

## LP Building Products

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Agrément Certificate

09/4634

Product Sheet 1

## LP LAMINATED VENEER LUMBER (LVL)

### LP SOLIDSTART LVL

#### PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to LP SolidStart LVL (Laminated Veneer Lumber), a wood-based material for use in structural members (eg beams, joists, lintels, rafters, ties, struts) or structural framing, and also for the fabrication of built-up components such as trusses and panels.

#### AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



#### KEY FACTORS ASSESSED

**Behaviour in relation to moisture** — the product will not be adversely affected by moisture under the internal conditions of a service class 1 or 2 environment as defined in BS 5268-2 : 2002 (see section 5).

**Structural performance** — structural requirements are met provided design is in accordance with the recommendations given in this Certificate (see section 6).

**Behaviour in relation to fire** — it can be shown by tests and assessment that the buildings will meet Building Regulations' requirements for fire rating (see section 7).

**Durability** — the product will have adequate durability for use in internal conditions of a service class 1 or 2 environment (see section 9).

The BBA has awarded this Agrément Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Brian Chamberlain  
Head of Approvals — Engineering

Greg Cooper  
Chief Executive

Date of First issue: 24 March 2009

*The BBA is a UKAS accredited certification body — Number 1113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at [www.bbacerts.co.uk](http://www.bbacerts.co.uk)*

*Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.*

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# Regulations

In the opinion of the BBA, LP SolidStart LVL, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



## The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	A1	Loading
Comment:		When relied upon to contribute to the structural strength and stability of a timber structure, the product will be satisfactory provided the design is in accordance with sections 6.1 to 6.8 of this Certificate. The product has been assessed as untreated and, therefore, its use is restricted in the House Longhorn beetle areas. See section 6.9 of this Certificate.
Requirement:	B2	Internal fire spread (linings)
Comment:		The product has a Class 3 surface and is a combustible material. See sections 7.1 to 7.3 of this Certificate.
Requirement:	B3(1)(2)	Internal fire spread (structure)
Comment:		The fire resistance and reaction to fire of the product can be determined using the procedures referenced in sections 7.1 to 7.3 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable but has been assessed as untreated. and, therefore, its use is restricted under this Regulation. See section 9 and the <i>Installation</i> part of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The use of the product satisfies the requirements of this Regulation. See sections 8.1 to 8.3 and 9 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards - construction
Standard:	1.1(a)(b)	Structure
Comment:		When designed in accordance with this Certificate, the product has sufficient strength and stiffness to transmit the design loads without excessive deflection, with reference to clause 1.1.1 <sup>(1)(2)</sup> . See sections 6.1 to 6.8 of this Certificate.
Standard:	2.1	Compartmentation
Standard:	2.2	Separation
Standard:	2.3	Structural protection
Comment:		The fire resistance of the product can be determined using the procedures referenced in sections 7.1 to 7.3 of this Certificate. In common with other timber products, the product is a combustible material and its use will be subject to restrictions under these Standards, with reference to clauses 2.1.13 <sup>(2)</sup> , 2.2.4 <sup>(2)</sup> , 2.2.5 <sup>(2)</sup> , 2.2.8 <sup>(1)</sup> , 2.3.2 <sup>(1)(2)</sup> . See sections 7.1 to 7.3 of this Certificate.
Standard:	2.5	Internal linings
Comment:		The product has a Class 3 surface. See sections 7.1 to 7.3 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is a durable material. See section 9 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The product is acceptable. See sections 8.1 to 8.3 of this Certificate.
Regulation:	D1	Stability
Comment:		The product will sustain and transmit the design load without excessive deflection or deformation. See sections 6.1 to 6.8 of this Certificate.
Regulation:	E3(a)(b)	Internal fire spread — Linings
Comment:		The product has a Class 3 surface. See sections 7.1 to 7.3 of this Certificate.
Regulation:	E4(1)	Internal fire spread — Structure
Comment:		The fire resistance of the product can be determined using the procedures referenced in sections 7.1 to 7.3 of this Certificate.

## Construction (Design and Management) Regulations 2007

## Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 2 *Delivery and site handling* (2.1 to 2.3).

# Non-regulatory Information

## NHBC Standards 2008

NHBC accepts the use of LP SolidStart LVL, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6 *Superstructure* and Chapter 7 *Roofs*.

## Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, LP SolidStart LVL, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure*, Sub-sections *External walls – timber frame*, *Upper floors*, *Pitched roofs* and *Flat roofs*.

## General

This Certificate relates to LP SolidStart LVL (laminated veneer lumber), a wood-based material for use in structural members (eg beams, joists, lintels, rafters, ties, struts) or structural framing, and also for the fabrication of built-up components such as trusses and panels.

The product has been assessed for use in accordance with BS 5268-2 : 2002 in a service class 1 or 2 environment. LP is a registered trademark and SolidStart is a trademark.

## Technical Specification

### 1 Description

1.1 LP SolidStart LVL comprises laminated Southern (Yellow) Pine or Douglas Fir/Hemlock veneers, in thicknesses of between 2.5 mm and 4.2 mm, bonded together by a type WBP (water and boil proof) phenol-formaldehyde adhesive to ASTM D 2559. Each lamination comprises a series of veneers. Veneers are lap, butt or scarf jointed. The outer veneers are additionally graded for visual quality. The product is designed for dry-use conditions only.

1.2 The range of standard sizes and manufacturing tolerances are given in Table 1.

Table 1 Range of sizes and manufacturing tolerance

Dimension	Size	Tolerance (mm)
thickness (mm)	19 to 178	±1.6
width (mm)	89 to 1219	≤ 235 width -1.6, +3.2
length (m)	up to 18	-0.0, +100

1.3 Quality control on the dried veneer includes checks on grading, dimensions and moisture content. Appropriate controls are applied throughout the production process, including checks on veneer temperature, veneer grade, quality and weight of glue-spread and curing temperature. Each finished billet is subject to inspection before being cut to length; any defective areas are cut out and rejected. Regular tests are made to determine the strength of the glue bond, the shear strength and the bending and tension strength parallel to the grain.

### 2 Delivery and site handling

2.1 The product is delivered banded and wrapped in water-resistant paper to minimise changes in moisture content due to weather. The lengths of members may be limited by handling or transport considerations, but can be up to 18 m.

2.2 In common with similar timber products, when using power tools for cutting, it is recommended that eye protection and a dust mask are used.

2.3 Normal precautions should be taken when handling, lifting and installing the product. The density of the product is given in section 6.8.

2.4 On site the product must be stored clear of the ground, appropriately stacked and protected against the weather.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on LP SolidStart LVL.

## Design Considerations

### 3 General

LP SolidStart LVL is satisfactory for use in structural members, eg beams, ties, struts, or structural framing, and also for the fabrication of built-up components such as trusses and panels.

## 4 Practicability of installation

4.1 The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

4.2 The product is cut and fixed easily using conventional woodworking tools.

4.3 The product can withstand normal site handling.

## 5 Behaviour in relation to moisture

5.1 LP SolidStart LVL is for use in a service class 1 or 2 environment<sup>(1)</sup>. Tests indicate that the equilibrium moisture content of the product in a given environment is lower than that of solid timber. In these environments, where the moisture content of solid timber does not exceed 18%, the moisture content of the product will not exceed 14%. The product will attain an average moisture content of 10% in service class 1 conditions.

(1) As defined in BS 5268-2 : 2002.

5.2 Where a building construction is likely to be sensitive to the relative movement of members, it is recommended, in accordance with BS 5268-2 : 2002, that the members should:

- be checked for moisture content at the time of the installation. The determination of moisture content by a calibrated moisture meter will be sufficiently accurate for this purpose, and
- have a moisture content at the time of installation close to the moisture content they will attain in service.

5.3 The product will not shrink in the same manner as solid timber, therefore, care is needed to avoid problems of differential movement when combining different materials.

5.4 Normally, the product will arrive on site with a typical moisture content of from 8% to 12%.

## 6 Structural performance



6.1 Design and detailing of members should be carried out in accordance with BS 5268-2 : 2002 using the grade stresses and moduli given in this Certificate.

6.2 The grade stresses<sup>(1)</sup> (Nmm<sup>-2</sup>) for dry exposure conditions for the product are given in Table 2 for service classes 1 and 2 as defined in BS 5268-2 : 2002.

(1) Modification factors are applied in certain circumstances (see section 6.3).

Table 2 Grade stresses (Nmm<sup>-2</sup>)

Property	Southern Yellow Pine (Nmm <sup>-2</sup> )		Douglas Fir/Hemlock (Nmm <sup>-2</sup> )	
	1.9E	2.0E	1.9E	2.0E
Bending parallel to the grain:				
as a joist	16.5	19.0	16.5	19.0
as a plank	16.5	19.0	14.0	18.5
Tension parallel to the grain	10.0	14.0	10.0	14.0
Compression parallel to the grain	13.5	17.0	13.5	17.0
Compression perpendicular to the grain:				
as a joist	5.2	5.5	5.2	5.2
as a plank	3.0	3.0	3.0	3.0
Shear parallel to the grain:				
as a joist	2.0	2.0	2.0	2.0
as a plank	1.0	1.0	1.0	1.0
Modulus of elasticity parallel to the grain:				
as a joist – mean value	12 500	13 000	12 500	13 100
as a plank – mean value	11 500	13 500	12 000	14 000

6.3 These stresses relate to specific conditions and are compatible with those assumed for solid timber given in BS 5268-2 : 2002. The modification factors  $K_3$ ,  $K_4$ ,  $K_5$ ,  $K_7$ ,  $K_{12}$  and  $K_{13}$ , as given in BS 5268-2 : 2002, are applicable when the actual service conditions are different. The modification factor  $K_8$  for load sharing may also be used but with a reduced value of 1.04.

6.4 A length factor ( $K_L$ ) should be applied for members in axial tension calculated using the formula:

$$K_L = (0.99/L)^{0.071}$$

where:

$L$  = length (m) with a maximum value of 5 m.

$K_L$  = 0.89 for lengths above 5 m.

6.5 The value for the modulus of rigidity can be evaluated by dividing the modulus of elasticity parallel to grain by factor of 16.

6.6 The mean modulus of elasticity should be used to calculate deflections and displacements under both dead and imposed loads and in the calculation of the modification factor  $K_{12}$ .

6.7 Joints made with nails perpendicular to the glue lines should be designed in accordance with BS 5268-2 : 2002, section 6. For the purpose of joint design, the product should be treated as for timber of strength class C27. The maximum diameter of nails inserted parallel to the glue line should be 3.75 mm.

6.8 The approximate density of members may be taken as  $630 \text{ kgm}^{-3}$  for Southern (Yellow) Pine and  $540 \text{ kgm}^{-3}$  for Douglas Fir/Hemlock at 8% moisture content.



6.9 The product has been assessed as untreated and, therefore, its use is restricted in areas affected by the House Longhorn beetle *Hylotrupes bajulus* L areas defined in the Approved Document A : 2004.

## 7 Behaviour in relation to fire



7.1 Guidance is given in BS 5268-4.1 : 1978 on the methods of assessment of fire resistance of timber members. The charring rate for category (a) species listed in Table 1 of this Standard is applicable.

7.2 The product is assessed as having a Class 3 surface spread of flame classification in accordance with BS 476-7 : 1997 and places restrictions on its area of use.

7.3 The product is assessed as designation P in relation to ignitability in accordance with BS 476-5 : 1979.

## 8 Maintenance



8.1 It is necessary that features of the construction which are essential to the structural performance of the product are maintained in an effective condition during its intended life.

8.2 The design should ensure that access is possible to those parts of the structure likely to require periodic inspection or maintenance.

8.3 Damaged LP SolidStart LVL should be replaced as soon as is practicable following the manufacturer's instructions and observing all necessary health and safety regulations.

## 9 Durability



Untreated LP SolidStart LVL is satisfactory for structural application in a service class 1 or 2 environment as defined in BS 5268-2 : 2002. It will have a durability comparable to that of plywood of similar timber species incorporating WBP phenol-formaldehyde adhesive.

# Installation

## 10 General

10.1 LP SolidStart LVL should be handled and installed in the same manner as for sawn timber. Guidance on design and workmanship is given in BS 5268-2 : 2002.

10.2 Holes for services such as cables and pipes can be drilled through the members but are restricted in size and quantity and must be positioned away from highly stressed zones on the member (see the manufacturer's technical literature for details).

10.3 Rectangular holes are not acceptable on the product.

# Technical Investigations

## 11 Testing and analysis

An evaluation was made of test data relating to:

- statistical determination of grade stresses and moduli
- equilibrium moisture content of the product in various controlled environments
- nailed joints and performance compared against that of various sawn softwood strength classes.

## 12 Other investigations

12.1 Assessments were made of the applicability to the product of the modification factors for grade stresses given in BS 5268-2 : 2002.

12.2 Assessment on the basis of existing data was made of:

- practicability of installation
- behaviour in fire
- durability.

12.3 The manufacturing processes were examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

## Bibliography

BS 476-5 : 1979 *Fire tests on building materials and structures — Method of test for ignitability*

BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*

BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*

BS 5268-4.1 : 1978 *Structural use of timber — Fire resistance of timber structures — Recommendations for calculating fire resistance of timber members*

ASTM D 2559 : 2000 *Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions*

## 13 Conditions

13.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

13.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

13.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

13.4 In granting this Certificate, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

13.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

