Weyerhaeuser

#1502 | TECHNICAL RESOURCE SHEET

Using Weyerhaeuser Products in Conventional Construction

Residential structures are routinely built using the conventional construction provisions of building codes such as the 2018 ICC International Residential Code (IRC) for One- and Two-Family Dwellings. These provisions are based on assumptions of anticipated loading, common construction practices, traditional materials, and "typical" structure sizes and geometries.

Over the years, residential dwellings built following conventional construction provisions have demonstrated a history of acceptable performance. However, the building codes only provide information for wood framing members made of sawn lumber. Values for other code-recognized materials, such as engineered wood products, must be found elsewhere. This resource sheet provides the information needed to prescribe Weyerhaeuser engineered wood products for conventional construction.

Substitution information in this guide complies with code-minimum provisions and provides a streamlined design process that enables you to bring the advantages of engineered wood products to any conventional application. However, since the tables shown are based on certain assumptions, member design for actual conditions could result in a more economical option—even for conventional applications. For structures or portions of structures that exceed the conventional construction limitations shown here, Weyerhaeuser offers software, literature, and technical support to help design solutions for specific applications.

Substitution information in this guide complies with code-minimum provisions.

Specifying Weyerhaeuser Products

By using the following guidelines, Weyerhaeuser products can be specified for conventional applications that fall within the limitations shown in the *Limitation Descriptions and IRC References* table on page 3. Products should be stored and handled per recommendations shown in Weyerhaeuser's *Product Transportation, Handling and Storage Technical Resource Sheet,* 1507. In addition, be sure to read and follow all safety and warning information provided in the Weyerhaeuser *Installation Guide for Floor and Roof Framing*, TJ-9001.

Floors

Trus Joist® TJI® Joists

The TJI® joist technical information published by Weyerhaeuser is based on engineering procedures similar to those used in standard building codes, making TJI® joists acceptable for use in conventional construction. Installation details and connection information unique to a TJI® joist floor system are provided in Weyerhaeuser literature and must be followed. Due to load distribution assumptions for the supporting structure, joist spans must be limited to 25'-7" maximum and continuous-span applications must be limited to 20'-6" maximum for any one span.

Special Considerations:

- Load-bearing walls must stack over walls or beams below—no offset load-bearing walls perpendicular to joist span direction.
- Cantilever applications must be verified using Weyerhaeuser literature or software. Conventional provisions for cantilevering a distance equal to the joist depth are not appropriate.

Structural Composite Lumber (SCL)

Weyerhaeuser's Trus Joist® SCL products of equal or greater strength, stiffness, and size can be conventionally specified or substituted for sawn lumber members using any of the lumber equivalents listed in the **SCL Material Equivalents** table on page 2.

Special Considerations:

- Holes allowed only per Weyerhaeuser recommendations; notches are not permitted.

Weyerhaeuser OSB Floor Panels
Weyerhaeuser Edge®, Edge Gold™ and Diamond™ OSB floor panels are manufactured in accordance with Voluntary Product Standard PS2, which is recognized by the IRC. For more information, see Weyerhaeuser's *Edge® and Edge Gold™ Floor Panel Specifier's Guide,* OSB-4000, or *Weyerhaeuser Diamond™ Floor Panel Specifier's Guide*, OSB-4051.

Walls

Trus Joist® TimberStrand LSL® Studs
For walls up to 10' in height, 2x4 and 2x6 TimberStrand® LSL studs may be conventionally specified per the **Stud Specifications for Conventional Applications** table on page 3. For other wall applications using TimberStrand® LSL, refer to the Weyerhaeuser wall guide for your region, TJ-9003 or TJ-9004.

Sill Plates
StrandGuard® TimberStrand® LSL sill plates are permitted for use in conventionally constructed walls that are in above ground, protected applications (Use Category 2) and supported by masonry or concrete foundations. For more information, see the *Trus Joist® Treated Sill Plates and Studs Specifier's Guide,* TJ-8100.

Weyerhaeuser OSB Wall Sheathing
Weyerhaeuser OSB wall sheathing is manufactured in accordance with Voluntary Product Standard PS2, which is recognized by the IRC. For more information, see Weyerhaeuser's *Floor, Roof, and Wall Panel Installation Guide*, OSB-4004.

Roofs

Trus Joist® TJI® Joists
Specify TJI® joists for roofs using the TJI® joist specifier's guides or software. The installation details and connection information provided in Weyerhaeuser literature must be followed.

Special Considerations:
- TJI® joists require a ridge beam or other vertical support at high end.

Structural Composite Lumber (SCL)
Weyerhaeuser's Trus Joist® SCL products of equal or greater strength, stiffness, and size can be conventionally specified or substituted for sawn lumber roof rafters or ceiling joists using any of the lumber equivalents listed in the **SCL Material Equivalents** table below. Hip and valley beams must be sized using Weyerhaeuser's *Roof System Specifier's Guide*, TJ-9005, or Weyerhaeuser software.

Special Considerations:
- Holes allowed only per Weyerhaeuser recommendations; notches are not permitted.
- Heel joint and lap splices should be specified per IRC Table R802.5.2.

Weyerhaeuser OSB Roof Sheathing
Weyerhaeuser OSB roof sheathing is manufactured in accordance with Voluntary Product Standard PS2, which is recognized by the IRC. For more information, see Weyerhaeuser's *Floor, Roof, and Wall Panel Installation Technical Resource Sheet*, OSB-4004.

Connections and Details

Trus Joist® TJI® Joists
All TJI® joist framing connections and details must comply with information shown in Weyerhaeuser installation and specifier's guides, TJ-9001 and TJ-4000.

Structural Composite Lumber (SCL)
The conventional framing connections and installation details for sawn lumber provided in code are applicable to SCL products. However, notches are not permitted in headers or beams, and holes in rectangular members must follow the provisions in Weyerhaeuser literature. Weyerhaeuser literature also contains design information and supplemental installation details.

All Weyerhaeuser technical publications can be downloaded from our website at weyerhaeuser.com.

SCL Material Equivalents

Use the **SCL Material Equivalents** table below to specify or substitute structural composite lumber material of equal or greater strength, stiffness, and size for sawn lumber floor joists, headers, girders, studs, rafters, and ceiling joists. The table shows the highest equivalent lumber grade; however, specification or substitution for lower grade lumber of the same species is also permitted. **This table is not appropriate for substituting sawn lumber for Trus Joist® products (reverse substitution).**

Sawn Lumber Grade and Species	Equivalent 1½" or Thicker Trus Joist® SCL Grade
#3 and Stud SPF, #3 and Stud Hem-Fir	1.3E TimberStrand® LSL(1)
#1 SPF, #1 and #2 Hem-Fir, #3 and Stud DFL, #2 SP	1.5E TimberStrand® LSL(2)
#1 SPF, #1 and #2 Hem-Fir, #3 and Stud DFL, #2 SP	1.55E TimberStrand® LSL and 1.6E TimberStrand® LSL(2)
Select Structural SPF, Select Structural Hem-Fir, Select Structural SP, #1 DFL, #1 SP	2.0E Microllam® LVL(3)
Highest grade of any species in code tables	2.0E Parallam® PSL or 2.2E Parallam® PSL(3)

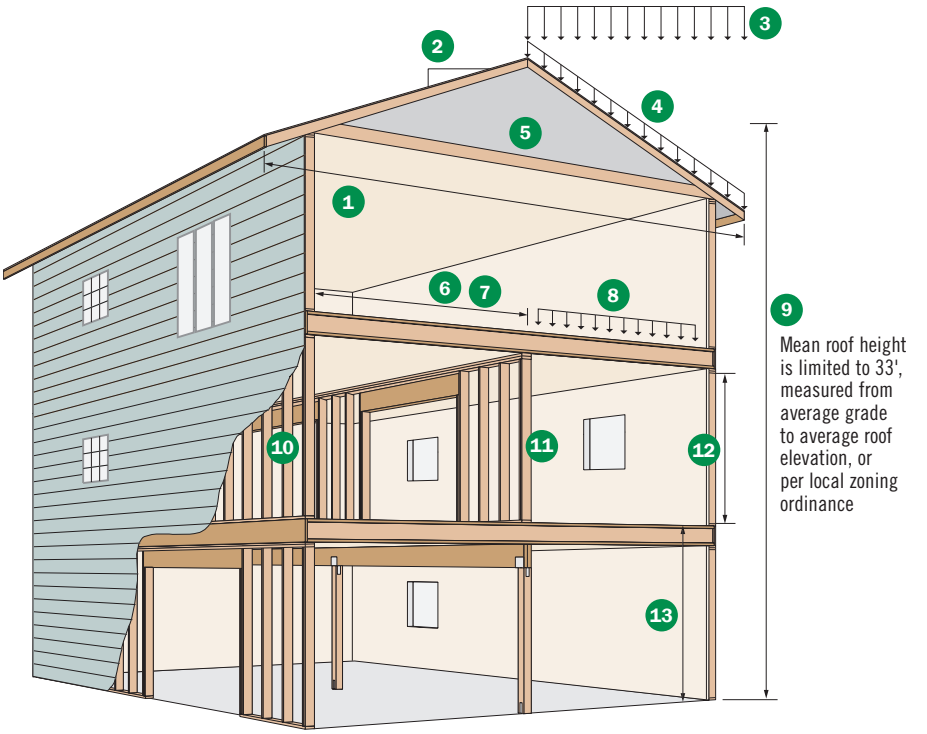
(1) 1.3E TimberStrand® LSL is permitted for wall bracing methods with a 6" on center nail spacing.
(2) 1.5E TimberStrand® LSL and higher is permitted for wall bracing methods with a 2" to 6" on center nail spacing.
(3) Microllam® LVL and Parallam® PSL are not applicable for wall bracing methods outlined in Table R602.10.4 of the IRC.

Code Evaluations: See ICC-ES ESR-1153, ICC-ES ESR-1387

The illustration on this page depicts the boundaries specified in the 2018 IRC. If your project does not exceed these boundaries, you can use the information provided in this resource sheet. Limits shown are based largely on the IRC; however, where provisions of the code are unclear or incomplete, other resources—such as engineering mechanics, analysis, and the 2018 ANSI/AF&PA Wood Frame Construction Manual (WFCM) for One- and Two-Family Dwellings—were used. Therefore, the information in this document meets the intent of conventional construction and must be followed when using Weyerhaeuser products in these applications.

Wind Limitations
Design wind speed:
< 130 mph in hurricane-prone regions and Hawaii;
< 140 mph elsewhere per IRC Table R301.2(5)B

Seismic Design Categories
A, B, C, D_0, D_1, and D_2. Excludes irregular portions of structures as defined by IRC R301.2.2.6



Limitation Descriptions and IRC References

	Description	2018 IRC Reference
1	Maximum roof span, including overhangs, limited to 40'. Maximum tabulated rafter span (horizontal projection) and ceiling joist span of 25'-7".	R802.10.2.1; footnote to IRC Tables R802.4(1)-R802.4(8), R802.5.1(1), R802.5.1(2)
2	Roof pitch: 3:12 minimum, 12:12 maximum	R802.10.2.1
3	Maximum ground snow load: 70 psf	IRC Section R301.2.3
4	Maximum tabulated roof/ceiling dead load: 20 psf	IRC Tables R802.4.1(1)-R802.4.1(8)
5	Maximum tabulated rafter and ceiling joist spacing: 24" on-center	IRC Tables R802.4(1)-R802.4(8), R802.5.1(1), R802.5.1(2)
6	Maximum tabulated joist span: 25'-7"	IRC Tables R502.3.1(1), R502.3.1(2)
7	Maximum tabulated floor joist spacing: 24" on-center	IRC Tables R502.3.1(1), R502.3.1(2)
8	Maximum uniform floor loads: 40 psf live load, 20 psf dead load	IRC Tables R502.3.1(1), R502.3.1(2)
9	Maximum of 3 stories	IRC Section R101.2
10	Maximum stud spacing: 24" on-center	IRC Table R602.3(5)
11	With TJI® joist floor systems, load-bearing walls must stack directly over bearing walls or beams below. With rectangular joists, walls may be offset a distance equal to the joist depth.	IRC Section R502.4
12	Maximum load-bearing stud length: 10' between points of lateral support	IRC Table R602.3(5)
13	Maximum story height: 10' stud height plus 19" floor framing = 11'-7"	IRC Section R301.3

Stud Specifications for Conventional Applications—per 2018 IRC Table R602.3(5)

Stud Size	Bearing Walls					Nonbearing Walls	
	Laterally unsupported stud height(1)	Maximum spacing when supporting roof and ceiling only	Maximum spacing when supporting one floor, roof, and ceiling	Maximum spacing when supporting two floors, roof, and ceiling	Maximum spacing when supporting one floor only	Laterally unsupported stud height(1)	Maximum spacing
2x4	10'	24"	16"	–	24"	14'	24"
2x6	10'	24"	24"	16"	24"	20'	24"

(1) Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall.

- See IRC for additional requirements and limitations.

When used in conventional construction applications, both 2x4 and 2x6 TimberStrand® LSL studs may be drilled or notched in accordance with IRC section R602.6.

Are engineered wood products code-approved for use with conventional construction provisions of the IRC?

Yes. Weyerhaeuser has obtained code recognition for all of its products, and the following language from IRC Section R104.11 permits using alternative materials, including engineered wood products:

> The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code.

If only some portions of my structure exceed the conventional construction boundaries listed here, can I mix conventional and engineered procedures in a building?

Yes. Using engineered lumber alongside conventional framing is permitted by IRC Section R301.1.3 and is common in today's construction. This guide may be used for the portions of the structure that are within the listed boundaries. It is important to consider the **full load path of the structure, both vertically and laterally,** when determining whether or not a component is within the boundaries. For example, an external load-bearing wall may meet the criteria listed for stud height, story height, wind speed, etc., but may be supporting a roof that is loaded beyond the boundaries, thus causing the wall (and all other members within the load path) to fall outside of the boundaries as well. IRC Section R301.1.3 also addresses the mixing of engineered design and conventional specification, as follows:

> When a building of otherwise conventional construction contains structural elements exceeding the limits of Section R301, or otherwise not conforming to this code, these elements shall be designed in accordance with accepted engineering practice.

It is important to note that dimensional stability differs between sawn lumber and engineered wood products, so the two should not be mixed in applications where differential shrinkage may be a problem. For example, sawn lumber rim board should not be specified when engineered wood joists are used in a floor system.

Will Weyerhaeuser warrant the products specified using this guide?

Weyerhaeuser provides a limited warranty for its products. However, because the code information reproduced or referenced in this guide is prepared by code officials and others outside of Weyerhaeuser, we cannot warrant the adequacy of conventional construction applications.

Why don't my hand calculations match those of the code-specified member?

Code specifications account for system effects such as load sharing, composite action, and redundancy found in conventional structures. Further, Weyerhaeuser has restricted the use of conventional construction provisions in a few applications—such as hip or valley beams, notches, and holes—where standard engineering calculations may indicate a potentially lower performance level.

Will the structure perform adequately?

Proper substitution of engineered wood products into conventional construction applications won't degrade structural performance. The specification guidelines included here are based on code-minimum provisions, which are intended to protect the safety of occupants. The components specified using this guide and the referenced code tables will perform to that level.

In some cases, the conventional construction solution is somewhat conservative. However, in other cases it provides a member that is not as robust as one that meets standard engineering calculation requirements. There are many reasons for these discrepancies; some conservatism stems from an attempt to make the code requirements simple, and some apparent lack of conservatism is supported by a history of acceptable performance and redundant framing practices.

It is important to remember that code provisions are not intended to address homeowner perceptions of quality, and so may not satisfy 100% of homeowners' concerns. In cases where homeowner perceptions of quality—such as floor performance—must be considered, we recommend using other Weyerhaeuser design tools (software and literature) when specifying.

How does this guide compare with the WFCM for One- and Two-Family Dwellings?

This guide and WFCM are highly compatible. In many cases, this guide illustrates how Weyerhaeuser products can be substituted for traditional lumber products in a manner that will provide equal or better performance. This guide imposes additional restrictions on the use of Weyerhaeuser products to ensure adequate performance.

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