



Tapered Red-I65T™ Joists



- Lightweight for Fast Installation
- Compatible with Standard Framing
- Available in Long Lengths
- Reduces the Need for Cricketing
- Works with Multiple Spans
- Limited Product Warranty



Welcome to RedBuilt

RedBuilt is an exciting business offering building solutions for a broad range of commercial and custom residential applications. In addition to pioneering unique manufacturing technologies, RedBuilt provides world-class service and technical support for architects, specifiers and builders.

RedBuilt gives you access to reliable, innovative products, including RedBuilt™ open web trusses, Red-I™ joists, and RedLam™ LVL beams and headers. And we keep things simple: You'll work with just one service-oriented supplier to get all these products—plus the support you need to build smarter.

RedBuilt: A family of brand-name building products... a source for innovative ideas and solutions... a supplier that's simpler to do business with.

The RedBuilt™ Tapered Red-I™ Joist Advantage

- **Dependable Delivery**—RedBuilt plants are located in key market areas, enabling us to deliver materials quickly. Each plant is staffed with experienced personnel who can help solve problems and talk with you about any special project requirements.
- **Minimum Waste**—Red-I™ 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 Red-I™ 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.

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ABOUT THIS GUIDE

The RedBuilt™ Tapered Red-I65T™ Joist Specifier's Guide is one of several guides that offer technical information and design recommendations for RedBuilt™ products. This guide is meant to provide architects, designers and engineers with information regarding Tapered Red-I™ joists for commercial and custom residential applications.

Tapered Red-I™ Joists: The Roofing Solution

Tapered Red-I™ joists offer a superior roofing solution for sloped roofs with flat ceilings. They can be used with multiple-span applications, giving design professionals more options for wall placement.

Tapered Red-I™ joists are an economical alternative to plated trusses, and work well even in challenging shallow-profile applications.

Other Tapered Red-I™ Joist Benefits Include:

Consistent Quality—Tapered Red-I™ joists are manufactured to be structurally uniform, dimensionally stable and warranted to be free from manufacturing errors and defects.

Design Flexibility—Unlike roof trusses, Tapered Red-I™ joists can be field-cut to fit complex roof shapes, reducing the need for special orders or costly manufacturing setups. Not only that, but longer lengths mean uninterrupted spans with joists that resist bowing, twisting and shrinking, allowing for a multitude of design options.

Easy Installation—Lightweight Tapered Red-I™ joists reduce time and labor costs. They can be moved and placed with light lifting equipment and quickly and easily installed.

Wider Flange—Red-I™ joists have 2½" flanges that provide ample surface area for nailing sheathing and room for correcting a panel layout that starts to drift during installation. The wider flange also delivers exceptional lateral stability.



Easy to handle and easy to trim, Tapered Red-I™ joists save valuable time and labor.



Face mount hangers can accommodate the variable depths of Tapered Red-I™ joists.



Large, multi-story projects are ideal applications for Tapered Red-I™ joists.

Building Codes and Product Acceptance:

See ICC-ES ESR-2993, ICC-ES ESR-2994

L.A. City RR #25832 and #25833, DSA IR23-9

JOIST DESCRIPTION AND DESIGN PROPERTIES

Design Properties

Basic Properties					Reaction Properties ⁽²⁾⁽³⁾⁽⁴⁾							
Joist Depth	Joist Weight (lbs/ft)	Resistive Moment ⁽¹⁾ (ft-lbs)	Vertical Shear (lbs)	EI x 10 ⁶ (in. ² -lbs)	End Reaction (lbs)				Intermediate Reaction (lbs)			
					Bearing Length				Bearing Length			
					1 3/4"		3 3/4"		3 3/4"		5 1/4"	
					Web Stiffeners		Web Stiffeners		Web Stiffeners		Web Stiffeners	
					No	Yes	No	Yes	No	Yes	No	Yes
9 1/2"	3.0	5,215	1,530	263	1,375	N.A.	1,675	N.A.	2,745	N.A.	3,365	N.A.
11 7/8"	3.3	6,750	1,930	450	1,375	1,745	1,885	1,925	2,745	3,120	3,365	3,735
14"	3.6	8,030	2,130	666	1,375	1,750	1,885	2,125	2,745	3,365	3,365	3,985
16"	3.9	9,210	2,325	913	1,375	1,750	1,885	2,330	2,745	3,490	3,365	4,105
18"	4.2	10,380	2,515	1,205	1,375	1,750	1,885	2,535	2,745	3,615	3,365	4,230
20"	4.4	11,540	2,710	1,545	N.A.	1,750	N.A.	2,740	N.A.	3,740	N.A.	4,355
22"	4.7	12,690	2,900	1,934	N.A.	1,750	N.A.	2,935	N.A.	3,860	N.A.	4,480
24"	5.0	13,830	2,880	2,374	N.A.	1,750	N.A.	3,060	N.A.	3,875	N.A.	4,605
26"	5.3	14,960	2,880	2,868	N.A.	1,750	N.A.	2,900	N.A.	4,725 ⁽⁵⁾	N.A.	5,345 ⁽⁶⁾
28"	5.5	16,085	2,880	3,417	N.A.	1,750	N.A.	2,900	N.A.	4,850 ⁽⁵⁾	N.A.	5,470 ⁽⁶⁾
30"	5.8	17,205	2,880	4,025	N.A.	1,750	N.A.	2,900	N.A.	4,975 ⁽⁵⁾	N.A.	5,590 ⁽⁶⁾

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.

- Caution:** Joist resistive moment properties should not be increased by a repetitive-member-use factor.
- Interpolation between bearing lengths and joist depths is permitted.
- The minimum bearing length may be reduced for joists supported by hangers if supplemental nail attachment is provided to the web stiffener.
- Bearing lengths are based on RedBuilt™ products. Check allowable bearing on supporting members.
- A 5 1/4" bearing length is required at intermediate reactions.
- A 7" bearing length is required at intermediate reactions.

Available Depths:

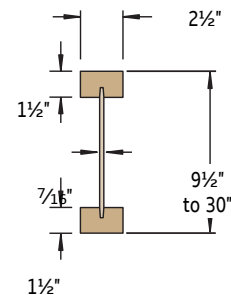
Joist Slope (:12")	Minimum Depth	Maximum Depth
1/8" to 1/4"	9 1/2"	30"
> 1/4" to 1/2"	10"	26"

Available Lengths:

12' through 60'

Available Slopes:

1/8" to 1/2" per foot. For slopes not shown in this guide, contact your RedBuilt representative.



Tapered Red-I65T™ Joist

Top and bottom flanges of 1 1/2" x 2 1/2" RedLam™ LVL with 7/16" web.

- Tapered Red-I™ joists do not have knock-out holes.

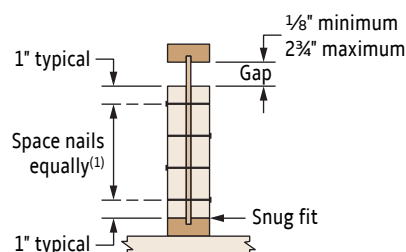
Red-I™ joists are intended for dry-use applications

WEB STIFFENERS

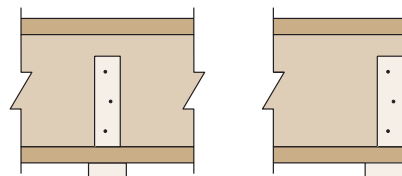
The Importance of Web Stiffeners

Web stiffeners are available from RedBuilt in pre-cut sizes and can be installed at the plant on one or both ends upon request. Web stiffeners are an important part of almost all Red-I™ joist installations because they will:

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



(1) Nails may be driven from one side only.



Proper Installation Ensures 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 RedBuilt and typically have the maximum gap shown at left. 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 at left).
- Plant-installed web stiffeners are available; one-end-only for skewed, hip and other bearings where dimensions cannot be assured.

Nail Quantities for Web Stiffener Attachment

Joist Depth	8d (0.113" x 2 1/2") Nails End or Intermediate
11 7/8"	3
14"	5
16"	6
18"	7
20"	8
22"	9
24"	10
26"	11
28"	12
30"	13

Web Stiffener Size and Material

Minimum Web Stiffener Size	Web Stiffener Material
1" x 2 5/16"	Sheathing (with face grain vertical) that meets the requirements of PS 1 or PS 2, or CSA Standards 0151, 0352, or 0437

Snow — 115% (PLF)

Span	¼" Per Foot Slope			⅜" Per Foot Slope		
	Shallow End Depth					
	10"	12"	14"	10"	12"	14"
12'	266	266	266	266	266	266
14'	228	228	228	228	228	228
16'	199	199	199	199	199	199
18'	177	177	177	177	177	177
20'	158	159	159	159	159	159
22'	125	144	144	144	144	144
24'	102	132	132	124	132	132
26'	84	117	122	103	122	122
28'	70	97	113	88	113	113
30'	59	82	104	75	101	105
32'	51	70	92	65	88	99
34'	44	60	80	57	76	91
36'	38	52	69	50	67	83
38'	33	46	61	44	59	75
40'	30	41	54	39	53	68

• **Bold italic** values indicate load is controlled by 1¾" bearing length. To achieve higher loads for other bearing conditions, contact your RedBuilt representative.

Non-Snow — 125% (PLF)

Span	¼" Per Foot Slope			⅜" Per Foot Slope		
	Shallow End Depth					
	10"	12"	14"	10"	12"	14"
12'	289	289	289	289	289	289
14'	248	248	248	248	248	248
16'	216	216	216	216	216	216
18'	192	192	192	192	192	192
20'	158	173	173	173	173	173
22'	125	157	157	152	157	157
24'	102	142	144	124	144	144
26'	84	117	132	103	132	132
28'	70	97	123	88	119	123
30'	59	82	109	75	102	115
32'	51	70	93	65	88	107
34'	44	60	80	57	76	99
36'	38	52	69	50	67	86
38'	33	46	61	44	59	76
40'	30	41	54	39	53	68

How to Use These Tables

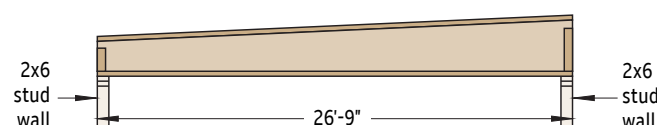
1. Select span. **Tapered Red-I™ joist tables shown are for simple-span applications only.** For multiple-span applications, contact your RedBuilt representative.
2. Scan across to proper slope and depth column. Load shown is the maximum capacity in pounds per linear foot.

Contact your RedBuilt™ representative for Tapered Red-I™ joist applications that require holes

General Notes

- Tables are based on:
 - Simple spans
 - 1¾" minimum bearing length
 - Uniform loads
 - Maximum live load to dead load ratio of 4:1
 - Deflection criteria of L/240 live load and L/180 total load
- Straight line interpolations may be made between depths and spans.
- For span or loading conditions not covered by these tables (such as multiple spans or concentrated loads), contact your RedBuilt representative for assistance.

Example Problem



Condition:

- Desired slope is ¼" per foot
- Load duration of 125%
- Out-to-out of 2x6 stud walls is 26'-9"
- Desired spacing is 32" on-center
- Live load is 20 psf
- Dead load is 15 psf
- Design load is 35 psf at 32" o.c. = 93 plf

Solution:

1. For joist span, use clear span plus ½ of 1¾" minimum bearing at each end and round up.

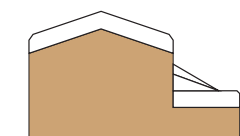
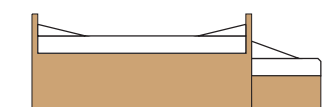
$$\text{Clear span} = 26'-9" - 5\frac{1}{2}" - 5\frac{1}{2}" = 25'-10"$$

$$\text{Joist span} = \text{clear span plus minimum bearing distance: } 25'-10" + \frac{7}{8}" + \frac{7}{8}" = 25'-11\frac{3}{4}"$$

Round joist span up to 26'-0"

2. Check the ¼" per foot columns in the **Non-Snow—125% (PLF)** table until a load in excess of 93 plf is located. A 12" shallow end depth Red-I65™ exceeds the required 93 plf.
3. To determine the depth at the deep end, multiply the slope times the length (to calculate the amount of rise) and add to the shallow end depth. Therefore: $0.25 \times 26 + 12" = 18.5"$ depth at deep end.

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. Examples above illustrate potential snowdrift conditions.

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

DEFLECTION CRITERIA

RedBuilt Recommended Deflection Criteria

Tapered Red-I™ joists are produced without camber.

The load tables presented in this guide incorporate the deflection criteria represented in the chart at right.

Deflection criteria will vary by application. In a roof system, excessive deflection would be unsightly and potentially cause ceiling cracks and/or drainage problems.

For a uniformly loaded simple span, the mid-span deflection Δ (inches) can be calculated as follows:

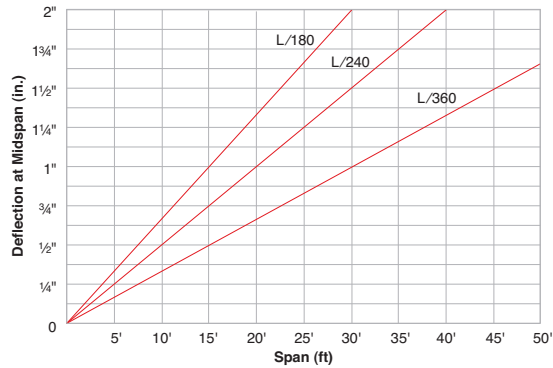
$$\Delta = \frac{22.5wL^4}{EI} + \frac{2.26wL^2}{d \times 10^5} \quad (\text{The second term is shear deflection})$$

w = uniform load (plf)

L = span (ft)

d = depth of Red-I™ joist (in.) at midspan

EI = value from EI column in **Design Properties** table on page 4



Roofs:

- Slopes of $\frac{1}{8}$ " to $\frac{1}{4}$ " per foot: Maximum deflection of $L/240$ at total load
- Slopes of $\frac{1}{4}$ " to $\frac{1}{2}$ " per foot: Maximum deflection $L/180$ at total load
- Plaster Ceilings: Also check $L/360$ at live load

RED-I™ BLOCKING PANELS AND RIM BOARD

Red-I™ blocking panels and rim board may be used for:

- Shear transfer—shear transfer nailing must be established by design
- Vertical load transfer
- General closure
- Helping prevent rollover during installation of joists

Allowable Uniform Vertical Load Transfer (PLF)

Red-I65™ Blocking Panel Depth			
9½"-14"	16"-20"	22"-24"	26"-30"
3,050	2,450	1,850	1,200

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

Concentrated Vertical Loads

The allowable concentrated vertical loads on Red-I™ 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.

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

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: $\frac{7}{8}$ " for Red-I65™

Example Calculation

4x4 post applied to 20" Red-I65™ joist through $\frac{23}{32}$ " sheathing.

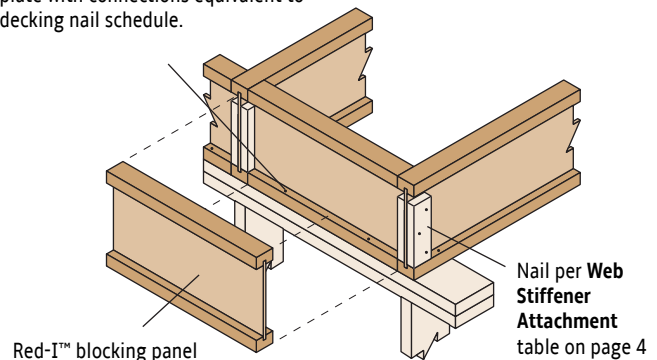
$$P_{\text{allow}} = 2,450 \left[\frac{3.5 + 2(\frac{23}{32}) + 2(\frac{7}{8})}{12} \right] = 1,365 \text{ lbs}$$

1 Red-I™ Blocking Panel

Minimum Red-I™ blocking panel attachment:

Use 10d x 3" box nails at 6" on-center.

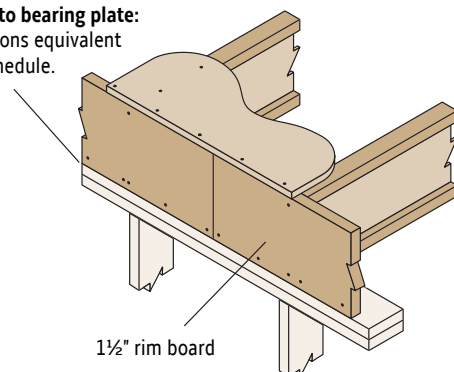
When used for shear transfer, nail to bearing plate with connections equivalent to decking nail schedule.



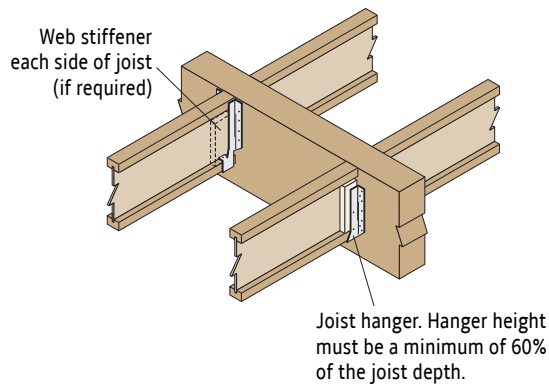
2 Rim Board

Attach rim board to bearing plate:

Nail with connections equivalent to decking nail schedule.

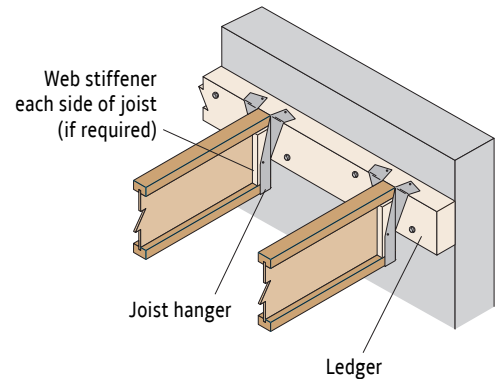


3 Hanger on Beam

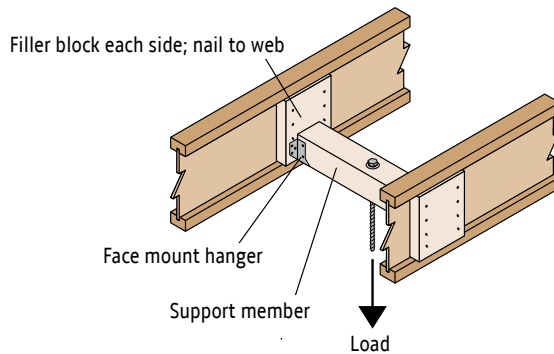


Web stiffeners are required if the sides of the hanger do not laterally support at least $\frac{3}{8}$ " of the Red-I™ joist top flange

4 Hanger on Ledger



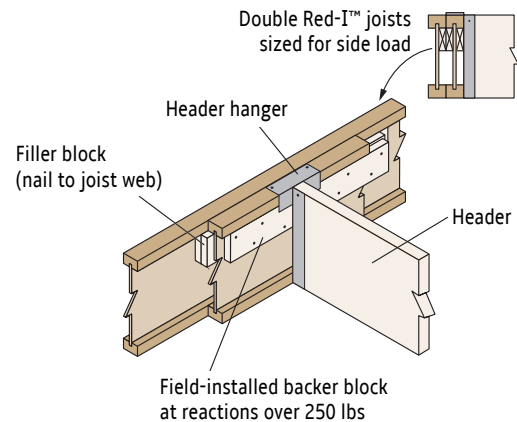
5 Support Detail



Each side of the bottom flange of the Red-I™ joist can support a 250 lb maximum load at 5' on-center (provided the load is included in normal design loads). Use the detail above for loads exceeding this limit.

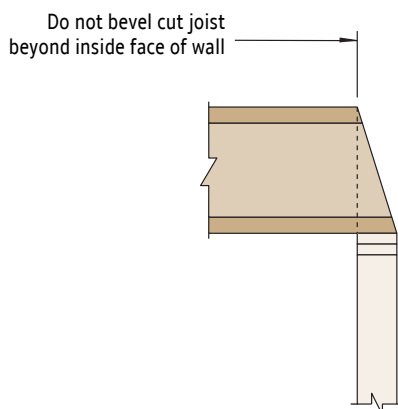
For additional information on supporting hanging loads and sprinkler systems, see the RedBuilt Sprinkler System Installation Guide (available online at www.RedBuilt.com).

6 Side-Loaded Double Joist

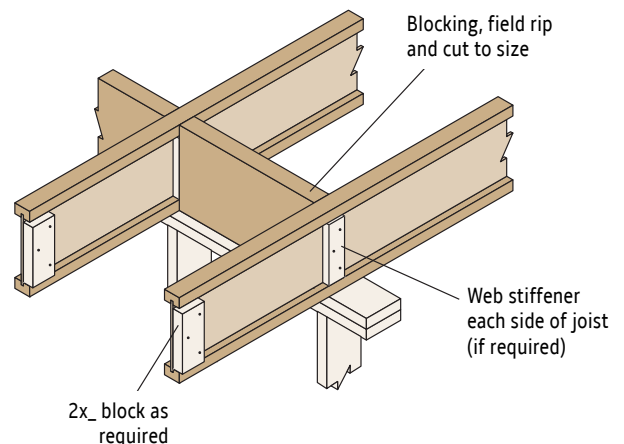


When supported by a Red-I™ joist, maximum hanger capacity is approximately 2,000 lbs. Refer to hanger manufacturer's literature for details.

7 Bevel Cut or Fire Cut



8 Cantilever





SERVICE AND SUPPORT YOU CAN COUNT ON.

RedBuilt is committed to creating superior structural solutions. How? By offering efficient structural building products supported by a broad range of services.

- Our team of RedBuilt representatives—one of the industry's largest—isn't afraid to get its hands dirty. We can help with technical information, installation questions or code compliance.
- At RedBuilt, our goal is to help you build solid and durable structures. A limited warranty for our products is in effect for the expected life of the building.
- Call us with a problem that you believe may be caused by our products, and our representative will contact you within one business day to evaluate the problem and help solve it—**GUARANTEED**.



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