How to Specify Engineered Wood Products

Presented by Robert Kuserk, PE

Webinar Attendee Survey

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https://www.apawood.org/apa-ww-survey

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

The leading resource for information about 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

APA – The Engineered Wood Association
What Are Engineered Wood Products?

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

What Are Engineered Wood Products?

Framing Products… 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

Span Rating
Assumes
1. Strength axis perpendicular to supports
2. Continuous across two or more spans

Assumptions:
- Roof Span L/240
  - 30 PSF live
  - 10 PSF dead
- Floor Span L/360
  - 100 PSF live
  - 10 PSF dead

Additional notes:
- Assumes supports at 12 spans or 3 supports max.
Bond Classification

EXPOSURE 1
Exposure due to active construction

OR

EXTERIOR
Long term weather exposure

Panel Specifications

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”
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)

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

Panel Specifications

APA Stamp in the Field
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

- Wood placed where stresses are greatest
- 46% less than lumber at 16" vs. I-joist at 19.2"
- 36% less when both are at 16"

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

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

- All grain parallel to length
### Parallel Strand Lumber (PSL)
- Common uses: headers, beams, load-bearing columns
- Veneers clipped into long strands varying length 300 to 1 or 24” to 96” long
- Parallel strand placement
- Specs are published on a proprietary basis by the manufacturer and recognized in evaluation reports.

### Laminated Strand Lumber (LSL)
- Flaked strands length to thickness ratio about 150 to 1 or 12” long
- Common uses: rim boards, studs, columns and headers

### Oriented Strand Lumber (OSL)
- Flaked strands length to thickness ratio about 75 to 1 or 6” long
- Common uses: studs

### Structural Composite Lumber (SCL) Specifications
- Refer to: APA Form E30
- Proprietary manufacturer published specifications
- SCL Includes: LVL, LSL, OSL, PSL

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**Structural Composite Lumber**

**Laminated Strand Lumber (LSL)**
- Flaked strands length to thickness ratio about 150 to 1 or 12” long
- Common uses: rim boards, studs, columns and headers

**Oriented Strand Lumber (OSL)**
- Flaked strands length to thickness ratio about 75 to 1 or 6” long
- Common uses: studs

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

Glulam Specifications

- Refer to:
  - APA Engineered Wood Construction Guide, Form E30
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 – $F_{w,0} = 2,400$ psi, or Combination 2DF – $F_{w,0} = 2,400$ psi
- 24F-V3/SP or 24F-V5/SP – $F_{w,0} = 2,400$ psi, or Combination 47F/SP – $F_{w,0} = 2,400$ psi
- High strength 30F-E1/SP or 30F-E2/SP – $F_{w,0} = 3,000$ psi

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

CLT

Cross-Laminated Timber (CLT)
- Applications: long span walls, floors, roof panels
- Typical Sizing: 2'-10" wide, ≤ 60' lengths, ≤ 20" thicknesses
- Publications: 2018 IBC, 2018 NDS, ANSI/APA PRG 320
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

CLT Panels

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 contained herein and shall comply with the requirements of the building code specified by the engineer of record. Preparation details shall be in accordance with the engineering drawings.

B. Manufacture

2. Cross-Sectional Properties: Cross-sections of Cross-Laminated Timber shall be measured with CLT grades, CLT specifications or identification, and shall be in accordance with the recommendations of ANSI/AHAM PRG 320. The dimensions of waterer (CLT) shall be in accord with the American Coast Lumber Industry for CLT and not less than the values specified in the engineering drawings.
3. Protection for Sheathing: Sheathing shall be protected with a water-resistant covering for installation.

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

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- Register with APA
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