

## ESL® Engineered Strand Lumber

ESL® is a structural product in which the uni-directional alignment of strands provides strength along the length of the product making it suitable for spanning applications such as beams, lintels, scaffolding planks, power pole cross arms, exterior decking and playground equipment.

ESL®'s beauty and strength is also perfect for interior applications, such as door jambs, flooring, stair treads and window frames.

## ESB® Engineered Strand Board

ESB® is a board product and comprises strands aligned bi-directionally i.e. in layers that are oriented at 90 degrees to each other ensuring strength in two directions.

ESB® is suited to panel applications such as external cladding, sea container flooring and concrete formwork.



**LIGNOR**  
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Lignor Product  
Characteristics





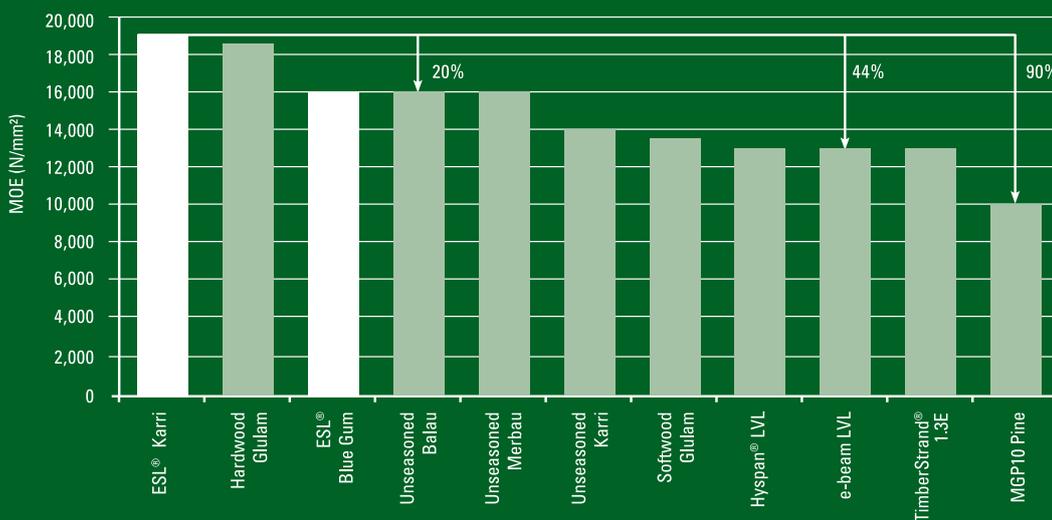
## Exceptional Performance

Lignor has undertaken extensive independent testing at leading laboratories in Germany, Canada and Australia. Tests have already been completed to test the strength, moisture resistance and internal bonding of ESL® and ESB®.

Lignor's plant is being designed to produce products in a range of sizes from 19-150mm thickness by up to 2.4m wide and up to 24m long. The applications are seemingly endless. By contrast, availability of large dimension sawn hardwoods is becoming increasingly limited.

ESL® is up to 44% stronger than high strength LVL, is stronger than all commonly available types of glulam and hardwoods, and can replace steel in certain applications based on strength. Based on this higher strength, 12-24% less volume of ESL® may be required for the same application when compared with LVL, softwood and hardwood.

### Strength of ESL® Relative to Other Structural Products



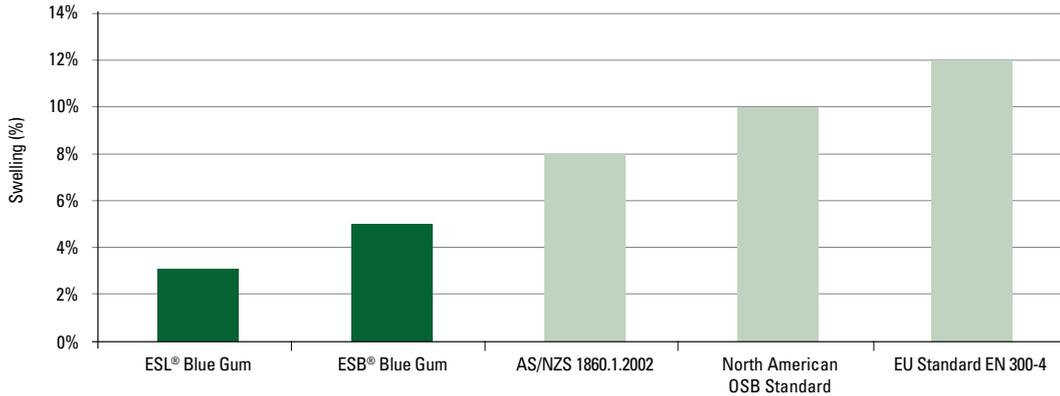
*Note: Some unseasoned hardwoods when seasoned have improved strength ratings but are not included as they are either not commercially available or cannot be produced in lengths and section sizes comparable to ESL®. The MOEs shown for glulam and hardwood are maximums available. Source: AS1720.2-2006, AS1720.1-1997, www.timber.org.au, company websites.*

Blue gum ESL<sup>®</sup> demonstrates an average modulus of elasticity (MOE) of 16,000N/mm<sup>2</sup>.

In testing completed to date, karri ESL<sup>®</sup> achieved an average MOE of 19,000N/mm<sup>2</sup> and this value is expected to increase as the product recipe and process is optimised for this wood species.

ESL<sup>®</sup> and ESB<sup>®</sup> exhibit excellent wear and water resistance properties due to the use of eucalypt hardwood and resulting high density of the products. The products also demonstrate low susceptibility to water swell, ingress and rot, with 24 hour swell test results significantly better than those required by international standards.

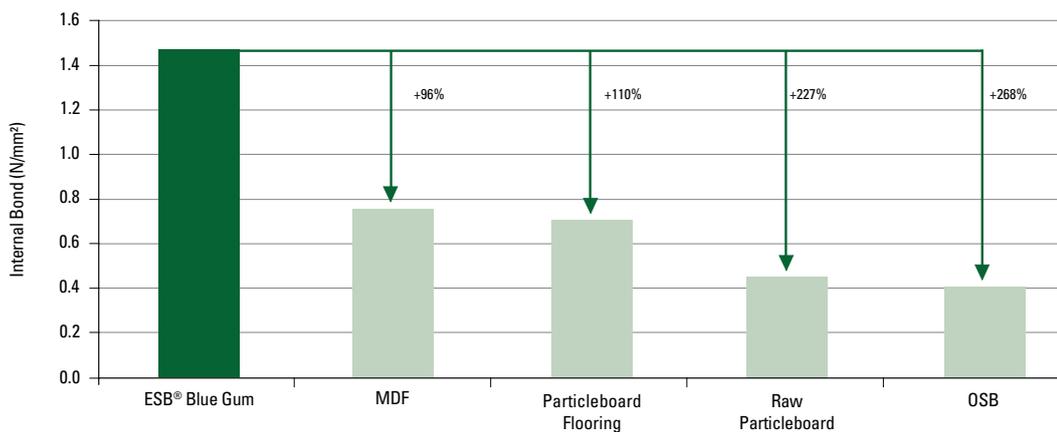
### ESL<sup>®</sup> and ESB<sup>®</sup> Water Absorption



Source: Lignor, respective Canadian, European and Australian standards.

ESL<sup>®</sup> and ESB<sup>®</sup> can be sawn, routed, profiled, turned, nailed and screwed in all planes. The internal bond strength for the products is exceptionally high and this high internal bond contributes to the reduced fixing requirements.

### ESB<sup>®</sup> Internal Bond Strength versus Other Board Products



Source: Lignor, BIS Shrapnel 2004 "The market potential for engineered strand lumber and engineered strand board in Australia and internationally" (comparative products).





## Production Process

ESL® and ESB® will be produced through a fully automated production process. After the logs are de-barked, they are shredded into thin strands. Stranding is a method commonly used in North America to produce engineered wood products. They are manufactured by bonding various forms of wood fibres to make a composite unit that is stronger and stiffer than the sum of its parts.

The strands are impregnated with resins and treatments and then formed into a large mat. The billets are compressed to form an exceptionally strong, termite, wet rot and fungal resistant product which is then cut into the final product dimensions.

## Treatments used

One of the benefits of using ESL® and ESB® over other engineered products is the use of non-toxic resins and treatments.

Lignor will use a non-formaldehyde based water resistant resin which is used to compress and bond

the strands together. The adhesion mechanism in the resin provides both a chemical and mechanical bond, contributing to the high internal bond property. The extra strength of this bond adds to the toughness and durability of the product.

The resin is usually unaffected by UV light. Sawdust and sander dust from the finished product can be considered as wood dust for health and safety purposes, in contrast to formaldehyde based resins used in many other engineered wood products, which result in additional health hazards when the products are burnt, sawn or sanded.

The treatment for termite and mould resistance is applied throughout the product and not just as a surface treatment. This means that ESL® and ESB® can be sawn without compromising protection.

Lignor's products are being developed to hazard class H3 standard, making them suitable for use in places where the timber is kept off the ground but is exposed to weather or periodic wetting.

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