevel Trus Joist® Commercial in precut sizes and can be installed at the plant on one or both ends upon request. Web stiffeners are an important part of almost all TJI® joist installations because they will:

- Stiffen the TJI® joist web material and prevent buckling.
- Minimize the bearing length required for the TJI® joist.
- Help transfer reaction loads into the TJI® joist web.
- Provide stabilization in hangers.

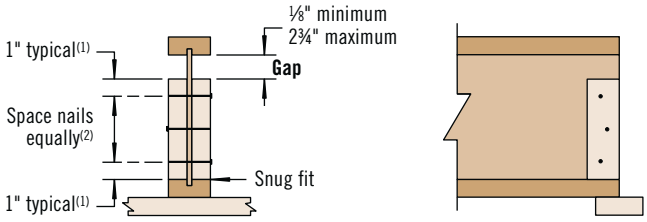
To Ensure System Performance

- Web stiffeners must be installed at bearing points as shown in the details below and at points of concentrated loads exceeding 1,500 lbs.
- Web stiffeners are required on joists 20" and greater in depth.
- Web stiffeners are available from iLevel Trus Joist® Commercial and typically have the maximum gap shown below. Verify that hanger nails adequately engage the web stiffener.
- Gap must be at top for all bearing conditions. For concentrated loads, the gap must be at the bottom (see details below).

Web Stiffener Attachment

Nail Quantities

Joist Depth	TJI® L65	TJI® L90 and TJI® H90		TJI® HS90
	8d (2½") Nails	16d (3½") Nails		16d (3½") Nails
	End or Intermediate	End	Intermediate	End or Intermediate
11⅞"	3	3	3	4
14"	5	3	3	6
16"	6	4	4	6
18"	7	4	4	8
20"	8	5	5	10
22"	9	6	11	10
24"	10	6	13	12
26"	11	7	14	14
28"	12	8	15	14
30"	13	8	17	16
32"	–	–	–	18



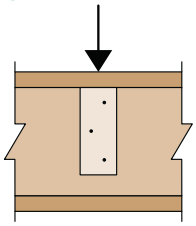
(1) 1½" (typical) with 2x4 solid sawn lumber web stiffeners.
(2) Nails may be driven from one side only.

Web Stiffener Size and Material

Flange Width	Web Stiffener Size	Web Stiffener Material
2½"	1" x 2⅝"	Sheathing (with face grain vertical) that meets the requirements of PS1 or PS2
3½"	2x4	Construction grade or better

Concentrated Load (No Bearing Wall Below)

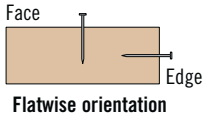
If concentrated loads from above exceed 1,500 lbs, install web stiffeners tight to TJI® joist top flange. See tables at left for nailing and material requirements.



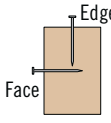
NAILING INFORMATION

Minimum Nail Spacing

Nail Type		Nail Size	TimberStrand® LSL			Microllam® LVL			Sawn Lumber	
			Face	Edge		Face	Edge		Face	Edge
				Joist Flange	Rim Board, Header, Beam		Joist Flange	Rim Board, Header, Beam		
8d(1)	Box	0.113" x 2½"	1½"	4"	3"	2"	4"	3"	4"	2"
	Common	0.131" x 2½"	1½"	6"	3"	2"	6"	3"	6"	2"
10d	Box	0.128" x 3"	1½"	6"	3"	2"	6"	3"	6"	2"
	Common	0.148" x 3"	1½"	6"	4"	3"	6"	4"	6"	2½"
12d	Box	0.128" x 3¼"	1½"	6"	3"	2"	6"	3"	6"	2"
	Common	0.148" x 3¼"	1½"	6"	4"	3"	6"	4"	6"	2½"
16d	Box	0.135" x 3½"	1½"	6"	4"	3"	6"	4"	6"	2½"
	Sinker	0.148" x 3¼"	1½"	6"	4"	3"	6"	4"	6"	2½"
	Common	0.162" x 3½"	1¾"	8"	6"	4"	8"	6"	8"	4"



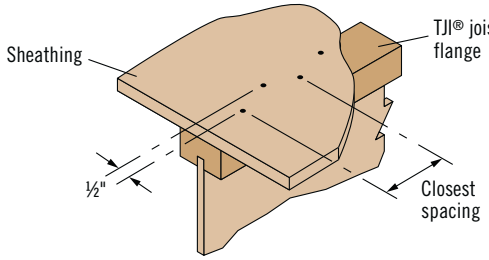
Flatwise orientation
(typical with TJI® joists and plywood edge blocking)



Edgewise orientation
(typical with rim board, beams, and headers)

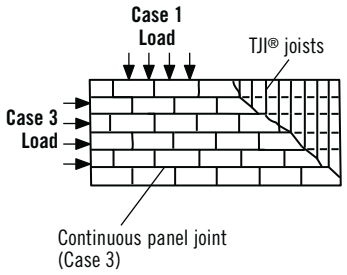
(1) 14 gauge staples may be a direct substitute for 8d nails if a minimum penetration of 1" into the flange is maintained.

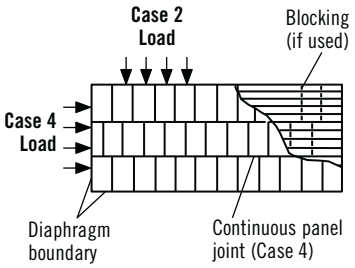
- If more than one row of nails is used, offset rows at least ½" and stagger. Use 10d (3") common nails, maximum, and maintain ⅜" minimum edge distance. **Exception: Wind/Seismic Connections** (page 18) and **High Shear Diaphragm Nailing** (page 17).
- Nailing pattern to be per plans and specifications, and nail spacing should comply with criteria listed on this page.
- For member stability, nail sheathing to the full length of the member (24" on-center, maximum).



Allowable Shear (in PLF) for Horizontal Blocked Diaphragms and 2½" or Wider TJI® Joists

Panel Grade	Minimum Panel Thickness	Flange Width	Rows of 10d Common Nails	Nail spacing per row at diaphragm boundaries and at continuous panel joints for Cases 3 and 4		
				4"	3"	3"
				Nail spacing per row at other panel edges		
				6"	5"	4"
Structural I Sheathing	15/32"	2½", 3½"	1	440	500	590
		2½"	2	640	750	920
		3½"	2	750	870	1,060
		3½"	3	920	1,080	1,330
	19/32"	2½", 3½"	1	490	560	660
		2½"	2	700	820	1,000
		3½"	2	830	960	1,160
		3½"	3	1,000	1,180	1,450
	23/32"	2½", 3½"	1	510	580	690
		2½"	2	750	870	1,070
		3½"	2	870	1,020	1,230
		3½"	3	1,070	1,260	1,550
Other Plywood or Sheathing Grades	15/32"	2½", 3½"	1	360	420	510
		2½"	2	580	690	860
		3½"	2	670	790	980
		3½"	3	860	1,030	1,270
	19/32"	2½", 3½"	1	380	450	550
		2½"	2	630	750	920
		3½"	2	720	850	1,050
		3½"	3	920	1,100	1,370
	23/32"	2½", 3½"	1	420	490	600
		2½"	2	690	820	1,010
		3½"	2	780	930	1,150
		3½"	3	1,010	1,200	1,490





Selected nail spacing must comply with Nailing Information on page 16

General Notes

- References APA Research Report 138.

Assumptions:

- Panels conform to PS1 or PS2.
- Values are for short-term loads due to wind or earthquake.
- Blocking at panel and diaphragm boundaries must meet or exceed the flange width.
- Shear values are based on 24" joist spacing for 15/32" panels, 32" for 19/32" panels, and 48" for 23/32" panels.
- Shear values have been derived from code-recognized methodologies. Any special inspection required should be specified by others.

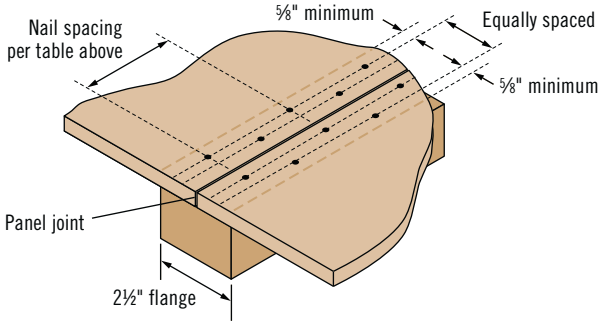
Nailing:

- Values require 1½" penetration of 10d common nails into the member.
- Multiple rows of nails require special inspection. Maintain ⅝" minimum edge distance and approximately ⅜" minimum spacing between rows.
- Number of nail rows applies to boundary nailing, continuous joints, and nailing at other panel edges.

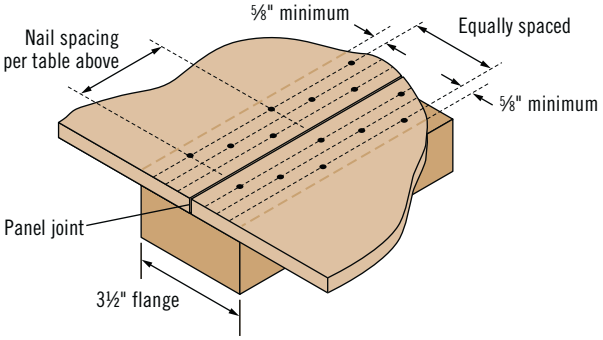
Intermediate framing members:

- Space nails 12" on-center, except when joist spacing is greater than 32", in which case nail spacing should be 6" on-center.

2½" Wide Flanges

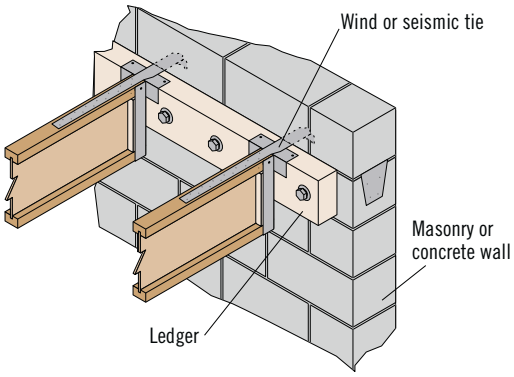


3½" Wide Flanges



iLevel Trus Joist® Commercial structural composite lumber flanges may be used for out-of-plane wall anchorage to flexible diaphragms in lieu of the minimum 2½" wood element thickness specified in Item 5 of Section 1633.2.8.1 of the UBC. iLevel Trus Joist® Commercial has obtained code approval for these types of connections; refer to ICC ES ESR-1153 for information.

19 Wall Tension Tie—With Straps



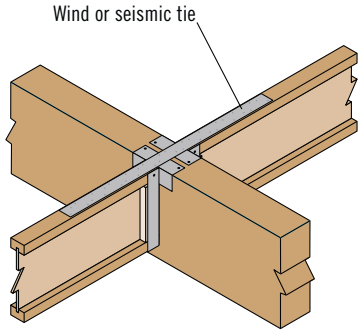
Strap Tension Tie Nailing and Capacities

Simpson Strap Model	Strap Length	10d (1½") Common Nails(1)		Allowable Loads(2) (lbs)			
				Masonry		Concrete	
		Masonry	Concrete	133%	160%	133%	160%
1¾" Microllam® LVL or 3x_ Ledger							
PAI18	18"	8 nails	10 nails	1,000	1,205	1,255	1,505
PAI23	23"	13 nails	15 nails	1,630	1,955	1,880	2,255
PAI28	29"	19 nails	21 nails	2,380	2,815	2,630	3,160
PAI35	35"	24 nails	27 nails	2,815	2,815	3,385	3,685
MPAI32(3)	32"	16 nails	16 nails	1,960	2,355	1,960	2,355
MPAI44(3)	44"	24 nails	24 nails	2,865	2,865	2,865	2,865
LTT20B	20	10 nails	10 nails	1,120	1,120	1,120	1,120
4x_ Ledger							
PAI18	18"	7 nails	9 nails	875	1,055	1,130	1,355
PAI23	23"	12 nails	14 nails	1,505	1,805	1,755	2,105
PAI28	29"	18 nails	20 nails	2,255	2,705	2,505	3,010
PAI35	35"	23 nails	26 nails	2,815	2,815	3,260	3,685
MPAI32(3)	32"	16 nails	16 nails	1,960	2,355	1,960	2,355
MPAI44(3)	44"	24 nails	24 nails	2,865	2,865	2,865	2,865
LTT20B	20	10 nails	10 nails	1,120	1,120	1,120	1,120

(1) 10d (3") nails are permitted with same design values.
(2) Based on adequate connection to the wall.
(3) Requires 3½" wide flanges.

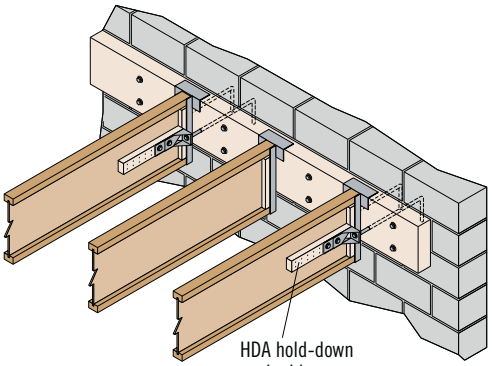
20 Wind or Seismic Tie at Butting Joists

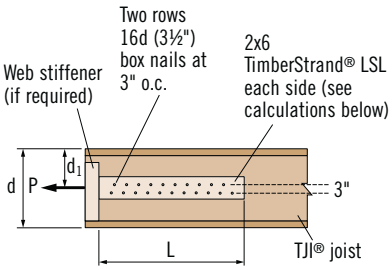
Tension straps must have a minimum nail spacing of 3" on-center per row, with a minimum of ⅜" between rows and maximum nail diameter of 0.148" (10d common).



See strap manufacturer's literature for allowable loads.

21 Wall Tension Tie—HDA Connections





To calculate the length of the TimberStrand® LSL block (to transfer shear to joist flange):

1. Find

$$L_1 = \frac{0.75(P/K)d_1}{C_D V_A - [V_{DL} + (0.75V_{LL})]}$$

2. Find

$$L_2 = \tfrac{3}{2}(n) + 3, \text{ where } n = \frac{P}{V_n C_D}$$

3. Compare L_1 and L_2. Use maximum of the two values for the length of the TimberStrand® LSL block.

C_D = Load duration factor
d_1 = Distance to axial load (in.) from top of joist
L_1, L_2 = Length of block (in.)
K = 1.0 for wind; 1.4 for seismic (accounts for strength-based seismic load)
n = Number of nails
P = Axial load (lbs)
V_A = Allowable shear load (lbs) for TJI® joist (see page 5)
V_{DL} = Shear load due to gravity dead load (lbs)
V_{LL} = Shear load due to gravity live load (lbs)
V_n = Nail shear capacity; see table below

16d Nail Shear Capacity

TJI® Web Thickness	V_n (100%) in lbs
⅜"	164
7/16"	169
½"	175

Fire Assembly Details

For Fire Assemblies and other construction-related fire information, please refer to our *Fire Facts Guide* (Reorder #1500), or visit our website at www.iLevel.com.

Sound Assemblies and Noise Measurement

The ability of a wall or floor/ceiling system to reduce airborne sound transmission is measured using ASTM E90, and reported using the ASTM E413 Sound Transmission Class (STC) rating system. The ratings listed at right, from the Acoustical and Insulation Materials Association, provides practical references for a range of STC numbers. In general, the higher the number, the better the acoustical performance. It is important to note that this table is valid only for a given level of background noise and should be used only for generalized comparisons.

Floor/ceiling systems can also be rated for impact noise transmitted through an assembly. Ratings are determined using the ASTM E492 Impact Insulation Class (IIC) system, and like STC ratings, a high IIC rating indicates significantly reduced impact noise.

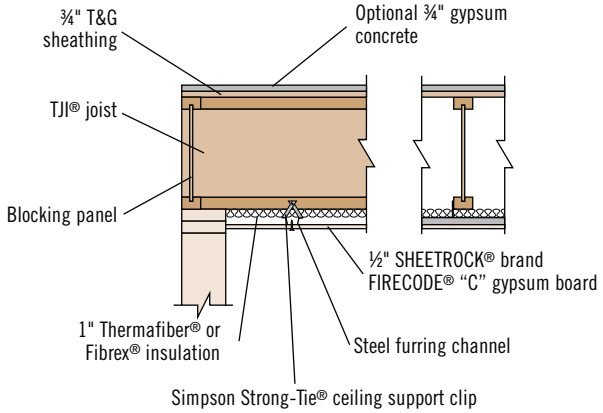
STC Ratings

25	Normal speech can be understood quite clearly
30	Loud speech can be understood fairly well
35	Loud speech audible but not intelligible
42	Loud speech audible as a murmur
45	Must strain to hear loud speech
48	Some loud speech barely audible
50	Loud speech not audible

Testing

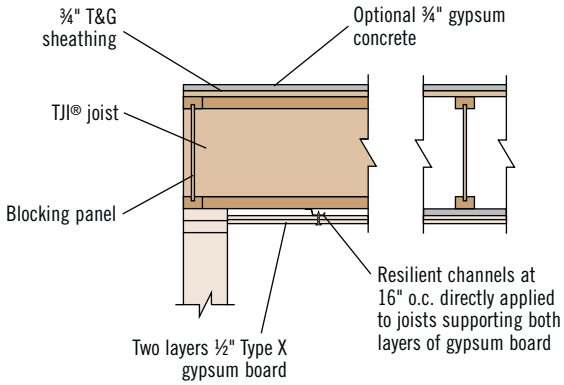
The acoustical assemblies provided below have been tested and rated by recognized acoustical laboratories, and the ratings shown are well within the acceptable range for multi-family buildings. However, in order to achieve these ratings, precautions should be taken to prevent flanking noise and sound leaks, and to ensure that actual construction conforms to the assembly shown.

22



Without Gypsum Concrete	With Gypsum Concrete
STC = 47	STC = 59
Pad and carpet IIC = 54	Pad and carpet IIC = 54
Cushioned vinyl IIC = 43	Cushioned vinyl IIC = 43

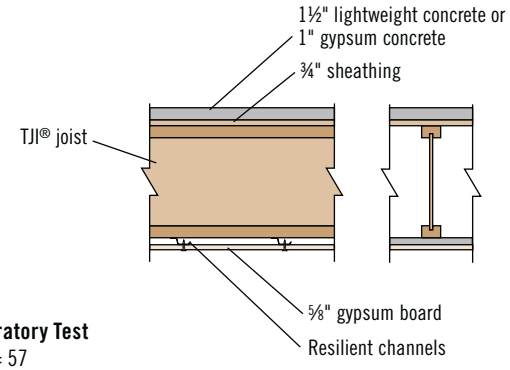
23



Without Gypsum Concrete	With Gypsum Concrete
STC = 50	STC = 58
Pad and carpet IIC = 60	Pad and carpet IIC = 54
Cushioned vinyl IIC = 45	Cushioned vinyl IIC = 46
Granit Acoustiflor® IIC = 51(1)	Granit Acoustiflor® IIC = 54(1)

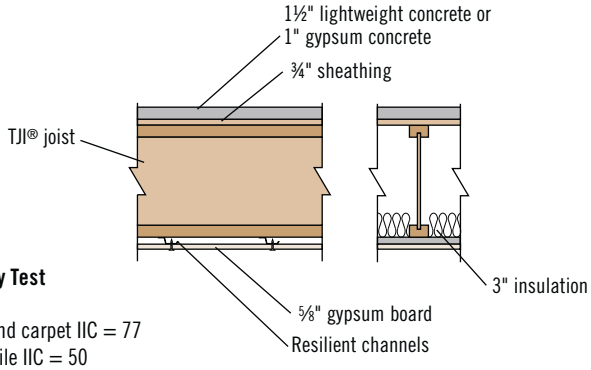
(1) Requires two layers of ⅝" Type X gypsum board with one layer of 3½" thick batt insulation.

24



Laboratory Test
STC = 57
G&H No. USDA-11xST

25



Laboratory Test
STC = 58
With pad and carpet IIC = 77
With vinyl tile IIC = 50
G&H No. USDA-11xST

Granit Acoustiflor® is a registered trademark of Tarkett Sommer. FIRECODE® and SHEETROCK® are registered trademarks of USG Corporation.
Thermafiber® is a registered trademark of Thermafiber, Inc. Fibrex® is a registered trademark of Fibrex® Insulations Inc.

L65, L90, AND H90 ALLOWABLE HOLES

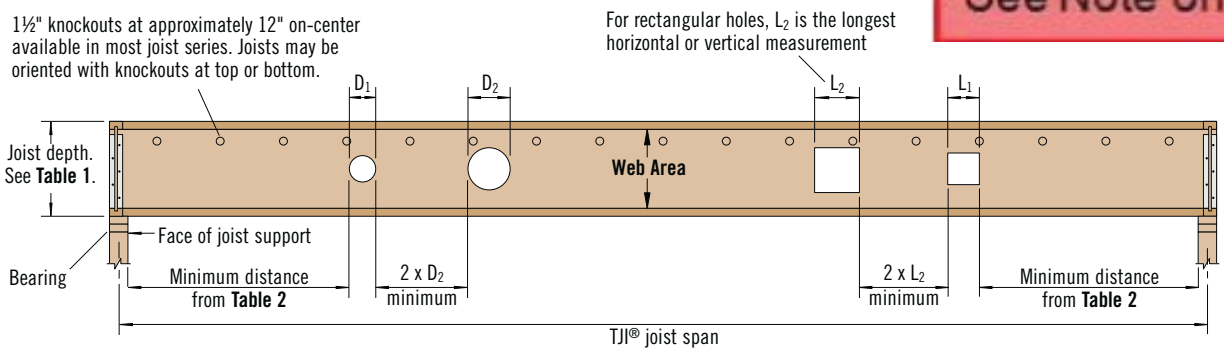


Table 1—Hole Size Factors and Locations

Round Hole Size	Rectangular Hole Size(1)	Joist Depth									
		11⅞"	14"	16"	18"	20"	22"	24"	26"	28"	30" or 32"
2"	1¼"	A	A	A	4"	4"	4"	4"	4"	4"	4"
4"	2¼"	B	B	A	A	A	1'-3"	1'-3"	1'-3"	1'-3"	4"
6"	3½"	E	C	C	B	B	A	A	A	A	1'-3"
8"	4¾"		E	D	C	C	B	B	B	A	A
10"	6"			E	E	D	C	C	B	B	B
12"	7"					E	D	D	C	C	B
14"	8¼"						E	E	D	D	C
16"	9½"							E	E	D	D
18"	10¾"									E	E
20"	12"										E

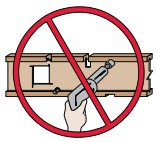
(1) Rectangular holes based on measurement of longest side; sizes given in the table are hole sizes, not duct sizes.

Table 2—Hole Locations

Joist Span	Hole Factor				
	A	B	C	D	E
14'	1'-3"	2'-0"	2'-6"	3'-9"	5'-0"
16'	1'-3"	2'-3"	3'-3"	4'-6"	5'-9"
18'	1'-6"	3'-0"	4'-3"	5'-6"	6'-9"
20'	1'-9"	3'-0"	4'-3"	5'-6"	7'-0"
22'	2'-0"	3'-0"	4'-3"	5'-9"	7'-3"
24'	2'-3"	3'-3"	4'-6"	5'-9"	7'-6"
26'	2'-3"	3'-9"	4'-9"	6'-0"	7'-9"
28'	2'-6"	4'-0"	5'-3"	6'-6"	8'-0"
30'	2'-9"	4'-3"	5'-9"	7'-0"	8'-6"
32'	3'-0"	4'-6"	6'-0"	7'-6"	9'-3"
34'	3'-0"	5'-0"	6'-6"	8'-0"	9'-9"
36'	3'-3"	5'-0"	6'-9"	8'-6"	10'-3"

How to Determine Hole Location

1. Determine the joist depth and desired hole size and find hole factor (letter) or hole location (distance) in **Table 1**. If the table reports a hole factor, proceed to step 2.
2. Refer to **Table 2**. The dimension shown where the joist span and hole factor from **Table 1** intersect is the required minimum distance from nearest edge of hole to inside face of support.



DO NOT cut, drill, or notch flanges

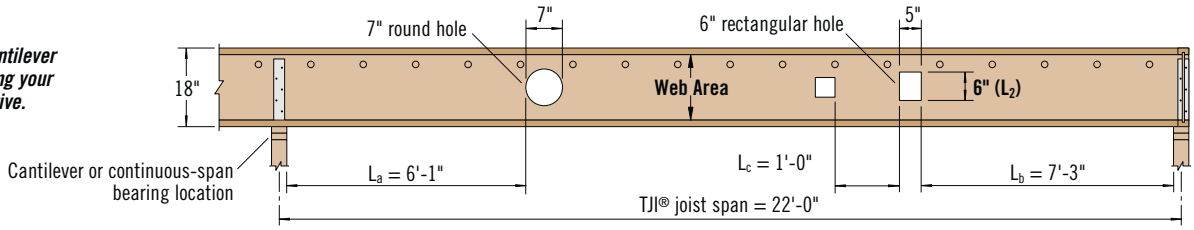
For concentrated loads or other conditions or exceptions, contact your iLevel representative

General Notes

- Tables are based on:
  - Simple spans.
  - More restrictive of either uniform loads or code-required concentrated loads (2,000 lbs over 2½ feet square and over two joists) with 25 psf dead and 20 psf partition load.
- Multiple holes require spacing 2 times the length of the largest hole.
- For joists continuous over a support, add 1" to distance shown in table for each foot of joist span. See **Example** below.
- Holes may be located vertically anywhere in the web. Leave ⅛" of web (minimum) at top and bottom of hole.
- **Do not cut holes in cantilever area without consulting your iLevel representative.**

Example: Find minimum distance from inside face of support to nearest edge of hole.

Do not cut holes in cantilever area without consulting your iLevel representative.



Round holes: For a 7" hole, find L_a:

1. From **Table 1**, round up to 8" hole size, where hole factor is C.
2. From **Table 2**, distance is 4'-3".
3. Joist is continuous over the support nearest the hole, so increase L_a by 1" for each foot of span (22"); L_a = 4'-3" + 22" = 6'-1".

Rectangular holes: For a 6" hole, find L_b and L_c:

1. From **Table 1**, hole factor is E.
2. From **Table 2**, distance L_b is 7'-3". Hole is nearest to an end support, so no distance increase is required.
3. Minimum distance between holes (L_c) = 2 x L_2; L_c = 2x(6") = 1'-0".

HS90 ALLOWABLE HOLES

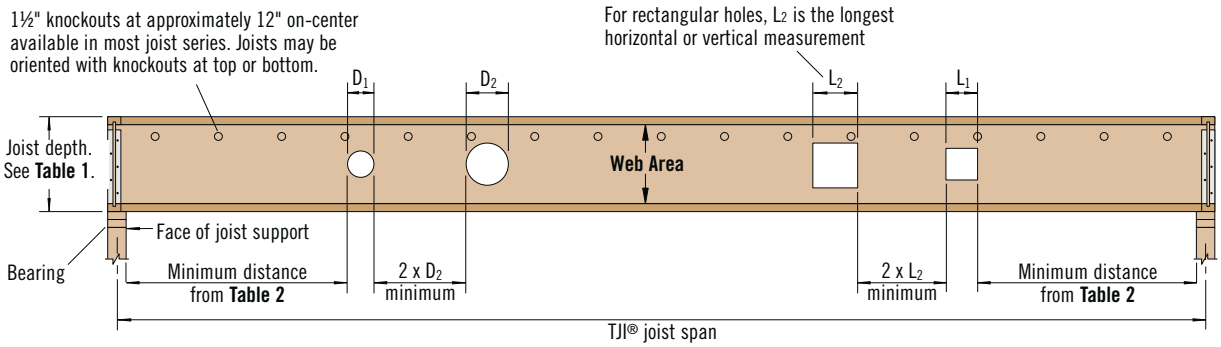


Table 1—Hole Size Factors and Locations

Round Hole Size	Rectangular Hole Size(1)	Joist Depth									
		11⅞"	14"	16"	18"	20"	22"	24"	26"	28"	30" or 32"
2"	1¼"	A	A	A	A	A	4"	4"	4"	4"	4"
4"	2¼"	C	B	A	A	A	1'-3"	1'-3"	1'-3"	1'-3"	4"
6"	3½"		C	C	B	B	A	A	A	A	1'-3"
8"	4¾"			D	C	C	B	B	B	A	A
10"	6"				E	D	C	C	B	B	B
12"	7"					E	D	D	C	C	B
14"	8¼"						E	E	D	D	C
16"	9½"							E	E	D	D
18"	10¾"									E	E
20"	12"										E

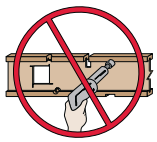
(1) Rectangular holes based on measurement of longest side; sizes given in the table are hole sizes, not duct sizes.

Table 2—Hole Locations

Joist Span	Hole Factor				
	A	B	C	D	E
14'	3'-3"	4'-0"	4'-6"	5'-9"	7'-0"
16'	3'-3"	4'-3"	5'-3"	6'-6"	7'-9"
18'	3'-6"	5'-0"	6'-3"	7'-6"	8'-9"
20'	3'-9"	5'-0"	6'-3"	7'-6"	9'-0"
22'	4'-0"	5'-0"	6'-3"	7'-9"	9'-3"
24'	4'-3"	5'-3"	6'-6"	7'-9"	9'-6"
26'	4'-3"	5'-9"	6'-9"	8'-0"	9'-9"
28'	4'-6"	6'-0"	7'-3"	8'-6"	10'-0"
30'	4'-9"	6'-3"	7'-9"	9'-0"	10'-6"
32'	5'-0"	6'-6"	8'-0"	9'-6"	11'-3"
34'	5'-0"	7'-0"	8'-6"	10'-0"	11'-9"
36'	5'-3"	7'-0"	8'-9"	10'-6"	12'-3"

How to Determine Hole Location

1. Determine the joist depth and desired hole size and find hole factor (letter) or hole location (distance) in **Table 1**. If the table reports a hole factor, proceed to step 2.
2. Refer to **Table 2**. The dimension shown where the joist span and hole factor from **Table 1** intersect is the required minimum distance from nearest edge of hole to inside face of support.



DO NOT cut, drill, or notch flanges

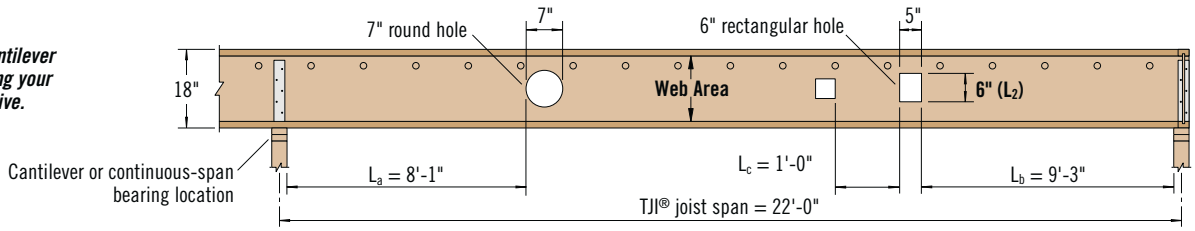
For concentrated loads or other conditions or exceptions, contact your iLevel representative

General Notes

- Tables are based on:
  - Simple spans.
  - More restrictive of either uniform loads or code-required concentrated loads (2,000 lbs over 2½ feet square and over two joists) with 25 psf dead and 20 psf partition load.
- Multiple holes require spacing 2 times the length of the largest hole.
- For joists continuous over a support, add 1" to distance shown in table for each foot of joist span. See **Example** below.
- Holes may be located vertically anywhere in the web. Leave ⅛" of web (minimum) at top and bottom of hole.
- **Do not cut holes in cantilever area without consulting your iLevel representative.**

Do not cut holes in cantilever area without consulting your iLevel representative.

Example: Find minimum distance from inside face of support to nearest edge of hole.



Round holes: For a 7" hole, find L_a:

1. From **Table 1**, round up to 8" hole size, where hole factor is C.
2. From **Table 2**, distance is 6'-3".
3. Joist is continuous over the support nearest the hole, so increase L_a by 1" for each foot of span (22");
   L_a = 6'-3" + 22" = 8'-1".

Rectangular holes: For a 6" hole, find L_b and L_c:

1. From **Table 1**, hole factor is E.
2. From **Table 2**, distance L_b is 9'-3". Hole is nearest to an end support, so no distance increase is required.
3. Minimum distance between holes (L_c) = 2 x L_2; L_c = 2x(6") = 1'-0".

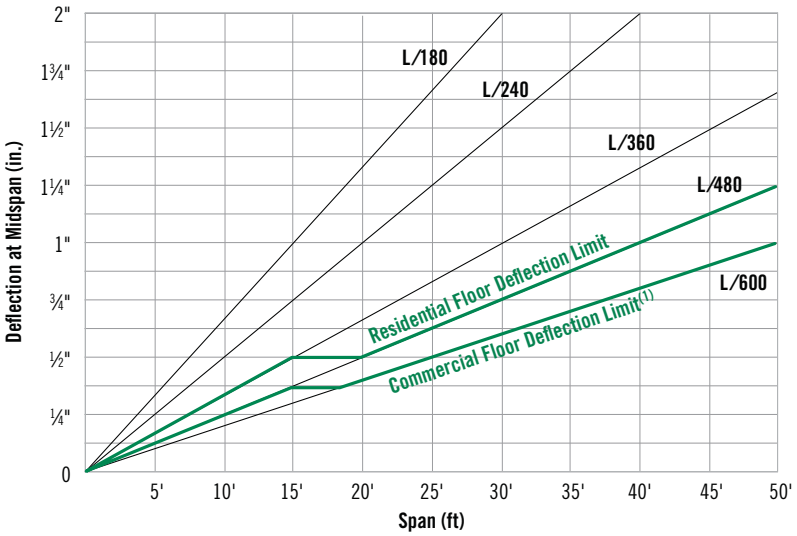
DEFLECTION CRITERIA

iLevel Trus Joist® Commercial Recommended Deflection Criteria

Full-scale tests have shown repeatedly that iLevel Trus Joist® Commercial products have deflection characteristics that are consistently predictable by calculation, with minimal set after load withdrawal.

The graph below shows that the iLevel Trus Joist® Commercial recommended deflection limit for residential and commercial floors is more restrictive than the minimum of L/360 required by building codes. The floor load portions of the tables shown on pages 6–8 were developed based on the **Commercial Floor Deflection Limit** shown in the graph below.

Deflection criteria will vary by application. In a roof system, excessive deflection would be unsightly and could cause ceiling cracks and/or drainage problems. Floor systems, however, have entirely different—and usually much more restrictive—deflection requirements due to an occupant's perception of floor performance and feel. For more information on floor performance, see page 9.



Floors:

- Maximum deflection at live load limited as indicated here.
- Movable partition loads need not be considered.

Roofs:

- Sloped Roofs—¼" to 12" per foot, maximum deflection L/180 at total load
- Plaster Ceilings—Also check L/360 at live load

(1) For live load applications greater than 50 psf, check the L/600 deflection limit using a 50 psf live load (movable partitions need not be considered), and check the code-prescribed deflection limit using the full live load.

Deflection Calculations

The deflection characteristics of TJI® joists can be closely approximated by analyzing beams using the EI values for flexural deflections shown in the **Design Properties** table on page 5. The EI values selected from the **Design Properties** table must be determined by application (i.e., for roof applications use the EI for joists; for floor applications use the EI for nailed panels or glue-nailed panels).

For uniformly loaded simple spans, the mid-span deflection (in inches) can be calculated as shown at right:

TJI® L65, L90, and H90 Joists:

$$\Delta = \frac{22.5wL^4}{EI} + \frac{2.26wL^2}{d \times 10^5}$$

TJI® HS90 Joists:

$$\Delta = \frac{22.5wL^4}{EI} + \frac{2.00wL^2}{d \times 10^5}$$

(The second function is shear deflection)

Where:

w = Uniform load in plf
L = Span in feet
d = Depth of TJI® joist in inches
EI = Value from the proper column in the **Design Properties** table (page 5)

Example:

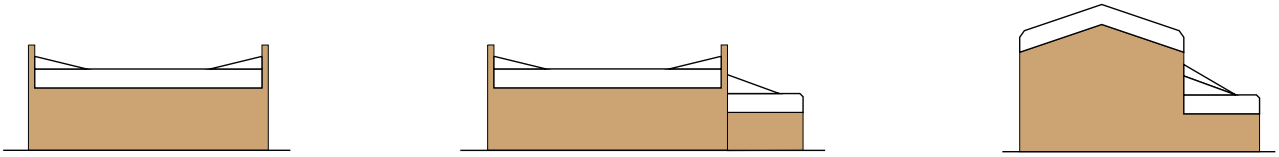
14" TJI® L65 floor joist
Nailed floor sheathing
20' span floor
100 plf uniform load

$$\Delta = \frac{22.5 \times 100 \times 20^4}{752 \times 10^6} + \frac{2.26 \times 100 \times 20^2}{14 \times 10^5} = 0.54"$$

In this same example, if the deck was glue-nailed to the TJI® joists the deflection would reduce to:

$$\Delta = \frac{22.5 \times 100 \times 20^4}{821 \times 10^6} + \frac{2.26 \times 100 \times 20^2}{14 \times 10^5} = 0.50"$$

SNOWDRIFT LOADING



Wind direction, site exposure, and roof type and shape are some of the factors that can dramatically influence the accumulation of snow on a roof structure. ASCE 7 *(Minimum Design Loads for Buildings and Other Structures)* and the applicable building code, as well as other local state and regional codes, provide guidelines for calculating snowdrift loadings on all types of building construction.

Drifts usually occur at locations of discontinuity in a roof such as at parapet walls, valleys, or where a high roof meets a low roof. Closer on-center spacing or additional support may be required at these locations. The examples above illustrate potential snowdrift conditions.

The project design professional is responsible for determining any additional loads due to snow drifting.

Technical Support Organization and Functions

iLevel Trus Joist® Commercial has an extensive network of sales offices, and engineering departments staffed by professional engineers and designers. Their role is to provide technical support and service to our field representatives, the professional design community, and the manufacturing plants. Engineering department personnel have access to extensive test data, production standards, building code product acceptance criteria, and the most current computer design software.

The engineering departments work closely with our field representatives and can provide the following services:

- Review and analysis of potential applications submitted by our field representatives
- Drawings showing placement, bearing conditions, dimensions, and installation suggestions
- Custom design of the product
- Assistance in resolving field problems should they arise

This design guide contains technical data and design information frequently required by the design professional when using our products. Because of the variety of possible conditions, the design professional is encouraged to request support from iLevel Trus Joist® Commercial engineering through one of our representatives.

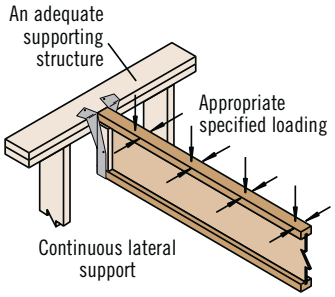
Product Application Assumptions

Our guarantee is subject to an adequate supporting structure for our products. The design of the entire structure is not the role of iLevel, nor can we assume accountability for the full function of the roof or floor system. We can only be responsible for the internal design integrity of our own products, which are structural components of roof and floor systems that are necessarily designed by others.

Our guarantee is also subject to continuous lateral support to the compression flange of our products unless specific design provisions account for other lateral support conditions. Continuous lateral support is provided by 8d (2½") nails at 24" on-center (minimum) for TJI® joists that are connected to an adequate diaphragm or total lateral strength system.

The magnitude, direction, and location of all design loads are as specified by the building designer. The review of this loading by our personnel is only for purposes of designing our product.

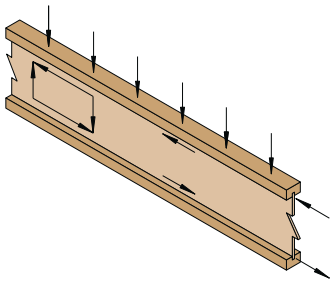
Other application assumptions are referenced on the terms and conditions of our purchase agreement contract.



Analysis Procedure—TJI® Joists

Using the allowable stresses found in our code approvals, TJI® joists are analyzed according to the procedures outlined in ASTM D5055. Bending capacity is determined using the net area of the flanges (rout area deducted) as sole flexural strength, while stiffness considers the contributions of the web material as well. Shear and reaction capacity have been established through product tests, and properties are routinely confirmed through ongoing quality-control testing. Local web buckling in high shear locations, as well as bearing load transfer to the web, may require reinforcement of the web (usually by use of web stiffeners). Web stiffener requirements and fastening details have been established by test.

The composite nature of the TJI® joist results in multiple control mechanisms—all of which are accounted for in testing but are generally unrelated to the shear mechanics of solid joists and timbers. For this reason, ignoring loads near supports is not generally appropriate, and the basic design shear is the vertical shear at the face of the support. In some cases, web confinement and inelastic beam behavior are observed to cause increases in shear strength during testing of members that are continuous over a support. Deflection of TJI® joists is closely predicted through flexural and shear deflection analysis, using composite action with the sheathing for nailed or glue-nailed attachments.



Concentrated and Non-Uniform Loads

For the most efficient use of iLevel Trus Joist® Commercial products resisting concentrated loads, non-uniform loads, and/or in conditions other than simple spans, consult TJ-Beam® design software or your iLevel Trus Joist® Commercial representative for precise sizing. As a general rule, extra members should be added to the system to carry concentrated loads such as bearing partitions, air conditioners, and other mechanical equipment. Handling concentrated loads in this manner usually provides the most economical system and also helps ensure more uniform deflection.

Treated Products

Preservative-treated iLevel Trus Joist® Commercial products are available and they require special design considerations. Refer to the *Preservative Treatment Guide* (Reorder #TJ-1020) or contact your iLevel Trus Joist® Commercial representative for more information.

Q1: What type of certification and quality assurance do TJI® joists have?

A1: iLevel Trus Joist® Commercial TJI® joists are manufactured in accordance with rigorous standards and are monitored by a third-party quality control agency (PFS Corporation). These standards are documented in current evaluation reports in major model building codes, which are also referenced in this guide.

Q2: What types of adhesives are used in TJI® joists, and are they waterproof?

A2: TJI® joists are manufactured using waterproof, thermoset adhesives such as resorcinol, phenol formaldehyde, and diphenylmethane diisocyanate (MDI). These adhesives all meet the requirements of ASTM standard D2559-92.

Q3: What is the level of formaldehyde emissions from the adhesives in your TJI® joists?

A3: It is less than 0.10 parts per million (ppm).

Independent third-party testing[1][2] shows that products manufactured with these adhesives do not emit significant amounts of formaldehyde. When tested in accordance with the ASTM large-chamber test[3], the formaldehyde emissions of these products were below 0.10 ppm, which is below even the most stringent regulatory requirements. In many cases, emissions were so low that they could not be distinguished from background levels of formaldehyde in the fresh air used during testing.

For more information see *Questions and Answers About Adhesives and Formaldehyde Emissions* (Reorder #1505) on our website, www.iLevel.com.

Q4: Do TJI® joists meet the requirements set forth in the U.S. Green Building Council's (USGBC) *Leadership in Energy and Environmental Design* (LEED) standard?

A4: LEED- NC (new construction) is a commonly used building rating system designed to accelerate the development of green building practice. While products such as TJI® joists are not LEED certified on an individual basis, they may contribute to point totals for a "whole building" certification. For example, the following items may be viewed as contributors toward points in the LEED rating system:

- The *Low Emitting Materials* section (EQ 4.4) recognizes composite wood that is free from urea-formaldehyde resins. iLevel Trus Joist® Commercial does not use urea-formaldehyde resins in any of its engineered lumber products.
- The *Certified Wood* section (MR 7) recognizes only FSC certification. iLevel has chosen to implement a Sustainable Forestry Initiative (SFI), plus ISO 14001 standards and practices to assure that strict environmental policies and procedures are in place. Although third-party evaluations have validated that there is no significant environmental difference between the FSC and SFI standards, LEED fails to recognize other credible programs.
- The *Regional Materials* section (MR 5.1 & 5.2) recognizes any materials that are manufactured within 500 miles of the constructed project.

Green Globes is another rating standard. It provides users with convenient planning options. More information about Green Globes is available at http://www.thegbi.org. Both programs are relatively new and will continue to evolve as building practices change and new products and materials are introduced. While LEED's focus is recycled materials, we believe that wood as a renewable building material should be given greater consideration. Life-Cycle Assessment criteria demonstrates the environmental benefits of wood over steel and concrete products. The CORRIM study's Life-Cycle Assessment report identified the environmental superiority of wood over these non-wood products. More information about the CORRIM report is available at http://www.corrim.org/reports/. The USGBC is considering revisiting their credit allocations for wood products. In addition, the use of nontraditional species and second- and third-growth timber in the manufacture of TJI® joists supports the overall objective of the LEED rating system.

Q5: Are tapered and cambered TJI® joists available?

A5: Yes. iLevel Trus Joist® Commercial offers the TJI® L65 series joist in a single slope, tapered profile to provide minimum roof slopes for drainage. For more details, refer to our *TJI® L65 Tapered Joist Commercial Design Guide*. A nominal camber can also be built into some TJI® joist products (see **TJI® Joist Descriptions** on page 4); contact your iLevel Trus Joist® Commercial representative for more information.

Q6: How can I contact an iLevel Trus Joist® Commercial representative?

A6: You can find your local iLevel Trus Joist® Commercial representative by calling 1-866-TJWorks (1-866-859-6757) or through the *ABOUT iLEVEL* section of our website at www.iLevel.com.

Q7: How do I get a copy of your TJ-Beam® sizing software?

A7: You can either contact your local iLevel Trus Joist® Commercial representative or request a copy on our website at www.iLevel.com.

Q8: Are repetitive-member increases allowed in TJI® joist design?

A8: No. The newly adopted product qualification model in ASTM D5055-02 has modified the resistive-moment values to more closely model wood I-joist moment capacity. However, this new procedure does not use a repetitive-member increase, so an increase to the TJI® joist moment values shown in this design guide is not applicable.

Q9: Are there special considerations for shear design in TJI® joists?

A9: Yes. In wood design, it is common practice to neglect all uniform loads within a distance equal to the joist depth. But that does not apply to TJI® joists at end bearing locations. In addition, it is critical that TJI® joists be designed for both reaction and shear at supports.

Q10: What are the deflection criteria most commonly used when selecting TJI® joists?

A10: TJI® joist deflections must meet all applicable building codes and any criteria specified by the building designer. But as the graph on page 22 shows, the iLevel Trus Joist® Commercial recommended deflection limits for residential and commercial floors are more restrictive than the minimums required by typical building codes.

It's important to note that designing a floor around a deflection limit is often not enough to ensure good floor performance. Individual perceptions of floor vibration vary, and they are influenced by a variety of factors associated with floor construction. The best way to predict how a floor will perform is to use TJ-Pro™ Ratings (available with our TJ-Beam® sizing software).

Q11: Are there special considerations when using double TJI® joists?

A11: Yes. With double TJI® joists, if a load is applied to the side of one member, you must connect the two TJI® joists together at the loading point to transfer the load equally into both members. For more specific information, see detail 7 on page 11.

Typically, sheathing is not nailed to both TJI® joists, which leaves one joist with an unbraced compression flange. To ensure the lateral stability of both joists when loads are applied from above, the TJI® joists must be connected as shown in detail 9 on page 12. Often, a rectangular member may be the simplest option.

Q12: Is the 1½"-thick flange on commercial TJI® joists sufficient for the nail penetration required by building code diaphragm tables?

A12: Yes. A 1½"-thick (or thicker) flange meets the fastener penetration requirements stated in building code diaphragm tables such as IBC Table 2306.3.1. For other building codes, calculations per the *2001 ANSI/AF&PA National Design Specification for Wood Construction* consider fastener penetration into the main member and show that a 1½" penetration does not reduce the lateral nail capacity.

Q13: How do I account for snowdrift loading on TJI® joists?

A13: Snowdrift loading should be considered by the designer in any snow load area where roof projections and/or changes in roof elevations could allow snow to accumulate. Specific design criteria falls under the jurisdiction of local building codes.

Q14: Does iLevel Trus Joist® Commercial provide guidelines for the installation of TJI® joists?

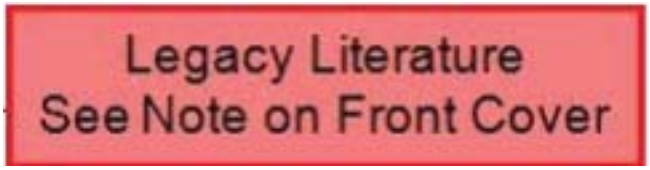
A14: Yes. Installation guides are provided with every TJI® joist delivery. Typical construction applications and details can be found in the guide, and particular attention should be given to the handling, storage, safety bracing, and installation instructions. Shop drawings showing job-specific information are also furnished upon request. A copy of our *TJI® Joist Installation Guide* (Reorder #COM-2002) can also be downloaded from www.iLevel.com.

Q15: Are your TJI® joists covered by a warranty?

A15: Yes. iLevel warrants that its products will be free from manufacturing errors or defects in workmanship and material. In addition, provided the product is correctly installed and used, the company warrants the adequacy of its design for the normal and expected life of the building. A copy of this Product Warranty (Reorder #TJ-1000) can be found on the back cover of this guide or on our website at www.iLevel.com.

Q16: Does iLevel Trus Joist® Commercial provide any rated fire assembly details?

A16: Yes. iLevel Trus Joist® Commercial provides a number of fire assembly details, which can be downloaded from our website at www.iLevel.com. Other details can be found in the iLevel Trus Joist® *Fire Facts Guide* (Reorder #1500), which you can download from our website at www.iLevel.com.



References:
(1) Structural Board Association Technical Bulletin (TB102). http://www.osbguide.com/osbliterature.html.
(2) American Plywood Association. http://www.apawood.org.
(3) *Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.* ASTM E1333.

1.0 General

1.1 Scope
This work includes the complete furnishings and installation of all iLevel Trus Joist TJI® joists, as shown on the drawings herein specified and necessary to complete the work.

1.2 Code Approvals
These products shall be designed and manufactured to the standards set forth in ICC ES ESR-1153.

1.3 Related Work Specified Elsewhere
A. Carpentry and Millwork
B. Glu-Laminated Members

1.4 Design
A. Products:
iLevel Trus Joist® Commercial products shall be designed to fit the dimensions and loads indicated on the plans.
B. Design Calculations:
When required, a complete set of design calculations shall be prepared by iLevel Trus Joist® Commercial.

1.5 Submittals
A. Drawings:
When required, drawings showing layout and detail necessary for determining fit and placement in the building shall be provided by iLevel Trus Joist® Commercial.
B. Production:
Fabrication and/or cutting shall not proceed until the architect and/or engineer have approved the submittal package.

2.0 Products

2.1 Materials
Flange members, web members, and adhesives shall conform to the provisions of ICC ES ESR-1153.

2.2 Fabrication
TJI® joists shall be manufactured by iLevel Trus Joist® Commercial in a plant listed in the reports referred to above and under the supervision of an approved third-party inspection agency.

2.3 Tolerances
Depth: ± 1/16"
Flange Width: ± 1/16"

2.4 Identification
Each of the joists shall be identified by a stamp indicating the joist series, ICC-ES evaluation report number, manufacturer's name, plant number, date of fabrication, and the independent inspection agency's logo.

2.5 Hardware
Not applicable.

3.0 Execution

3.1 Installation
TJI® joists, if stored prior to installation, shall be stored in a vertical orientation and protected from the weather. They shall be handled with care so they are not damaged. TJI® joists are to be installed in accordance with the plans and any iLevel Trus Joist® Commercial drawings and installation suggestions. Temporary construction loads that cause stresses beyond design limits are not permitted. Safety bracing is to be provided by the installer to keep the TJI® joists straight and plumb as required and to ensure adequate lateral support for the individual TJI® joist members and the entire system until the sheathing material is applied.

3.2 Installation Review
Prior to enclosing the TJI® joists, the Contractor shall give notification to the iLevel Trus Joist® Commercial representative to provide an opportunity for review of the installation.

3.3 Performance Standards
Products shall be proven by testing and evaluation in accordance with the provisions of ASTM D5055.

3.4 Fire Rating/Sound Rating
Fire and sound ratings are to be established in accordance with assemblies as detailed in ICC ES ESR-1153 or the *Directory of Listed Products,* published by Intertek Testing Services.

3.5 Warranty
The products delivered shall be free from manufacturing errors or defects in workmanship and material. The products, when correctly installed and maintained, shall perform as designed for the normal and expected life of the building.

4.0 Alternates and/or Equals

4.1 Base Bid
Due to the customized detailing and engineering characteristics of the roof and/or floor framing assembly, it is a requirement that TJI® joists be used in the base bid.

4.2 Acceptable Alternatives
At the discretion of the specifier of record, acceptable alternatives or equals will be listed on the final addendum of the specifications for the request for bid.

4.3 Alternates and Equals
If not listed in the specifications as acceptable, any other alternates or equals must meet and conform to the dimensions and loads indicated on the plans and product specifications, and shall be certified for conformance by a registered engineer, taking into account structural performance, possible conflicts with related trades, compatibility with the overall design and building requirements, and building codes. Certification of alternates or equals must be contained in the bid, otherwise the bid shall be deemed non-responsive.

Refer to local building codes for live load design requirements.

Composition Roofing

2–15 and 1–90 lb . . . . . 1.7 psf
3–15 and 1–90 lb . . . . . 2.2 psf
3-ply and gravel . . . . . 5.6 psf
4-ply and gravel . . . . . 6.0 psf
5-ply and gravel . . . . . 6.5 psf
Insulated Roof Membrane Assembly (IRMA)
2" thick . . . . . 13.0 psf
Single-ply roofs (insulation not included)
Ballasted system . . . . . 13.0 psf
Mechanically fastened . . . . . 2.0 psf
Fully adhered . . . . . 2.0 psf

Douglas Fir Sheathing*
(Based on 36 pcf for plywood, 40 pcf for OSB)

½" plywood . . . . . 1.5 psf
⅝" plywood . . . . . 1.8 psf
¾" plywood . . . . . 2.3 psf
1⅛" plywood . . . . . 3.4 psf
½" OSB . . . . . 1.7 psf
⅝" OSB . . . . . 2.0 psf
¾" OSB . . . . . 2.5 psf
⅞" OSB . . . . . 2.9 psf
1⅛" OSB . . . . . 3.7 psf

*For southern pine weights, increase Douglas fir weights by 10%.

Miscellaneous Roofing Materials

Corrugated galvanized steel
16 ga . . . . . 2.9 psf
20 ga . . . . . 1.8 psf
22 ga . . . . . 1.5 psf
24 ga . . . . . 1.3 psf
Asphalt shingles . . . . . 2.5 psf
Wood shingles . . . . . 2.0 psf
Clay tile . . . . . 9.0 to 14.0 psf
Slate (⅜" thick) . . . . . 15.0 psf

Rigid Insulation (1" thick)

Hemlock . . . . . 1.2 psf
Cork . . . . . 0.7 psf
Gold bond . . . . . 1.5 psf
Polystyrene foam . . . . . 0.2 psf
Foamglass . . . . . 0.8 psf
Rigid fiberglass . . . . . 1.5 psf

Roll or Batt Insulation (1" thick)

Rock wool . . . . . 0.2 psf
Glass wool . . . . . 0.1 psf

Floors

Hardwood (nominal 1") . . . . . 4.0 psf
Concrete (1" thick)
Regular . . . . . 12.0 psf
Lightweight . . . . . 8.0 to 10.0 psf
Gypsum concrete (¾" thick) . . . . . 6.5 psf
Sheet vinyl . . . . . 0.5 psf
Carpet and pad . . . . . 1.0 psf
¾" ceramic or quarry tile . . . . . 10.0 psf

Ceilings

Acoustical fiber tile . . . . . 1.0 psf
½" gypsum board . . . . . 2.2 psf
⅝" gypsum board . . . . . 2.8 psf
Plaster (1" thick) . . . . . 8.0 psf
Metal suspension system (including tile) . . . . . 1.8 psf

To calculate total dead load, use a minimum of 1.5 psf for "miscellaneous" with all dead loads

Weights of Douglas Fir Framing Members

Nominal Size (in.)	Joist Spacing		
	12"	16"	24"
2x4	1.4 psf	1.1 psf	0.7 psf
2x6	2.2 psf	1.7 psf	1.1 psf
2x8	2.9 psf	2.2 psf	1.5 psf
2x10	3.7 psf	2.8 psf	1.9 psf
2x12	4.4 psf	3.3 psf	2.2 psf
3x6	3.6 plf		
4x6	5.0 plf		
4x8	6.8 plf		
4x10	8.6 plf		
4x12	10.4 plf		

- For southern pine weights, increase Douglas fir weights by 10%.

Weights of Sprinkler Lines

Size of Pipe	Schedule 40, Standard Pipe		Schedule 10, Thin Wall Pipe	
	Dry (plf)	Wet (plf)	Dry (plf)	Wet (plf)
1"	1.7	2.1	1.4	1.8
1¼"	2.3	3.0	1.8	2.5
1½"	2.7	3.6	2.1	3.1
2"	3.7	5.2	2.7	4.2
2½"	5.8	7.9	3.6	5.9
3"	7.6	10.8	4.3	8.0
3½"	9.2	13.5	5.0	9.8
4"	10.9	16.4	5.6	11.8
5"	14.8	23.5	7.8	17.3
6"	19.2	31.7	9.3	23.1
8"	28.6	50.8	16.9	40.1
10"	40.5	74.6		

- For additional information on sprinkler systems, see iLevel Trus Joist® Commercial *Sprinkler System Installation Guide* (Reorder #COM-1000).

Approximate Weights of iLevel Trus Joist® Commercial Products

	Series	PLF Weight
Trusses	TJL™, TJL-T™, or TJLX™	3.75–4.25
	TJW™ or TJW-T™	4.50–5.25
	TJS™	4.75–5.75
	TJM™	8.00–9.00
	TJH™	10.00–12.00
Joists	TJI® L65	3.0–5.8
	TJI® L90	4.2–6.6
	TJI® H90	4.6–7.1
	TJI® HS90	6.0–9.1

Structural Composite Lumber	Density (pcf)
1.9E Microllam® LVL	42
TimberStrand® LSL	45
Parallam® PSL	45
Wolmanized® Parallam® PSL	52 (Service Level 2)

- PLF Unit Weight = (density) x (width) x (depth).

Wolman® and Wolmanized® are registered trademarks of Arch Treatment Technologies, Inc., Smyrna, Georgia.

iLevel® TRUS JOIST® commercial

Legacy Literature
See Note on Front Cover

SERVICE YOU CAN COUNT ON

iLevel Trus Joist® Commercial TJI® Joists are designed to be the foundation of an integrated structural system when combined with other iLevel Trus Joist® Commercial products. In addition, our products are backed by one of the industry's largest and most experienced networks of engineering support and field service representatives. iLevel Trus Joist® Commercial representatives and experienced engineering staff are located throughout the United States to help with technical information, installation questions, or code compliance.

Software Solutions: If you are a design professional or lumber dealer, iLevel Trus Joist® Commercial iLevel offers a full array of software packages to help you specify individual framing members, create cut lists, manage inventories—even help you design whole-structure framing solutions. Contact your iLevel Trus Joist® Commercial representative to find out how to get the software you need.

Technical Support: Need technical help? iLevel Trus Joist® Commercial has one of the largest networks of engineers and sales representatives in the business. Call us for help, and a skilled member from our team of experts will contact you within one business day to evaluate and help solve your structural frame problems—GUARANTEED.

At iLevel Trus Joist® Commercial, our goal is to help you build solid and durable structures by providing high-quality commercial building products and unparalleled technical and field support. A limited warranty for our products is in effect for the expected life of your structure.

CONTACT US

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OUR WARRANTY

December 2007
Reorder COM-2000

This document supersedes all previous versions. If this is more than one year old, contact your dealer or iLevel rep.
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