



National Research
Council Canada

Conseil national
de recherches Canada

Institute for
Research in
Construction

Institut de
recherche en
construction

CCMC 11402-R

CCMC

*EVALUATION
REPORT*

DIVISION	06181
Issued	1987-01-28
Re-evaluated	2002-10-21
Revised	2003-07-30
Re-evaluation due	2004-07-20

Re-Evaluation
in process

Westlam®

Western Archrib
A Division of 316291 Alberta Limited
4315 - 92nd Avenue
Edmonton, Alberta
T6B 3M7

Tel.: (780) 465-9771
Fax: (780) 469-1667

Plant: 4315 - 92nd Avenue
Edmonton, Alberta

This Registry contains no endorsement, warranty, or guarantee, expressed or implied, on the part of the National Research Council of Canada for any evaluated material, product, system or service described herein. NRC accepts no responsibility for the performance of any product described herein if manufactured and/or used outside the purpose of the CCMC evaluation. Readers should not infer that NRC has evaluated the product for any purpose or characteristic other than stated herein.

1. Purpose of Evaluation

The proponent sought confirmation from the Canadian Construction Materials Centre (CCMC) that “Westlam®” can serve as a glued-laminated, structural beam having specified strength values equivalent to those stated in CSA O86-01, “Engineering Design in Wood,” except for specified stress in bending due to negative moment, and having a proprietary design value for specified stress in bending due to negative moment, in compliance with the intent of the National Building Code of Canada (NBC) 1995.

2. Opinion

Subject to the limitations and conditions stated in this report, test results and assessments provided by the manufacturer show that “Westlam®” complies with CCMC’s Technical Guide for Design Properties of Glued-laminated Beams, Masterformat number 06183, dated 95-04-04. “Westlam®” provides a level of performance equivalent to that required in:

- NBC 1995, Subsection 4.3.1., Sentence 9.23.4.2.(3), and Article 3.1.4.6.;

- CAN/CSA O86-01, "Engineering Design in Wood;"
- CAN/CSA-O122-M89, "Structural Glued-Laminated Timber;"
- CAN/CSA-O177-M89, "Qualification Code for Manufacturers of Structural Glued-Laminated Timber;" and
- CSA O112.7-M1977, "Resorcinol and Phenol-Resorcinol Resin Adhesives for Wood (Room- and Intermediate-Temperature Curing)," Type 1.

Canada Mortgage and Housing Corporation permits the use of this product in construction financed or insured under the National Housing Act.

3. Description

"Westlam®" is an exterior grade-laminated construction made of western spruce or lodgepole pine boards, or both (see Figure 1), with the grain running mainly parallel to the longitudinal axis of the member. All boards are surfaced to a thickness of 50 mm or less prior to their manufacture. The individual boards within any lamination are end-jointed by means of a structural finger joint oriented across the width of the board ends. Laminations of various grades are arranged within the depth of the member according to the desired layup pattern with three zones. Table 2 indicates minimum layup requirements. The face and end joints of the boards are bonded with an exterior-type phenol-resorcinol adhesive.

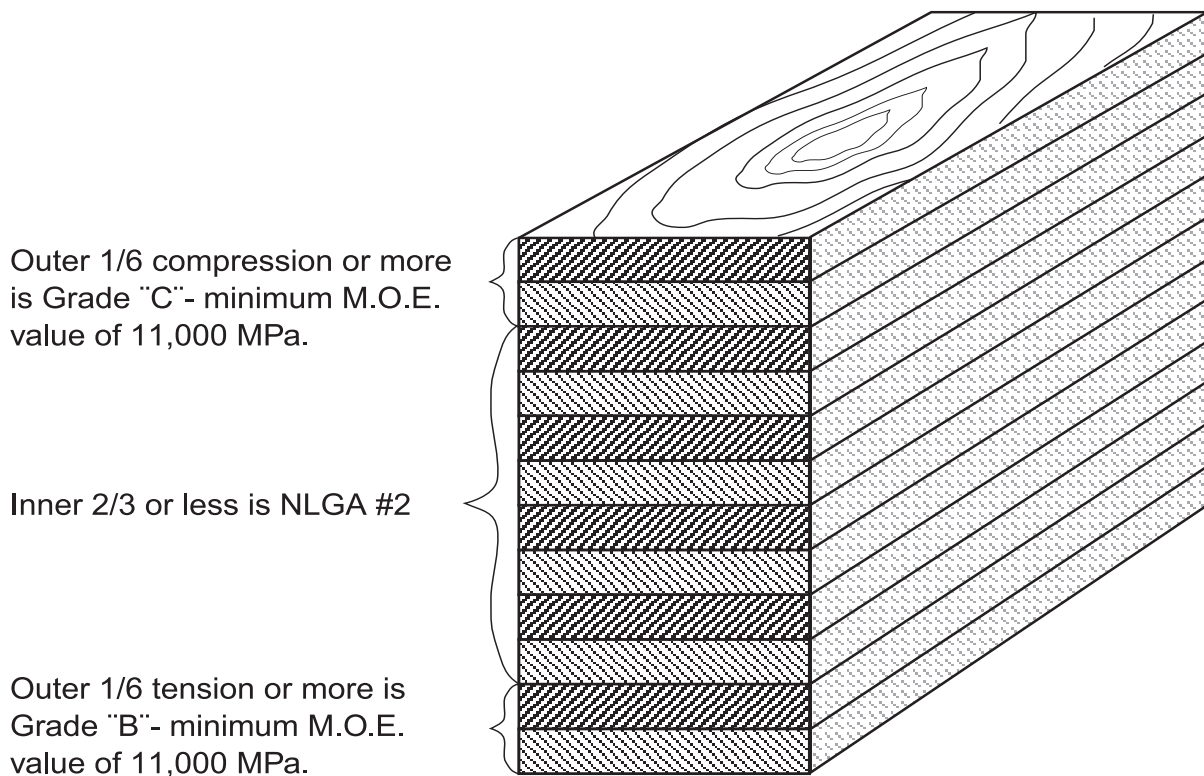


Figure 1. A Block of "Westlam®"

4. Usage and Limitations

“Westlam®” is permitted for use in building construction as an alternative to lumber, and can be used in the construction of beams, header joists, trimmer joists, rafters, purlins, truss chords, posts, lintels, and stair stringers. The use of “Westlam®” is subject to the following conditions:

- “Westlam®” shall be designed in accordance with the requirements of NBC 1995, Subsection 4.3.1. and CSA O86-01, "Engineering Design in Wood."
- The drawings and related documents shall bear the authorized professional seal and signature of a professional engineer or architect skilled in wood design and licensed to practice under the appropriate provincial or territorial legislation. The drawings shall bear a statement to the effect that the design is in accordance with the requirements of NBC 1995, Subsection 4.3.1., and show the governing design loads and deflections.
- The specified strengths for “Westlam®” shall not exceed the values set forth in Table 1.
- Except where a floor is required to support a concentrated load or a uniform live load of more than 2.4 kN/m², and in lieu of engineering design, the spans for “Westlam®” used for roof and floor beams may conform to the maximum spans shown in NBC 1995, Table A-11, for the applicable uniform live loads. Such beams shall consist of 130-mm-wide “Westlam®” to replace 3-ply built-up beams, and 175-mm-wide “Westlam®” to replace 4-ply built-up beams.
- When used as a wood framing member, “Westlam®” shall conform to NBC 1995, Subsection 9.23.2.
- For buildings falling under the scope of Part 9, “Westlam®” may be selected from span tables prepared and published by the manufacturer.
- “Westlam®” shall not be notched, drilled, or otherwise weakened, unless such notching or drilling is allowed for in the design of the member.
- The product must be clearly identified with the manufacturer’s name or logo, and the phrase “CCMC #11402-R.”
- “Westlam®” must be installed in strict accordance with the manufacturer’s current instructions.

Table 1. Specified Strengths (MPa) for “Westlam®” Glued-Laminated Lodgepole Pine and/or Spruce

Bending Stress Grade	20f-E	20f-EX
Bending at Extreme Fibre due to Positive Bending Moment (F_b)*	25.6	25.6
Bending at Extreme Fibre due to Negative Bending Moment (F_b)*	19.2	25.6
Longitudinal Shear (F_v)	1.75	1.75
Compression Perpendicular to Grain (F_{cp})		
Compression face	5.8	5.8
Tension face	5.8	5.8
Modulus of Elasticity (E)	10 300	10 300

* For 304.8 mm depth (d). For other depths, multiply the bending stress at extreme fibre by the multiplier factor derived from the following formula:

Multiplier Factor = $(304/d)^{1/9}$, where d = depth of member (mm)
or select the appropriate multiplier from the following table:

Depth (mm)	114	152	190	228	266	304	342	380	418
Multiplier	1.12	1.08	1.05	1.03	1.01	1.00	0.99	0.98	0.97
Depth (mm)	456	495	532	570	608	646	664	722	760
Multiplier	0.96	0.95	0.94	0.93	0.92	0.92	0.91	0.91	0.90

Table 2. Minimum Layup Requirements for “Westlam®” for Stress Grade 20f-E Bending (MPa)

Zone	Visual Grade	Minimum E Value (MPa)
Outer 1/6 (or More) Compression	C	11 000
Inner 2/3 or Less	No. 2 or better	No requirement
Outer 1/6 (or More) Tension	B	11 000

5. Performance

Testing of "Westlam®" was conducted by various testing agencies recognized by CCMC.

Most tests were carried out in accordance with ASTM and other published standards, with modifications in specimen dimensions appropriate to laminated lumber.

The testing indicated that the stiffness and specified strength in bending for "Westlam®" compares directly with the specified strengths for lodgepole pine and/or spruce glued-laminated timber in CSA O86-01, Table 6.3. General design provisions for the calculation of moment capacity, as set forth in CSA O86-01, are applicable. However, for depths other than 304 mm, the specified strength in Table 1 must be adjusted by the factor $(304/d)^{1/9}$ to account for the effect of size on strength properties.

To determine a proprietary design value for bending due to negative moment, a total of 408 lumber pieces and 120 finger-jointed samples of spruce/lodgepole lumber were tested. The lower 95% tension strength, in MPa, was determined for Band "C" grades (graded to CAN/CSA-O122-M89) in various sizes. The ratio of Ultimate Tension Strength (U.T.S.) for CAN/CSA-O122 "C" grade to that of "B" grade was determined for two widths of lumber and for one width of finger-jointed. This ratio ranged from 0.79 to 0.85.

The specified strength due to negative moment was determined for Westlam-E beams by applying the U.T.S. ratio to the known value of specified strength in bending due to positive moment. The specified strength in bending due to negative moment calculated in this way is 19.2 MPa.

Western Archrib's manufacturing quality assurance program continues to meet the requirements of CAN/CSA-O177-M89, "Qualification Code for the Manufacturers of Structural Glued-Laminated Timber." Quality assurance audits are provided by the American Plywood Association. Ongoing compliance with CAN/CSA-O122 and the "Westlam®" CCMC report are confirmed by the American Plywood Association.

For more information, contact:

Ron Waters, P.Eng.
(613) 993-6602

*Issued by the Institute for Research in Construction
under the authority of the National Research Council*

John Berndt, P.Eng.
Manager, CCMC

Note: Readers are asked to refer to limitations imposed by NRC on the interpretation and use of this report. These limitations are included in the introduction to CCMC's Registry of Product Evaluations, of which this report is part.

Readers are advised to confirm that this report has not been withdrawn or superseded by a later issue by referring to <http://irc.nrc.gc.ca/ccmc>, or by contacting the Canadian Construction Materials Centre, Institute for Research in Construction, National Research Council of Canada, Montreal Road, Ottawa, Ontario, K1A 0R6; Telephone (613) 993-6189, Fax (613) 952-0268.