

# TECHLINE

## Properties and Use of Wood, Composites, and Fiber Products

### Structural Composite Lumber



Manufacturers of wood products are facing a challenge: the available resource is declining in size and quality while the demand for higher quality structural wood products is increasing. Structural composite lumber is a family of reconstituted lumber products that can help meet the challenge. It has extremely uniform strength and stiffness properties and is almost warp free. The desired length and width of composite lumber can be economically produced regardless of the size of the trees available. Because many species can be used almost interchangeably, more timber harvested from a single stand can be utilized. The two types of commercially available structural composite lumber are laminated veneer lumber and parallel-strand lumber.

**Laminated veneer lumber (LVL)** is manufactured from layers of veneer with the grain of all the layers parallel. (This contrasts with plywood, in which the grain orientation of adjacent layers is perpendicular.) Most manufacturers use sheets of 1/10- to 1/6-in.- (2.5- to 4.2-mm-) thick veneer. These veneers are stacked to the required thickness and may be laid end to end to the desired length with staggered end joints in the veneer. Waterproof adhesives are generally used to bond the veneer under pressure. The resulting product is a billet of lumber that may be up to 1-3/4 in. (44-mm) thick, 4 ft (1.2 m) wide, and 80 ft (24.4 m) long. The billets are ripped to the desired width and cut to the desired length. Common sizes of LVL are similar to those of sawn lumber.

**Parallel-strand lumber (PSL)** is manufactured from strands or elongated flakes of wood. One product is made from veneer clipped to 1/2 in. (13 mm) wide and up to 8 ft (2.4 m) long. Another product uses elongated flakes and technology similar to that used to produce oriented strand-board. For yet another product, interconnected strands crushed from small logs are assembled to the desired configuration. All the products use waterproof adhesive that is cured under pressure. The size of the product is controlled during manufacture through adjustments in the amount of material and pressure applied. PSL is commonly available in the same sizes as structural timbers or lumber.

Design values for either LVL or PSL are not standardized. Rather, standard procedures are used by each manufacturer

to develop their design values (ASTM D5456). Thus, design information for LVL and PSL varies by manufacturer and is provided in their product literature. Generally, engineering design properties compare favorably with or exceed those of high-quality, solid-sawn dimension lumber.

For a list of manufacturers, contact

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Recent work with LVL has demonstrated the effect of juvenile wood on the structural integrity of an LVL product: Small portions of juvenile wood strategically placed have little effect on properties. The greatest effect of juvenile wood on LVL is in the cost of manufacturing. Ongoing research at the Forest Products Laboratory is focused on the effect of low moisture and long-term, high-temperature exposure on properties of structural composite lumber.

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#### References

American Society for Testing and Materials. 1996. ASTM Standard D5456, Standard specification for evaluation of structural composite lumber products. Annual Book of Standards, Vol. 4.10. West Conshohocken, PA.

Kretschmann, David E.; Moody, Russell C.; Pellerin, Roy F.; Bendtsen, B. Alan; Cahill, James M.; McAlister, Robert H.; Sharp, Donald W. 1993. Effect of various proportions of juvenile wood on laminated veneer lumber. Res. Pap. FPL-RP-521. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 31 p.



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