CCMC CANADIAN CODE COMPLIANCE EVALUATION

CCMC EVALUATION

CCMC 13507-R

CCMC Canadian code compliance evaluation

CCMC number:	13507-R
Status:	Active
Issue date:	2010-10-27
Modified date:	2022-11-21
Evaluation holder:	**Murphy Company, Engineered Wood Division** 412 West Central Ave. Sutherlin OR 97479 United States Website: murphyplywood.com Telephone: 541-459-4545
Product name:	Murphy LVL
Code compliance:	NBC 2015, OBC
Evaluation requirements:	CCMC-TG-061710-15A "CCMC Technical Guide for Structural Composite Lumber"

In most jurisdictions this document is sufficient evidence for approval by Canadian authorities.
Learn more about CCMC recognition Look for the trusted CCMC mark on products to verify compliance.

Code compliance opinion

It is the opinion of the Canadian Construction Materials Centre that the evaluated product, when used as structural composite lumber (SCL) in accordance with the conditions and limitations stated in this evaluation, complies with the following code:

National Building Code of Canada 2015

Code provision	Solution type
4.3.1.1.(1) Buildings and their structural members m ...	Acceptable
9.23.4.2.(3) Spans for built-up wood and glued-lamina ...	Alternative

Ontario Building Code

Ruling No. 10-21-258 (13507-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 2010-12-30 (revised 2017-09-19) pursuant to s.29 of the Building Code Act, 1992 (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

The above opinion is based on the evaluation by the CCMC of technical evidence provided by the evaluation holder, and is bound by the stated conditions and limitations. For the benefit of the user, a summary of the technical information that forms the basis of this evaluation has been included.

Product information

Product name

Murphy LVL

Product description

The product is manufactured by laminating veneer sheets of Douglas Fir coated with an exterior type adhesive conforming to CSA O112.6-M1977(R2006), “Phenol and Phenol Resorcinol Resin Adhesives for Wood (High Temperature Curing),” (see CCMC 13019-L) in specific lay-up patterns, which are fed into a continuous press with the grain of the veneer oriented parallel to the length of the member. The lay-up patterns and adhesives used are as specified in the Murphy Company, Engineered Wood Division Manufacturing Standard.

The product is available in thicknesses from 35 mm to 89 mm, in widths ranging from 89 mm to 610 mm, and in lengths up to 24 m.

The manufacturing quality assurance program and records are verified by APA – The Engineered Wood Association as part of the product certification.

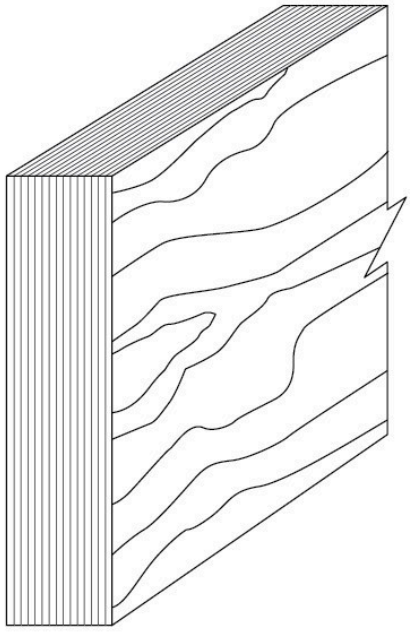

Figure 1. Veneer orientation of Murphy LVL

Manufacturing plant

This evaluation is valid only for products produced at the following plant:

Product name	Manufacturing plant
	Sutherlin, OR, US
Murphy LVL	⊘

⊘ Indicates that the product from this manufacturing facility has been evaluated by the CCMC

Conditions and limitations

The CCMC's compliance opinion is bound by this product being used in accordance with the conditions and limitations set out below.

- As with all SCL, this product is intended for dry service applications only. (1)
- The product is intended for use in construction as an alternative material to lumber. Proprietary design values presented for the product are to be used by professional engineers for design in accordance with CSA O86 for structural applications such as beams, headers, joists, rafters and columns as intended by the product manufacturer. The specific application must be qualified through specific testing and validated by the manufacturer. Applications such as I-joist flanges, studs and metal-plated truss chords are beyond the scope of this evaluation.
- The pre-engineered tables in the literature outlined below have been provided to the CCMC by the Murphy Company to demonstrate compliance to Part 9 for acceptance by the local authority having jurisdiction (AHJ):
    i. **Murphy company's pre-engineered tables** (2)
    When the product is used to support uniform loads only, the installation must be in accordance with the tables and installation details published by the Murphy Company in the document entitled "Murphy LVL Limit States Design Guide (2.0 E-LVL – 2.2E-LVL)," dated November 2018.

    For applications falling within the scope of the Murphy Company's above-noted document, the product must be installed in accordance with the installation guidelines contained therein. Applications outside the scope of these installation guidelines require engineering on a case-by-case basis.

    ii. **Murphy company's installation details**
    Murphy Company's pre-engineered details within the document outlined in i. above are limited in scope to building designs where the anticipated loads on the following structural details are not exceeded:

    - floor beam span table (page 3);
    - garage door header tables (page 4);
    - window and door header tables (page 5);
    - uniform load tables (pages 6 to 9);
    - connection details (page 11); and
    - multiple piece assembly and side load capacity (page 12).

    iii. **Engineering required**
    For structural applications beyond the scope and limitations of the above-referenced Murphy Company publication or when required by the AHJ, the drawings or related documents must bear the authorized seal of a professional engineer skilled in wood design and licensed to practice under the appropriate provincial or territorial legislation.

    Installations beyond the scope and limitations stated in Sections i. and ii. imply, but are not limited to, the following:

    - higher loads/longer spans than the manufacturer's pre-engineered details;
    - concentrated loads;
    - areas of high wind or high seismicity;
    - design of supporting members/columns when the total beam/header load exceeds the NBC 2015 pre-engineered beam/lintel tables; and
    - design of supporting foundation footings when the total load exceeds the NBC 2015 pre-engineered floor/roof joist tables.

    The engineer must design in accordance with CSA O86 and may use as a guide the "Engineering Guide for Wood-Frame Construction," published by the Canadian Wood Council.

The specified strengths for the product must not exceed the values set forth in Table 1 in this evaluation.

Nail spacing for the product must conform to Table 3 in this evaluation. Fastener capacities must be as shown in Table 2 in this evaluation.

The ends of all Murphy LVL members used as joists, rafters and beams must be restrained to prevent rollover. This is normally achieved by attaching a diaphragm sheathing to the top, or to the compression edge, and to an end wall, or shear transfer panel, capable of transferring a minimum unfactored uniform load of 730 N/m or the required shear forces due to wind or seismic conditions. Blocking or cross-bracing with equivalent strength may also be used.

The compression edges of all Murphy LVL members used as joists, rafters and beams must be laterally supported at least every 610 mm, except where designed in accordance with CSA O86.

iv. **Engineering support provided by the manufacturer**
The Murphy Company may provide engineering services in conjunction with its product specification and offers the following support contact number: 541-459-4545.

This product must be identified with the phrase “CCMC 13507-R” along the side of the product. This CCMC number is only valid when it appears in conjunction with the certification mark of APA – The Engineered Wood Association

1 All lumber, wood-based panels and proprietary engineered wood products are intended for dry service conditions. “Dry service” is defined as the in-service environment in which the average equilibrium moisture content (MC) of lumber is 15% or less over a year and does not exceed 19% at any time. Wood contained within the interior of dry, heated or unheated buildings has generally been found to have a MC between 6% and 14% depending on season and location. During construction, all wood-based products should be protected from the weather to ensure that the 19% MC is not exceeded in accordance with Article 9.3.2.5., Moisture Content, of Division B of the NBC 2015.

2 The pre-engineered tables present the pre-engineered factored resistance of the beam. The AHJ may require further engineering to determine the factored load in accordance with Part 4 of Division B of the NBC 2015.

Technical information

This evaluation is based on demonstrated conformance with the following criteria:

Criteria number	Criteria name
CCMC-TG-061710-15A	CCMC Technical Guide for Structural Composite Lumber

The evaluation holder has submitted technical documentation for the CCMC's evaluation. Testing was conducted at laboratories recognized by the CCMC. The corresponding technical evidence for this product is summarized below. Technical evidence provided in Appendix A shows products were tested to a previous edition of CSA O86 and are applicable to CSA O86-14.

Design requirements

Table 1. Specified strengths (MPa) of the product (1) (2) (3)

Grade	Bending strength, f_b (4) – beam	Bending strength, f_b (4) – plank	Tensile strength parallel to grain, f_t (5)	Compressive strength parallel to grain, f_c	Compressive strength perpendicular to grain, f_{cp} – beam	Compressive strength perpendicular to grain, f_{cp} – plank	Horizontal shear strength, f_v – beam	Horizontal shear strength, f_v – plank	Modulus of elasticity (MOE) – beam	Modulus of elasticity (MOE) – plank
2250Fb-1.5E	28.67	28.03	13.85	25.86	9.41	5.65	3.65	1.92	10 340	9 650
3100Fb-2.0E	39.50	37.76	21.55	35.21	9.41	6.90	3.72	1.92	13 790	13 790
3100Fb-2.2E	39.50	37.76	21.55	35.21	9.41	6.90	3.72	1.92	15 170	15 170

Notes

1 Specified design stresses are for standard term load duration and may be adjusted (with the exception of MOE) using load duration factors in accordance with CSA O86-14.

2 Specified design stresses apply to product installation conditions of use that are dry, well ventilated and covered. Dry conditions are conditions in which the moisture content of the solid-sawn lumber is 15% or less.

3 Beam = load parallel to glue line; plank = load perpendicular to glue line.

4 The specified bending strength, f_b, is based on a standard depth of 305 mm. For other depths, multiply the beam f_b by $(305/d)^{0.18}$, where d = depth in mm. For depths less than 64 mm, the factor for the 64 mm depth must be used.

5 The specified tensile strength, f_t, is based on a standard length of 6 096 mm. For other lengths, multiply f_t by $(6\ 096/l)^{0.11}$, where l = length in mm. For lengths less than 914 mm, use the value adjusted to the 914 mm length.

Table 2. Equivalent specific gravity for fastener design of the product (1) (2)

Grade	Nails – withdrawal load – installed in edge	Nails – withdrawal load – installed in face	Nails – lateral load – installed in edge	Nails – lateral load – installed in face	Bolts – lateral load – installed in face – parallel to grain	Bolts – lateral load – installed in face – perpendicular to grain
All	0.49	0.50	0.50	0.50	0.50	0.50

Notes

1 Fastener values determined using the equivalent specific gravities in this Table are for normal load duration and must be permitted to be adjusted using the load duration factors in accordance with CSA O86-14.

2 When loaded parallel and perpendicular to the grain, the bolt edge distance must be a minimum of four times the bolt diameter.

Table 3. Nail spacing for fastener design of the product (1)

Thickness (t), mm	Orientation	Fastener (2) (3)	Minimum end distance, mm	Minimum nail spacing, mm – single row	Minimum nail spacing, mm – multiple rows (4) (5)
32 ≤ t < 38	Edge (6)	64 mm and smaller	64	102	–
32 ≤ t < 38	Edge (6)	76 mm and 83 mm	64	102	–
32 ≤ t < 38	Edge (6)	89 mm	89	127	–
32 ≤ t < 38	Face (7)	64 mm and smaller	38	76	76
32 ≤ t < 38	Face (7)	76 mm and 83 mm	38	76	76
32 ≤ t < 38	Face (7)	89 mm	38	127	127
t ≥ 38	Edge (6)	64 mm and smaller	64	76	102
t ≥ 38	Edge (6)	76 mm and 83 mm	89 (8)	102	127
t ≥ 38	Edge (6)	89 mm	89	127	152 (9)
t ≥ 38	Face (7)	64 mm and smaller	38	76	76
t ≥ 38	Face (7)	76 mm and 83 mm	38	76	76
t ≥ 38	Face (7)	89 mm	38	127	127

Notes

1 Edge distance must be sufficient to prevent splitting.

2 83 mm sinkers may be spaced the same as an 83 mm common wire nail.

3 Fastener sizes and closest on centre (o.c.) spacing not specifically described above are beyond the scope of this evaluation.

4 Multiple rows in the edge orientation must be spaced 13 mm or more from each other and offset one-half of the tabulated minimum nail spacing.

5 Multiple rows must be equally spaced from the centre line of the narrow face axis.

6	Nail penetration for edge nailing must not exceed 51 mm for 89 mm nails (common or box) and 64 mm for 76 mm and 83 mm nails (common or box).
7	Tabulated closest o.c. spacing for face orientation is applicable to nails that are installed in rows parallel to the grain (length) of the LVL. For nails installed in rows perpendicular to the direction of the grain (width/depth) of the LVL, the closest o.c. spacing for face orientation must be sufficient to prevent splitting of the LVL.
8	Minimum end distance may be reduced to 64 mm for single row nailing.
9	Minimum nail spacing may be reduced to 127 mm when the LVL is 44 mm or thicker.

Appendix A - additional information

The design values obtained from testing to ASTM D 5456-07, “Evaluation of Structural Composite Lumber Products,” as specified in CSA O86-09 are summarized below. The manufacturer’s published pre-engineered joist spans were then designed in accordance with CSA O86-14.

Table 4. Additional test information for the product [(1)]

Property	Test information
Bending	Specimens were tested in edgewise and flatwise bending to establish the characteristic value. Data from quality control (QC) tests were used to establish the applicable coefficient of variation, CV_w. The reliability normalization factor from CSA O86-09 was used to determine the specified strength.
MOE	The 2.0E specimens were tested in edgewise bending to establish the mean MOE. The established mean MOE was 2.2×10^6 psi, and is maintained as indicated in the quality control manual (QCM), and is confirmed by the third-party certification agency to form the qualification for the 2.2E product grade.
Shear	Specimens were tested in edgewise and flatwise shear to establish the characteristic value. Data from QC tests were used to establish the applicable coefficient of variation, CV_w. The reliability normalization factor from CSA O86-09 was used to determine the specified strength.
Compression parallel to grain	Specimens were tested in compression parallel to grain to establish the characteristic value. Data from QC tests were used to establish the applicable coefficient of variation, CV_w. The reliability normalization factor from CSA O86-09 was used to determine the specified strength.
Compression perpendicular to grain	Specimens were tested in compression perpendicular to grain to establish the characteristic value following ASTM D 5456-14b. The characteristic value was multiplied by 1.81 to establish the specified strength in accordance with CSA O86-14. The original value determined in accordance with CSA O86-09 was maintained since it is more conservative compared to the specified strength when calculated in accordance with CSA O86-14 Update No.1.
Tension parallel to grain	Specimens were tested in tension to establish the characteristic value. Data from QC tests were used to establish the applicable coefficient of variation, CV_w. The reliability normalization factor from CSA O86-09 was used to determine the specified strength.
Nail withdrawal	Nail withdrawal values were established following ASTM D 1761, "Standard Test Methods for Mechanical Fasteners in Wood," for an 8d common nail having a 31.75 mm penetration. Specimens were tested and equivalent species capacity was determined in accordance with ASTM D 5456-07, A2.4.
Nail bearing	Dowel bearing strength was determined as per ASTM D 5764-97a(2007), "Standard Test Method for Evaluating Dowel-Bearing Strength of Wood and Wood-Based Products," using 10d common nails with a nominal diameter of 3.76 mm and a lead hole diameter of 2.77 mm. Specimens were tested, and the mean bearing capacity was used to establish the equivalent species capacity as per ASTM D 5456-07, A2.5.
Bolt bearing	Bolt bearing capacity was determined as per ASTM D 5764-97a(2007) using 12.5-mm- and 19-mm-diameter bolts.
Creep and recovery	Creep testing was conducted in accordance with the creep and recovery test described in ASTM D 5456-07. The specimens met the acceptance criteria of ASTM D 6815, "Standard Specification for Evaluation of Duration of Load and Creep Effects of Wood and Wood-Based Products."
Adhesive	The adhesive complies with CSA O112.6-M1977. The adhesive used is from the Hexion Inc., family of Cascophen 84204 (CCMC 13019-L).

Note

1 Design values were developed in accordance with the referenced standards found herein. The requirements met have not changed in the current editions of the standards.

Administrative information

Disclaimer

This evaluation is issued by the Canadian Construction Materials Centre (CCMC), a part of the Construction Research Centre at the National Research Council of Canada (NRC). The evaluation must be read in the context of the entire CCMC Registry of Product Assessments and the legislated applicable building code in effect.

The CCMC was established in 1988 on behalf of the applicable regulator (i.e., the provinces and territories) to ensure—through assessment—conformity of alternative and acceptable solutions to regional building codes as determined by the local authority having jurisdiction (AHJ) as part of the issuance of a building permit.

It is the responsibility of the local AHJs, design professionals, and specifiers to confirm that the evaluation is current and has not been withdrawn or superseded by a later issue. Please refer to the website or contact:

Canadian Construction Materials Centre
Construction Research Centre
National Research Council of Canada
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Ottawa, Ontario, K1A 0R6
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Fax: 613-952-0268

The NRC has evaluated the material, product, system or service described herein only for those characteristics stated herein. The information and opinions in this evaluation are directed to those who have the appropriate degree of experience to use and apply its contents (i.e., AHJs, design professionals and specifiers). This evaluation is only valid when the product is installed in strict compliance with the stated conditions and limitations of evaluation and the applicable local building code. In circumstances where no applicable local building permit is issued and that no confirmation of compliance 'for use in the intended field application' is undertaken, this evaluation is null and void in all respects. This evaluation is provided without representation, warranty, or guarantee of any kind, expressed, or implied, and the NRC provides no endorsement for any evaluated material, product, system or service described herein. The NRC accepts no responsibility whatsoever arising in any way from any and all use and reliance on the information contained in this evaluation with respect to its compliance to the referenced code(s) and standard(s). The NRC is not undertaking to render professional or other services on behalf of any person or entity nor to perform any duty owed by any person or entity to another person or entity.

Language

Une version française de ce document est disponible.
In the case of any discrepancy between the English and French version of this document, the English version shall prevail.

Copyright

CCMC recognition

The Canadian Construction Materials Centre (CCMC) assesses compliance with Canadian building, energy and safety codes. We are the only construction code compliance service supported and operated by the Government of Canada. Trusted by over 6,000 regulators across Canada.

> Most Canadian authorities having jurisdiction (AHJs) consider CCMC product assessments acceptable as evidence for product approval.

CCMC assessments are recognized by construction authorities across Canada:

Alliance of Canadian Building Official Associations (ACBOA)	(Alliance of Canadian Building Official Associations (ACBOA))
First Nations National Building Officers Association (FNNBOA)	(First Nations National Building Officers Association (FNNBOA))
Canadian Home Builders' Association (CHBA)	(Canadian Home Builders' Association (CHBA))
Alberta Building Officials Association (ABOA)	(Alberta Building Officials Associations (ABOA))
Saskatchewan Building Officials Association (SBOA)	(Saskatchewan Building Officials Association (SBOA))
Manitoba Building Officials Association (MBOA)	(Manitoba Building Officials Association (MBOA))
Ontario Building Officials Association (OBOA)	(Ontario Building Officials Association (OBOA))
New Brunswick Building Officials Association (NBBOA)	(New Brunswick Building Officials Association (NBBOA))
Nova Scotia Building Officials Association (NSBOA)	(Nova Scotia Building Officials Association (NSBOA))

The CCMC provides code compliance assessments to Canadian code requirements, consulting nationwide with construction regulators to elicit regional variations in code requirements as well as provincial and local interpretations. Users are advised to review the technical information presented in CCMC assessments when making approval decisions. Learn more about how the CCMC provides a unique service for Canada.

For more information, contact the CCMC by phone at (613) 993-6189 or by email at ccmc@nrc-cnrc.gc.ca

Code compliance as an acceptable solution

Code Compliance via Acceptable Solutions

> If a building design (e.g. material, component, assembly or system) can be shown to meet all provisions of the applicable **acceptable solutions** in Division B (e.g. it complies with the applicable provisions of a referenced standard), it is deemed to have satisfied the objectives and functional statements linked to those provisions and thus to have complied with that part of the Code.
>
> — **National Building Code of Canada, Sentence A-1.2.1.1.(1)(a)**

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Acceptable Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

All CCMC evaluation reports are opinions of code compliance established in accordance with the National Building Code of Canada, Subsection 1.2.1. "Compliance with this Code," which requires compliance to be achieved by:

- complying with the applicable acceptable solutions in Division B, or
- using an alternative solution that will achieve at least the minimum level of performance required by Division B in the areas defined by the objective and functional statements attributed to the applicable acceptable solutions.

The CCMC assesses compliance with Canadian building, energy and safety codes, and is trusted by over 6,000 regulators across Canada.

Code compliance as an alternative solution

Code Compliance via Alternative Solutions

> Where a design differs from the acceptable solutions in Division B, then it should be treated as an "**alternative solution**." A proponent of an alternative solution must demonstrate that the alternative solution addresses the same issues as the applicable acceptable solutions in Division B and their attributed objectives and functional statements. However, because the objectives and functional statements are entirely qualitative, demonstrating compliance with them in isolation is not possible. Therefore, Clause 1.2.1.1.(1)(b) identifies the principle that Division B establishes the quantitative performance targets that alternative solutions must meet. In many cases, these targets are not defined very precisely by the acceptable solutions [...] Nevertheless, Clause 1.2.1.1.(1)(b) makes it clear that an effort must be made to demonstrate that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B—not “well enough” but “as well as.”
>
> — **National Building Code of Canada, Sentence A-1.2.1.1.(1)(b)**

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Alternative Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

All CCMC evaluation reports are opinions of code compliance established in accordance with the National Building Code of Canada, Subsection 1.2.1. "Compliance with this Code," which requires compliance to be achieved by:

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