



How to Specify Engineered Wood Products



Presented by Aleeta Dene, P.E.

Webinar Attendee Survey



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Who is APA – The Engineered Wood Association?

APA represents approximately 175 member mills in 23 states and seven provinces.



- ☐ Voice of industry
- ☐ Mark of quality
- ☐ Technical support
- ☐ Free education
- ☐ Research
- ☐ Non-profit organization
- ☐ HQ in Tacoma, WA
- ☐ www.apawood.org

What are Engineered Wood Products

Engineered Wood

Any wood-based building material that has been improved physically by a man-made process.



What Are Engineered Wood Products?

Panel Products

- **WSP – Wood Structural Panels**
 - Plywood
 - OSB – Oriented Strand Board
- **Siding**
- **Specialty Panels**
 - Radiant Barrier
 - Formwork
 - Industrial Panels
 - Overlaid Panels
 - APA OSB used as fire rated sheathing



What Are Engineered Wood Products?

Framing Products

- I-Joists
- SCL – Structural Composite Lumber
 - PSL – Parallel Strand Lumber
 - LVL – Laminated Veneer Lumber
 - LSL – Laminated Strand Lumber
 - OSL – Oriented Strand Lumber
- Glulam – Glued Laminated Timber



What Are Engineered Wood Products?

**Framing Product...
or Panel Product**

- **CLT – Cross-Laminated Timber**



Advantages of EWP

- ✓ Sustainable
- ✓ Predictable
- ✓ Performance
- ✓ Less Waste

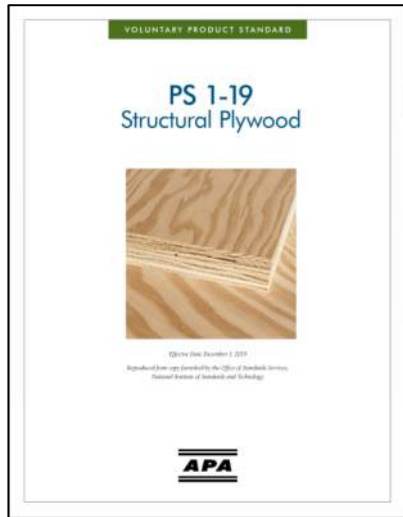


Panel Products

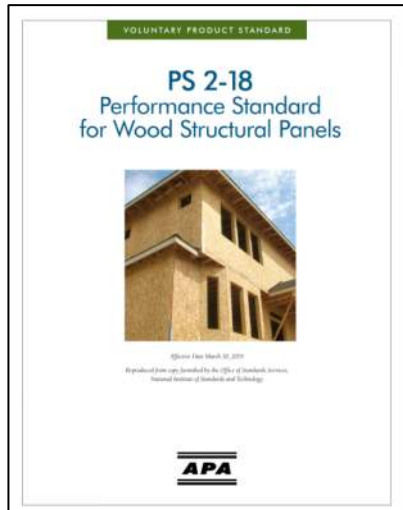
Alternating Layer Direction
Moisture-Resistant Adhesive
Wet and Dry Structural Performance Tests
Available in Exterior and Structural I Grade

Plywood v. OSB
Veneers v. Flakes
Prescriptive Standard v. Performance Standard

Manufacturing Standards



PS 1: Voluntary Product Standard
PRESCRIPTIVE Standard (*revised 2020*)



PS 2: Voluntary Product Standard
PERFORMANCE Standard (*revised 2019*)

Panel Products

Siding and Specialty Panels

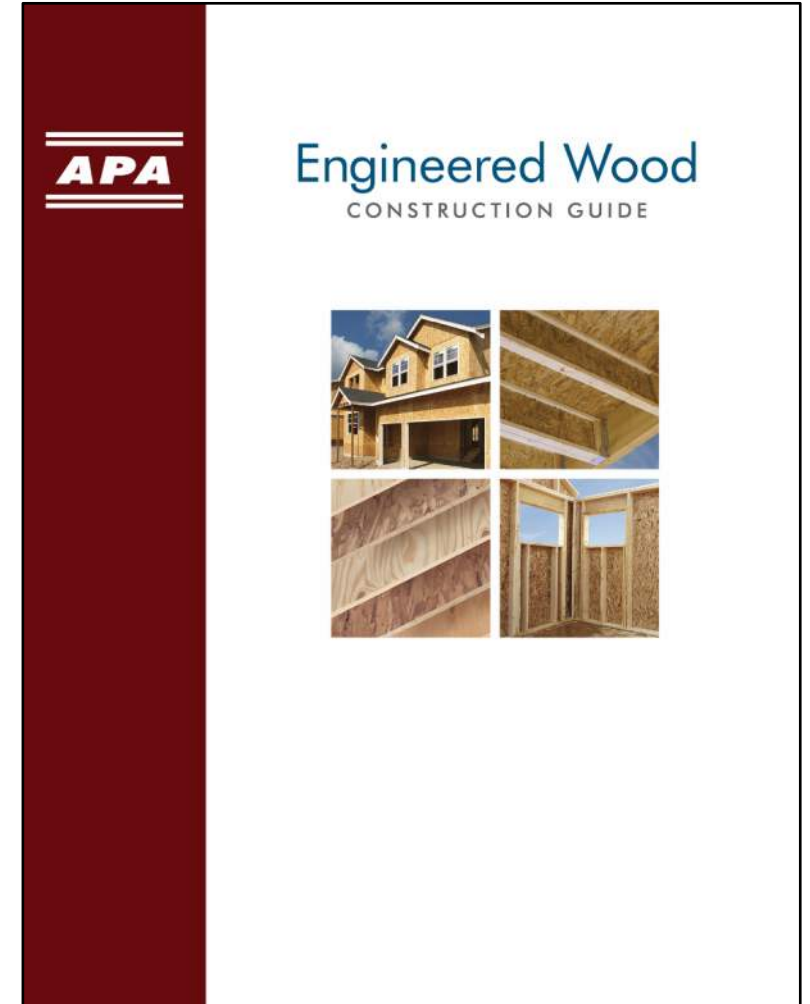
- Siding
- Specialty Panels
 - Radiant Barrier
 - APA Plyform®
 - Industrial Panels
 - Overlaid Panels



APA Specification Resources

APA Engineered Wood Construction Guide, Form E30

- Free PDF download
- Nominal cost for hard copy
- The single “go to” document for all engineered wood products
- www.apawood.org



Panel Specifications

- Refer to APA Engineered Wood Construction Guide, Form E30
 - OSB
 - Plywood
 - Concrete Formwork
 - Exposure 1 vs Exterior explained

Panel Specification Guide¹

CSI* DIVISION 3—CONCRETE FORMWORK

A. Materials

1. **Forms**—Plywood concrete forms shall be (specify appropriate grade):²
APA PLYFORM CLASS I EXT,
APA HIGH DENSITY OVERLAY CONCRETE FORM PLYFORM CLASS I EXT, or
APA MEDIUM DENSITY OVERLAY CONCRETE FORM PLYFORM CLASS I EXT.

Use plywood thickness sufficient to support concrete at temperature and rate poured³; securely brace and shore forms to prevent displacement and to safely support construction loads.

CSI* DIVISION 6—WOOD AND PLASTICS

A. General Provisions

1. **Identification Requirements**—Each panel shall be identified with the appropriate trademark of APA, and shall meet the requirements of the latest edition of Voluntary Product Standard PS 1, Voluntary Product Standard PS 2 or ANSI/APA PRP-210.
2. All panels which have any edge or surface exposed long term to the weather shall be classed Exterior.^{4,5}
3. Panel Performance Category, grade and Group number or span rating shall be at least equal to that shown on the drawings.⁶ Application shall be in accordance with recommendations of APA.⁷

B. Roof Sheathing

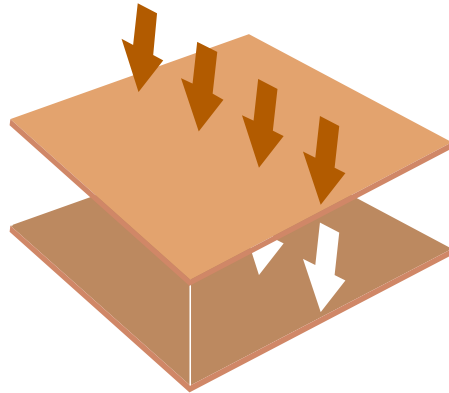
1. Panel roof sheathing shall be (specify appropriate grade):
APA RATED SHEATHING EXP 1
APA RATED SHEATHING EXT
APA RATED SHEATHING/CEILING DECK EXP 1
APA STRUCTURAL I RATED SHEATHING EXP 1, or
APA STRUCTURAL I RATED SHEATHING EXT.

Sheathing exposed long term to weather shall be classed Exterior.⁵

Install with the long dimension or strength axis of the panel across supports, except where noted⁸, and with panel continuous over two or more spans. For pitched roofs, place screened surface or side with skid-resistant coating up, if OSB panels are used. Wear skid-resistant shoes when installing roof sheathing and keep roof deck free of dirt, debris and snow during construction. Suitable edge support



Span Rating

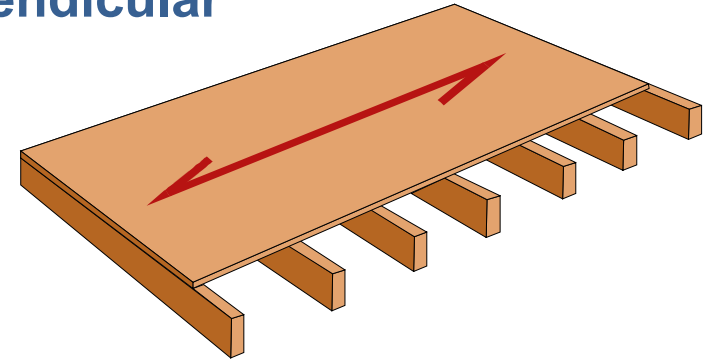


Roof Span L/240
30 PSF live
10 PSF dead

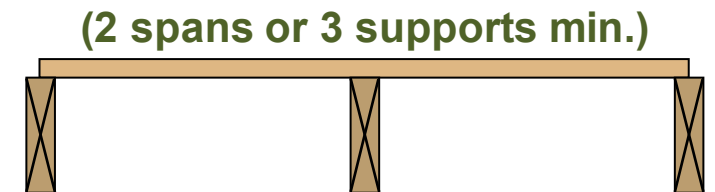
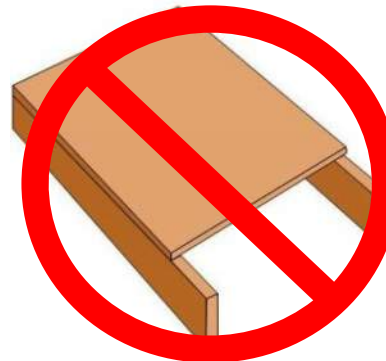
Floor Span L/360
100 PSF live
10 PSF dead

Assumes

1. Strength axis perpendicular to supports

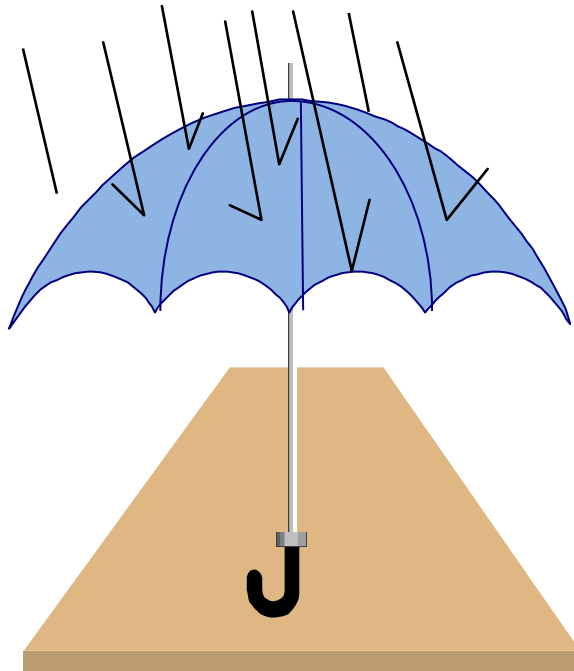


2. Continuous across two or more spans



Bond Classification

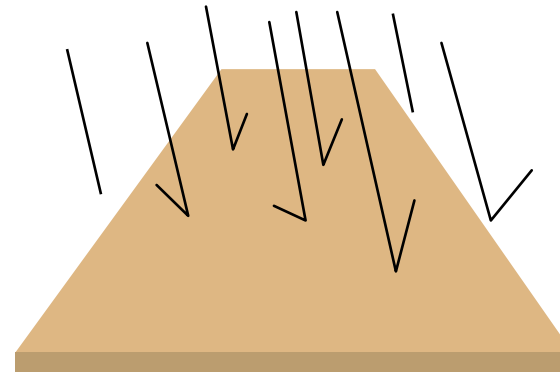
EXPOSURE 1



Exposure due to
active construction

OR

EXTERIOR



Long term weather
exposure

Bond Classification

APA

RATED SHEATHING
24/16

SIZED FOR SPACING
EXPOSURE 1
THICKNESS 0.418 IN.

000



PS 2-18 SHEATHING
PRP-108 HUD-UM-40
7/16 CATEGORY

OR

Bond
Classification

APA

RATED SHEATHING
STRUCTURAL I
48/24

SIZED FOR SPACING
EXTERIOR
THICKNESS 0.703 IN.

000



PS 1-19 C-C PRP-108
23/32 CATEGORY

APA

Panel Specifications

7. FLOOR SHEATHING IS 3/4" TONGUE AND GROOVE C-D PLYWOOD (48/24 RATING) OR OSB, GLUED AND NAILED WITH 10d SCREWS 2-1/2" IN LENGTH AT 6" O.C. AT SUPPORTED EDGES, AND 10d SCREWS 2-1/2" IN LENGTH @ 6" O.C. @ INTERMEDIATE SUPPORTS. SHEATHING SHALL BE CONTINUOUS OVER TWO SPANS WITH FACE GRAIN PERPENDICULAR TO THE SUPPORTS.

8. WALL SHEATHING SHALL MEET SHEAR WALL SCHEDULE FOR REQUIREMENTS OF SHEAR WALLS

- AT INTERIOR WALLS: PROVIDE 5/8" GYPSUM WALLBOARD (SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS) EACH SIDE OF STUDS, Nailed WITH 5d COOLER NAILS AT 7" O.C. (USE 6d COOLER NAILS FOR 5/8" WALLBOARD AT ALL SUPPORTS. PROVIDE SOLID 2x BLOCKING AT ALL SHEET EDGES. BLOCKING IS NOT REQUIRED AT NON-LOAD BEARING PARTITIONS.

- AT EXTERIOR WALLS: SHEATH THE INTERIOR FACE OF WALLS WITH 5/8" GYPSUM WALLBOARD AS NOTED ABOVE FOR INTERIOR WALLS, SHEATH THE EXTERIOR FACE OF WALLS WITH 7/16" CDX PLYWOOD (OR 7/16" O.S.B.), NAILED WITH 8d RING SHANK NAILS AT 6" O.C. AT ALL EDGE SUPPORTS, AND 8d RING SHANK NAILS AT 6" O.C. AT ALL INTERMEDIATE SUPPORTS. PROVIDE SOLID DOUBLE 2x BLOCKING AT ALL SHEET EDGES.

9. ROOF SHEATHING SHALL BE 19/32" C-D PLYWOOD OR OSB (40/20 RATING), NAILED PER ROOF SHEATHING FASTENING SCHEDULE. PROVIDE ONE PLYWOOD CLIP PER SPAN BETWEEN SHEET EDGES. PROVIDE SOLID 2x BLOCKING BETWEEN SUPPORTS AT ALL HIPS, RIDGES, VALLEYS, AND CHANGES IN ROOF SLOPE. PLYWOOD SHEATHING SHALL BE CONTINUOUS OVER TWO SPANS WITH FACE GRAIN PERPENDICULAR TO THE SUPPORTS, ALL ROOF SHEATHING SHALL BE RATED FOR EXPOSURE-1

FYI:

- ✓ Instead of OSB or Plywood *consider* **“Wood Structural Panel”**
- ✓ Use the wording **“Panel Performance Category”** rather than exact panel thickness (for example 3/4”)
- ✓ Just say “NO” to “CDX”. Instead use **“rated sheathing”**

APA Performance Panels

When specifying panels, designate: grade, span rating, bond classification, dimensions (thickness, width x length), edge, APA trademark.

Out of Date Specifications

- **1/2" CDX** - C & D veneers, with exterior glue (when panels were made with interior & exterior glue)

Previous Specifications

- **15/32" APA Rated Sheathing, 32/16, Exposure 1**

New Terminology www.apawood.org/apa-trademark

- **15/32 Performance Category, APA Rated Sheathing, 32/16, Exposure 1, nominal 4'x8' (either T&G for tongue and groove or square edge)**

Panel Specifications



Consider adding to specs.:

- 1/8" gap all panel edges
- Fasteners 3/8" from panel edges
- Wet weather installation

Refer to APA Publications:

X501 – Questions on Panel...Moisture...

D481 – TN Minimizing Buckling of WSP

APA Stamp in the Field



Framing Products

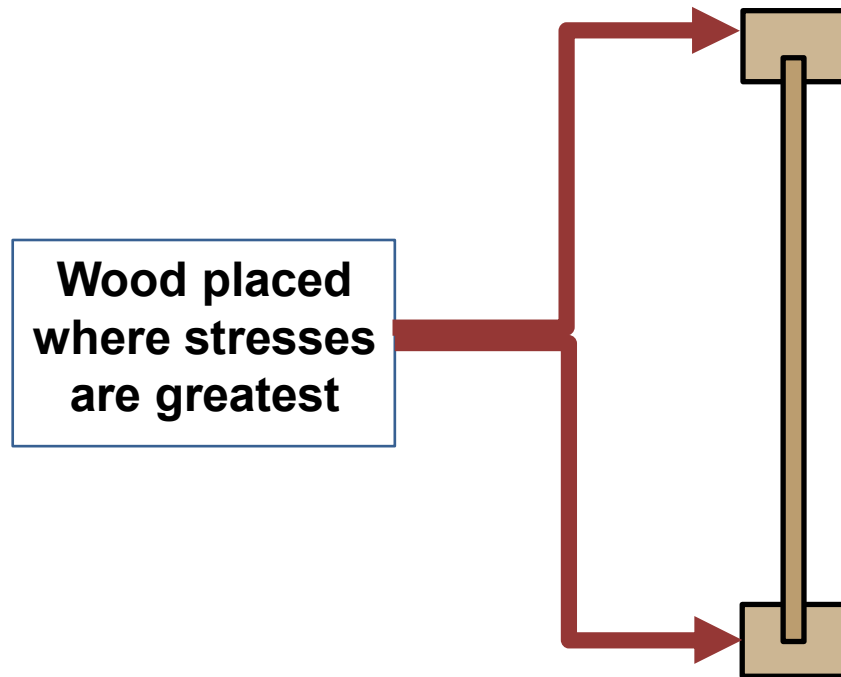
Framing Products

- **I-Joists**
- **SCL – Structural Composite Lumber**
 - LVL – Laminated Veneer Lumber
 - LSL – Laminated Strand Lumber
 - OSL – Oriented Strand Lumber
 - PSL – Parallel Strand Lumber
- **Glulam – Glued Laminated Timber**



I-Joist Advantages

Engineered design = More efficient



- 46% less than lumber at 16" vs. I-joist at 19.2"
- 36% less when both are at 16"

I-Joist Specifications

- Refer to:
 - APA Form E30
 - APA PRI-400 (residential)
 - APA PRI-405 (commercial)
 - Proprietary manufacturer published specifications

1 2 3 4 5
| MM-DD-YR-HR MANF. LOGO || **APA** 11-7/8 XXX-XX MILL 000 PR-LXXX ESR-XXXX ||
1. Date 2. APA manufacturer logo 3. Product depth and designation 4. APA mill number 5. Product evaluation reports

APA Performance Rated I-Joist Specification Guide

The following is a guide for specifying APA Performance Rated I-Joists (PRI) to be used in residential floor applications. These structural products are available in net depths of 9-1/2, 11-7/8, 14 and 16 inches and can be used for simple- or multiple-span floor construction. Exterior use, or use of wood I-joists in other than dry conditions, is not recommended.

A. General

1. APA PRIs shall be furnished and installed as shown by the approved building plans and installation instructions.
2. The designation of APA PRIs shall be based on the applicable loading, joist spacing and spans shown in the plans. PRIs may be selected using Tables 11 and 12. For non-uniform loading conditions requiring an engineering analysis, see Table 8 of APA Performance Rated I-Joists, Form Z725, for PRI joist design properties. The specification for I-joists required for a specific floor application shall include joist depth, designation, length and number of pieces required.

Example: 21 pieces—APA 9-1/2" PRI-40 x 30 feet long

3. All accessory products such as I-joist blocking panels, rim boards, squash blocks, web stiffeners, etc., shall be provided and installed in accordance with the applicable installation details shown in APA Performance Rated I-Joists, Form Z725.
4. APA trademarked structural glued laminated timber (glulam) or approved structural composite lumber (SCL) shall be furnished for load-bearing joist headers. The depth of these components shall be specified to match the I-joist depth when flush framing is required.

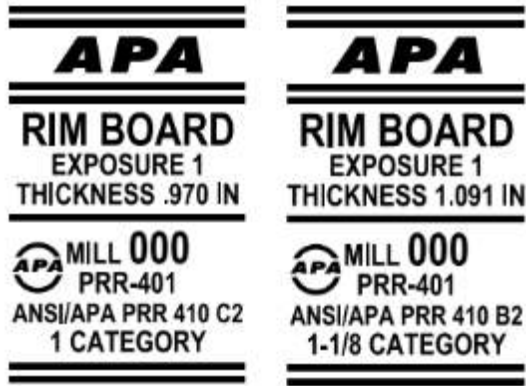
The contractor shall use approved connection hardware (joist hangers) as specified in the plans. Such hardware shall be compatible with the width and depth of APA PRIs furnished, to provide flush nailing surfaces at adjoining members and to prevent rotation.

B. Manufacture

1. *Materials, Manufacture and Quality Assurance*—Product quality shall conform to the manufacturer's approved quality manual, with quality assurance inspection services provided by APA in accordance with

Rim Board

TYPICAL RIM BOARD TRADEMARKS



Various EW products used as a rim board and typical thickness:

- ❑ Glulam (typ. 3-1/2")
- ❑ LSL (typ. 1-1/8", 1-1/4", 1-1/2", 1-3/4", 3-1/2")
- ❑ LVL (typ. 1-1/4", 1-1/2", 1-3/4", 3-1/2")
- ❑ OSB (typ. 1", 1-1/8")
- ❑ OSL (typ. 1-1/4", 1-3/4")

Use 100% EWP in the floor system. Do not use a mix of sawn lumber with EWP because shrinkage and dimensional differences can be problematic.

Engineered Floor Systems

Engineered design = Better systems

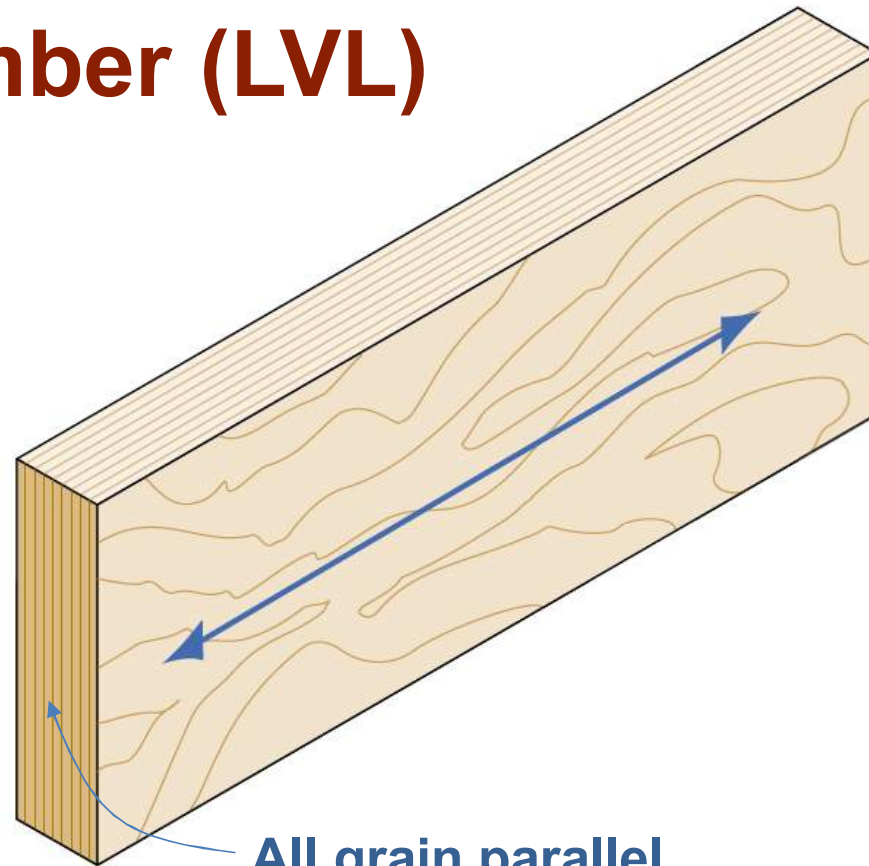
Flatter surfaces, stronger, quieter floors, fewer problems



Structural Composite Lumber

Laminated Veneer Lumber (LVL)

- **Common uses**
 - Beams
 - Headers
 - Rafters
 - Scaffold planking



Structural Composite Lumber

Laminated Strand Lumber (LSL)

- Flaked strand length-to-thickness ratio is around 150
- Common uses: studs and headers

Oriented Strand Lumber (OSL)

- Flaked strand length-to-thickness ratio is around 75
- Common uses: studs



SCL Specifications

- Refer to:
 - APA Form E30
 - Proprietary manufacturer published specifications
- SCL Includes:
 - LVL
 - LSL
 - OSL
 - PSL



1. Qualified SCL grade (usually represented by design values).
2. APA mill number.
3. Product evaluation reports.
4. Standard specification for LVL.

Structural Composite Lumber (SCL) Specification Guide

A. General

1. SCL shall be furnished and installed as shown on the approved building plans and in accordance with the specifications of the SCL manufacturer.
2. The contractor shall use approved hardware and connections as specified in the plans.

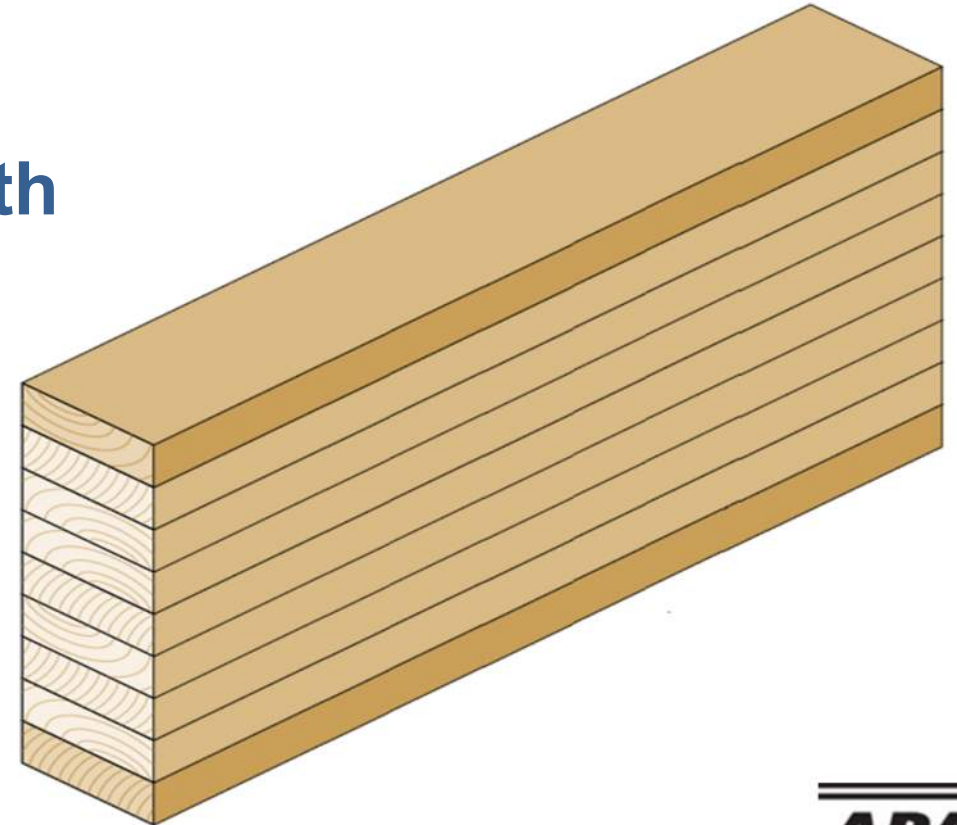
B. Manufacture

1. **Materials, Manufacture and Quality Assurance**—Product quality shall conform to the manufacturer's approved quality manual, with quality assurance inspection services provided by APA in accordance with building code requirements and the applicable APA Product Report or code evaluation report.
2. **Trademarks**—SCL shall be marked with the APA trademark, indicating conformance with the manufacturer's APA Product Report or code evaluation report.
3. **Job Site Shipment**—SCL shall be protected from direct exposure to weather prior to installation.
4. **Protection for Shipment**—Members shall be protected with a water-resistant covering for shipment.

Glued Laminated Timbers (Glulam)

Dimension lumber laminations

- Wood laminations bonded together
- Wood grain runs parallel to the length
- May or may not be homogeneous
- Common uses: beams, headers and columns

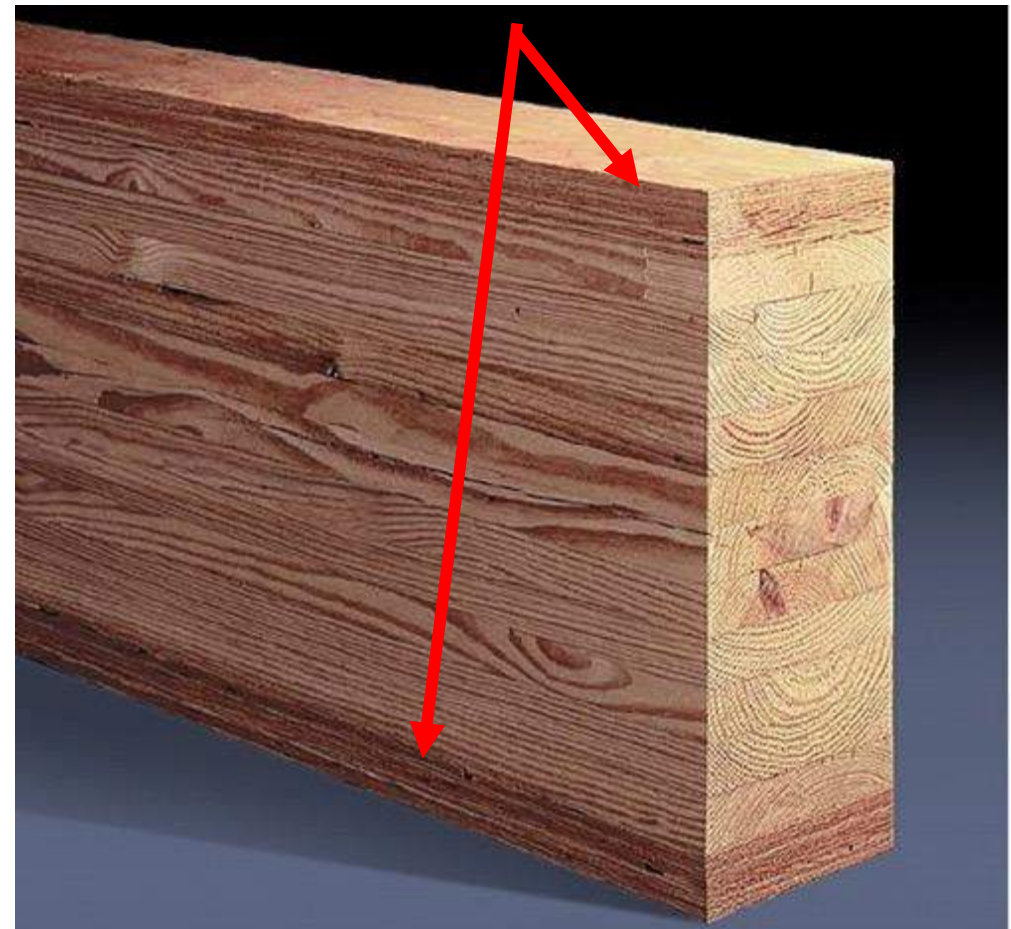


High Strength Glulam Beams

LVL Hybrid Glulam with LVL Outer Laminations

- Full length with no finger joints required
- LVL has greater tensile strength compared to lumber
- 30F-2.1E stress level achieved
- Direct substitute for many SCL products

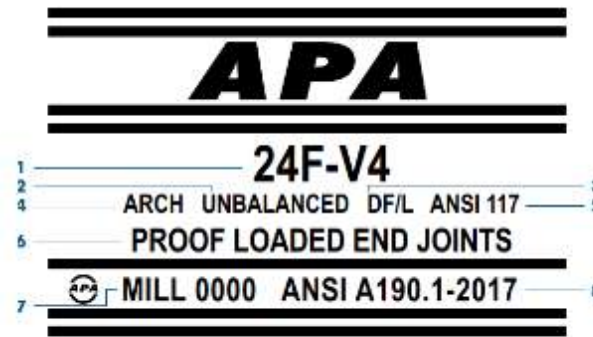
LVL Laminations



Glulam Specifications

■ Refer to:

- **APA Engineered Wood Construction Guide, Form E30**
- **ANSI A190.1-2022: Product Standard for Structural Glued Laminated Timber**



1. Combination symbol.
2. Unbalanced layout.
3. The species or species group of lumber used.
4. Designation of appearance classification.
5. Applicable design and manufacturing specification.
6. Indicates the member has the required laminations proof loaded.
7. Mill number.
8. Identification of ANSI A190.1, the Standard for Wood Products – Structural Glued Laminated Timber.

Glulam Specification Guide

The following is a guide for preparing specifications for structural glued laminated timber used for bending members such as purlins, beams or girders or for axially loaded members such as columns or truss chords.

A. General

1. Structural glued laminated timber shall be furnished as shown on the plans and in accordance with the following specifications. (Where other uses or requirements are applicable, modify specifications accordingly.)
2. For custom designed members, shop drawings and details shall be furnished by the (manufacturer) (seller) and approval obtained from the (architect) (engineer) (general contractor) (buyer) before fabrication is begun.
3. The (manufacturer) (seller) (general contractor) shall furnish connection steel and hardware for joining structural glued laminated timber members to each other and to their supports, exclusive of anchorage embedded in masonry or concrete, setting plates and items field-welded to structural steel. Steel connections shall be finished with a minimum of one coat of rust-inhibiting paint.

B. Manufacture

1. **Materials, Manufacture and Quality Assurance**—Structural glued laminated timber of softwood species shall be in conformance with ANSI A190.1, Standard for Wood Products – Structural Glued Laminated Timber, or other code-approved design, manufacturing and/or quality assurance procedures.
2. **End-Use Application**—Structural glued laminated timber members shall be manufactured for the following structural uses as applicable: (Simple span bending member—B) (continuous or cantilever span bending member—CB) (compression member—C) (tension member—T).
3. **Design Values**—Structural glued laminated timber shall provide design values for normal load duration and dry-use condition.^{1,2} The design should specify a layout combination from ANSI 117 or specify a stress class from Table 9.
4. **Appearance Classification**—Structural glued laminated timber shall be (framing) (framing-L) (industrial) (industrial-L) (architectural) (premium) classification³ in accordance with ANSI A190.1.
5. **Laminating Adhesives**—Adhesives used in the manufacture of structural glued laminated timber shall meet requirements for (wet-use) (dry-use) service conditions.¹
6. **Camber (when applicable)**—Structural glued laminated timber (shall) (shall not) be manufactured with a built-in camber.
7. **Preservative Treatment (when applicable)**—Structural glued laminated timber shall be pressure treated after manufacture in accordance with American Wood Protection Association (AWPA) Standard U1 with (creosote or creosote/coal tar solution) (pentachlorophenol in oil) (pentachlorophenol in light solvent) (copper naphthenate) preservatives as required for (soil contact) (above ground) exposure.⁴
8. **Fire Resistance (when applicable)**—Structural glued laminated timber shall be sized and manufactured for one-hour fire resistance.⁵ The use of pressure impregnated fire retardant treatments is not recommended.
9. **Protective Sealers and Finishes**—Unless otherwise specified, sealer shall be applied to the ends of all

Glulam Specifications

Glulam Beam Combination Symbols

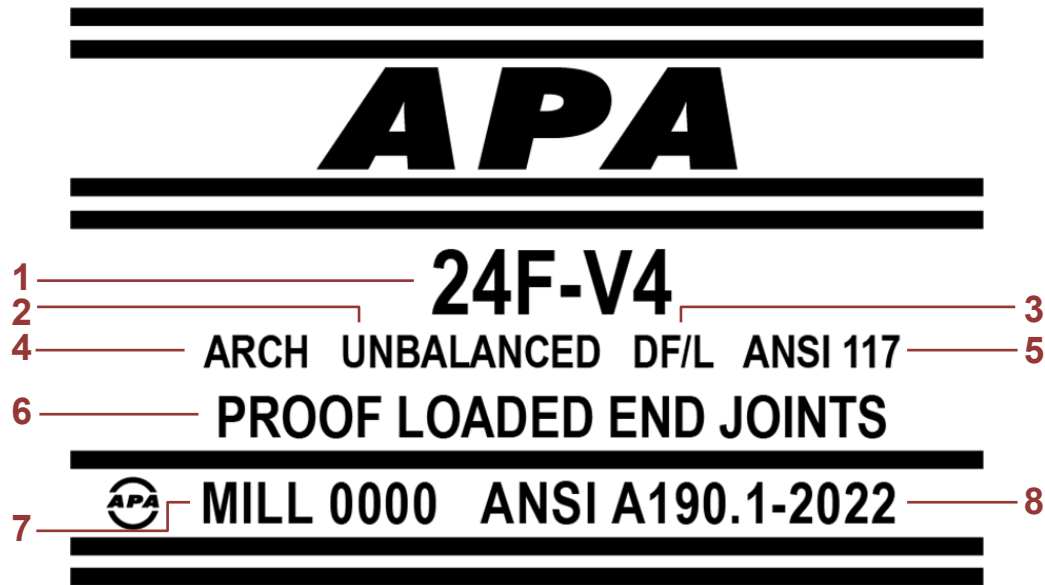
1. Allowable Design Stress
2. Appearance Classification
3. Grading = Visual (V) or Mechanical (E)
4. Assigned combination number of lumber used to assign the design stresses
 - Shear, Modulus of Elasticity, etc.
5. Wood Species: Commonly DF or SP

Common Beam Combinations:

- 24F-V4/DF or 24F-V8/DF – $F_{bx} = 2,400$ psi, or Combination 2/DF – $F_{bx} = 1,700$ psi
- 24F-V3/SP or 24F-V5/SP – $F_{bx} = 2,400$ psi, or Combination 47/SP – $F_{bx} = 1,400$ psi
- High strength 30F-E1/SP or 30F-E2/SP – $F_{bx} = 3,000$ psi

Glulam Specifications

Glulam Trademark



1. Combination symbol
2. Unbalanced layup
3. The species or species group of lumber used
4. Designation of appearance classification
5. Applicable design and manufacturing specification
6. Indicates the member has the required laminations proof loaded
7. Mill number
8. Identification of *ANSI A190.1, Standard for Wood Products – Structural Glued Laminated Timber.*

CLT

Cross-Laminated Timber (CLT)

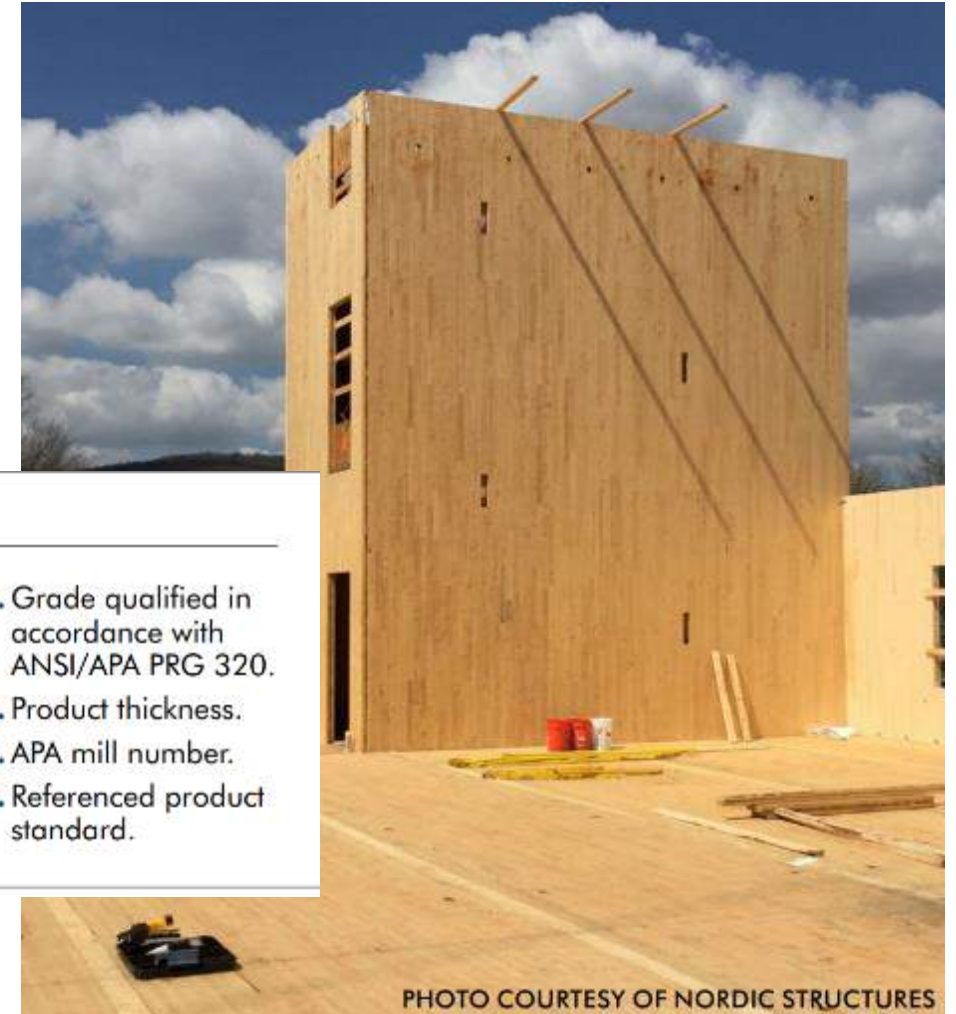
- Applications: long span walls, floors, roof panels
- Typical Sizing: 2-10' wide, $\leq 60'$ lengths, $\leq 20''$ thicknesses
- Publications: 2018 IBC, 2018 NDS, ANSI/APA PRG 320



CLT Panels

Cross-laminated timber (CLT) is a large-scale, prefabricated, solid engineered wood panel.

- **Lightweight & strong**
- **Excellent acoustic, fire, seismic and thermal performance**
- **Easy to install**
- **Little site waste**
- **Green product & Biophilia effect**
- **Alternative to concrete, masonry or steel**



TYPICAL CLT TRADEMARK



1. Grade qualified in accordance with ANSI/APA PRG 320.
2. Product thickness.
3. APA mill number.
4. Referenced product standard.

CLT Specifications

- **Refer to:**
 - **APA Form E30**
 - **ANSI/APA PRG 320 (basic CLT grades)**
 - **APA Product Reports (custom CLT grades)**



Cross-Laminated Timber (CLT) Specification Guide

A. General

CLT shall be furnished and installed in accordance with the recommendations provided by the CLT manufacturer and the engineering drawing approved by the engineer of record. Permissible details shall be in accordance with the engineering drawing.

B. Manufacture

1. *Materials, Manufacture and Quality Assurance*—Product quality shall conform to ANSI/APA PRG 320, *Standard for Performance-Rated Cross-Laminated Timber*.
2. *Trademarks*—CLT products conforming to ANSI/APA PRG 320, *Standard for Performance-Rated Cross-Laminated Timber*, shall be marked with CLT grade, CLT thickness or identification, mill name or identification number, the APA logo and "ANSI/APA PRG 320." The top face of custom CLT panels with unbalanced layup used for roof or floor shall be marked with "TOP" stamp.
3. *Protection for Shipment*—Members shall be protected with a water-resistant covering for shipment.

Code Recognized

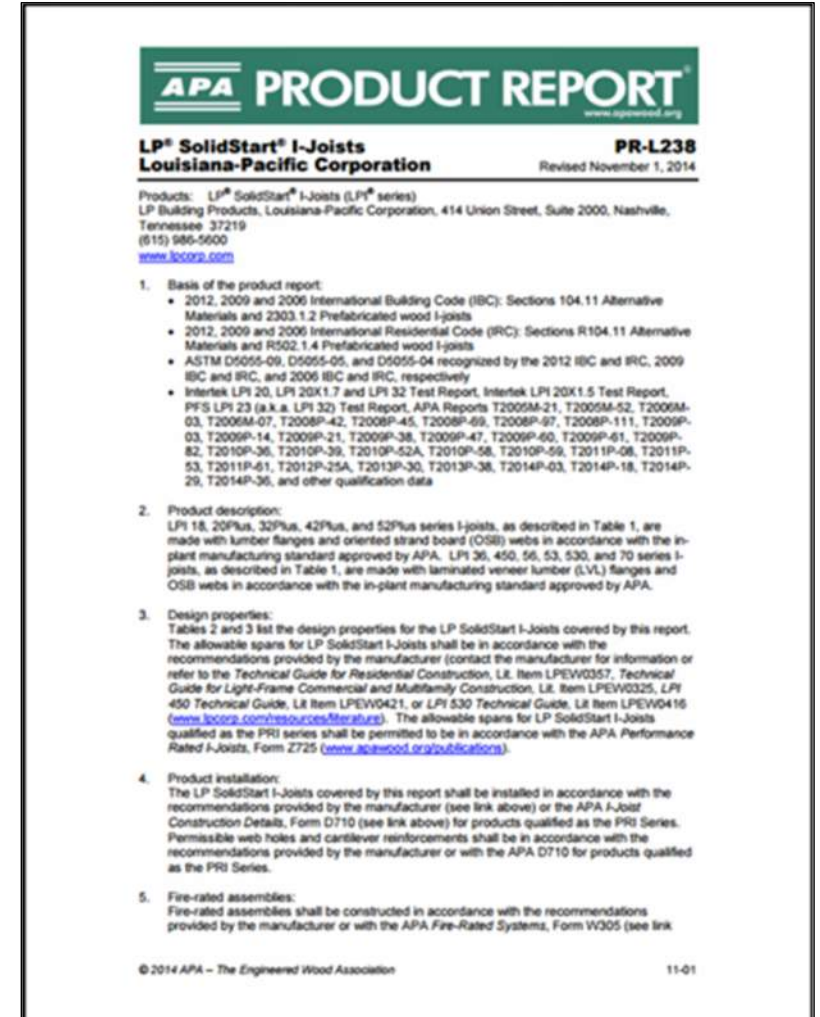
Proprietary **vs** Non-Proprietary

- Lab Tested
 - ES Reports
 - I-Joists
 - Structural Composite Lumber (SCL)
- Lab Tested
 - Code Design Values
 - Plywood
 - Oriented Strand Board
 - Glulam
 - Cross-Laminated Timber (CLT)



APA Product Reports

- Report indicates that product meets the intention of the listed codes when used as stated and within the specified limitations.
- Design properties are included.
- Available for download at www.apawood.org



Engineered Wood: A Green Choice

www.apawood.org/green-verification-reports



Engineered Wood Product
Engineered Wood Manufacturing

GR-L000

Engineered Wood Manufacturing
1111 S. First Avenue
Woodtown, Ontario XXX111
www.EngineeredWoodManufacturing.com

1. Basis of the green verification report:
 - 2012 and 2008 National Green Building Standard, ICC 700
 - 2009 LEED for New Construction and Major Renovations
 - 2009 LEED Canada for New Construction and Major Renovations
 - ASTM D5456-09 and D5456-05a recognized by the 2012 IBC and IRC, and 2009 IBC, respectively
 - APA Q415, Green Verification Checklist – ICC 700-2012
 - APA L410, Green Verification Checklist – ICC 700-2008
 - APA L415, Green Verification Checklist – LEED
 - APA Product Report PR-L233
 - Documentation supporting green product verification
2. Product description:

www.apawood.org/newsletters

- Go to www.apawood.org/newsletters
- Register with APA
- Follow instructions for newsletter sign up
- Registering gives you access to APA publications, webinars and newsletters



PUBLICATIONS, VIDEOS, CAD DETAILS AND MORE



APA Update e-Newsletter
The *APA Update* e-Newsletter highlights new and updated resources from APA. Distributed monthly to those who request it when registering for access to APA publications.



DESIGNERS CIRCLE
FOR BUILDING PROFESSIONALS



APA Designers Circle e-Newsletter
The *Designers Circle* e-Newsletter for architects, engineers and building design professionals features the latest information about commercial wood-frame construction engineering and design. Distributed quarterly, it includes case studies, feature articles, upcoming events and more.

Field Services Division Territories



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