DrJ™ CERTIFICATION

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Technical Evaluation Report

TER 1211-01

Lamco Laminated Finger-Jointed Lumber (LFL®) (BlueLinx)

Produits Forestiers Lamco Inc.

Product:

Lamco LFL® (Laminated Finger-Jointed Lumber) Structural Wood Based Lumber or Advanced Engineered Lumber

Issue Date:

December 21, 2012

Revision Date:

May 24, 2022

Subject to Renewal:

July 1, 2023

COMPANY INFORMATION:	ADDITIONAL LISTEES:
Produits Forestiers Lamco Inc. 760 Chemin de la Moraine Saint-Félicien, QC G8K 0A1 Canada 418-679-2647 jgirard@pflamco.com lamcofp.com	BlueLinx Corporation 1950 Spectrum Cir SE Ste 300 Marietta, GA 30067-8472 Product Name: onCENTER® Advanced Framing Lumber (AFL)

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 02 00 - Design Information

SECTION: 06 17 00 - Shop-Fabricated Structural Wood

1 PRODUCT EVALUATED[1]

1.1 Lamco LFL® (Laminated Finger-Jointed Lumber) Structural Wood Based Lumber or Advanced Engineered Lumber

2 APPLICABLE CODES AND STANDARDS[2,3,4]

2.1 *Codes*

2.1.1 *IBC—15, 18, 21: International Building Code®*

2.1.2 *IRC—15, 18, 21: International Residential Code®*

2.1.3 *NBC—10, 15: National Building Code of Canada*

2.1.4 *FBC-B—17, 20: Florida Building Code – Building*

2.1.5 *FBC-R—17, 20: Florida Building Code – Residential*

2.1.6 *CALGreen—19: California Green Building Standards Code*

2.2 *Standards and Referenced Documents*

2.2.1 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*

2.2.2 *ASTM D2559: Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions*

2.2.3 *ASTM D5456: Standard Specification for Evaluation of Structural Composite Lumber Products*

2.2.4 *ASTM D5764: Standard Test Method for Evaluating Dowel-Bearing Strength of Wood and Wood-Based Products*

[1] For more information, visit drjcertification.org or call us at 608-310-6748.

[2] Unless otherwise noted, all references in this TER are from the 2021 version of the codes and the standards referenced therein. This material, design, or method of construction also complies with the 2000-2018 versions of the referenced codes and the standards referenced therein.

[3] All terms defined in the applicable building codes are italicized.

[4] All references to the *FBC-B* and *FBC-R* are the same as the 2018 *IBC* and 2018 *IRC* unless otherwise noted in the Florida Supplement at the end of this TER.

2.2.5 *CSA O86: Engineering Design in Wood*

2.2.6 *EN 14374: Timber Structures Structural Laminated Veneer Lumber Requirements*

3 Performance Evaluation

3.1 Lamco LFL® was tested and evaluated to determine its resistance properties, which are used to develop reference design values for allowable stress design (ASD) and limit states design (LSD). This TER examines Lamco LFL® for:

3.1.1 Use as an alternative material to that described in *IBC* Chapter 23, in particular, compliance with the requirements noted in Section 2301.2 for ASD.

3.1.2 Compliance with *IBC* Section 2304 and Section 2308 and *IRC* Chapter 5, Chapter 6 and Chapter 8 for conventional light-frame construction applications.

3.1.3 Use as an alternative material and method of construction in compliance with *IBC* Section 104.11 and *IRC* Section R104.11.

3.1.3.1 When used in an application that exceeds the limits of *IRC* Section R301, an engineered design shall be submitted in accordance with Section R301.1.3 and this TER.

3.1.4 Structural capacities in accordance with *IBC* Section 2303.1.10.

> **2303.1.10 Structural composite lumber.** Structural capacities for structural composite lumber shall be established and monitored in accordance with *ASTM D5456*.

3.1.5 Structural capacity in accordance with *NBC* Part 4 and 9 and *CSA O86*.

3.1.6 Fire-resistance properties of Lamco LFL® are evaluated with regard to equivalence to solid-sawn lumber in accordance with the *IBC*, *IRC* and *NBC*.

3.2 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.

3.3 Any engineering evaluation conducted for this TER was performed within DrJ's ANAB accredited ICS code scope and/or the defined professional engineering scope of work on the dates provided herein.

4 Product Description and Materials

4.1 Lamco LFL® is manufactured by Produits Forestiers Lamco Inc. at its facility in Saint-Félicien, Quebec.

4.2 The product is made from rough sawn Black Spruce predominantly, classified according to LAMCO's Quality Control Manual or spruce-pine-fir (SPF) #2 and better or machine stress rated (MSR) lumber. Short segments of the lumber are assembled with tongue and groove joints along the length of the members and finger joints across the width of the members.

4.3 All joints are adhered with a heat-resistant adhesive (HRA) of phenol-resorcinol-formaldehyde (PRF) or polyurethane adhesive.

4.3.1 HRAs are classified and qualified in accordance with ASTM D2559.

4.4 The wood lumber properties and species, adhesive, manufacturing parameters, and finished product dimensions and tolerances are specified in the approved quality documentation and Lamco's in-plant manufacturing standard.

4.5 *Material Availability*

4.5.1 Grades: 1.6E, 1.7E, 1.9E, and 2.1E

4.5.2 Thickness: $1^{7}/_{16}$" (36.5 mm) and 1½" (38.1 mm)

4.5.3 Width: 2½" to 16" (63.5 mm to 406 mm)

4.5.4 Length: up to 32'-2" (9.8 m)

5 APPLICATIONS

5.1 Lamco LFL® is an alternative to sawn lumber for floor, roof, and wall structural members.

5.2 Structural applications include use as beams, columns, headers, joists, rafters, chords and webs of trusses, I joist flanges, rim boards and wall studs.

5.3 Lamco LFL® is used as an equivalent alternative to sawn lumber for use where fire resistance is required as follows:

5.3.1 Lamco LFL® with a minimum thickness of $1^{7}/_{16}$" may be used as an equivalent alternative to 1½"-thick solid-sawn lumber in accordance with the *IBC*, *IRC* and *NBC*.

5.4 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience and technical judgment.

5.5 *Design*

5.5.1 Design of Lamco LFL® is governed by the applicable code and the provisions for structural composite lumber (SCL) in *NDS* or *CSA O86*.

5.5.2 Cuts, notches and holes in structural members shall comply with the applicable building code for sawn lumber and this TER. For applications outside of the scope of the applicable code, consult the manufacturer's installation instructions or a Registered Design Professional.

5.5.3 Uniformly loaded beams may have holes bored in the member, provided such holes are entirely in the center ⅓ of the member in both the length and depth dimensions.

5.5.4 For buildings constructed in accordance with *IBC* Section 2308 and *IRC* Chapter 5, Chapter 6 and Chapter 8 and subject to the limitations therein, the following conditions apply:

5.5.4.1 Holes bored in joists, rafters and ceiling joists shall not be within 2" (51 mm) of the top or bottom of the joist and the diameter of any such hole shall not exceed ⅓ the depth of the joist.

5.5.4.2 Holes bored into studs shall not exceed 40% of the stud width, and the edge of the boring shall be no closer than ⅝" from the edge of the stud.

5.5.4.3 Holes shall not be located in the same section of the stud as a cut or notch.

5.5.4.4 Notches in the top or bottom of joists, rafters and ceiling joists shall not exceed 1/6 the depth and shall not be located in the middle ⅓ of the span.

5.5.4.5 Notches on the ends of joists, rafters and ceiling joists shall not exceed ¼ the joist depth.

5.5.4.6 In load bearing walls, Lamco LFL® is permitted to be cut or notched to a depth not exceeding 25% of its width.

5.5.4.7 In non-load bearing walls, Lamco LFL® is permitted to be cut or notched to a depth not exceeding 40% of its width.

5.5.4.8 Notches on cantilevered portions of rafters (e.g., notches at exterior bearing walls) are permitted, provided the dimension of the remaining portion of the rafter is not less than 3½" and the length of the cantilever does not exceed 24".

5.5.4.9 Taper cuts at the ends of ceiling joists shall not exceed ¼ the depth of the joist measured at the inside of the bearing.

5.5.5 Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.

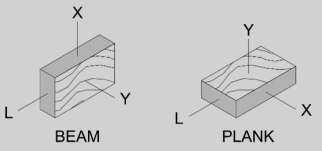
5.5.6 The design provisions for wood construction noted in *IBC* Section 2301.2 and *IRC* Section R301.1.3 apply to Lamco LFL® for ASD, unless otherwise noted in this TER. Allowable unit stresses for Lamco LFL® for dry conditions of use are specified in Table 1.

TABLE 1. REFERENCE DESIGN VALUES FOR LAMCO LFL® (ASD)[1,2,3,4]

Grade	Bending, F_b (psi)	Tension[6,7,8], F_t (psi)	Compression, F_c (psi)		Horizontal Shear, F_v (psi)	Modulus of Elasticity, E ($x10^6$ psi)	Modulus of Elasticity for Beam & Column Stability, E_{min} ($x10^6$ psi)
	Beam[5,9]	Parallel-to-Grain	Parallel-to-Grain	Perpendicular-to-Grain	Beam	True[5]	
1.6E	1200	1300[7]	1600	425	135	1.6	0.793
1.7E	1800	1585[8]	1925	595	180	1.7	0.862
1.9E	2300	1800[8]	2190	675	205	1.9	0.968
2.1E	2300	2175[9]	2660	675	250	2.1	1.039

SI: 1 psi = 0.00689 MPa or 1 MPa = 145 psi

1. The reference design values in this table are applicable for the product used in dry, well-ventilated interior applications, in which the equivalent moisture content of sawn lumber is less than 16%.
2. The reference design values in this table are for normal load duration. Loads of longer or shorter duration shall be adjusted in accordance with the applicable code. Duration of load adjustments shall not be applied to $F_{c\perp}$, E or E_{min}.
3. Orientation nomenclature for Lamco LFL®.



4. Using True (shear free) E, deflection is calculated as follows for uniformly loaded simple span beams:

   $\Delta = [5WL^4/(32Ebh^3)] + [12WL^2/(5Ebh)]$

   where: Δ = deflection in inches (mm)
   W = uniform load in lbs./in. (N/mm)
   L = span in inches (mm)
   E = modulus of elasticity in psi (MPa)
   b = width of beam in inches (mm)
   h = depth of beam in inches (mm)

5. The bending values in these tables are based on a reference depth of 12" (305 mm). For other depths, the bending value for 1.6E grade shall be adjusted by a volume factor of $(12/d)^{0.34}$, where d is measured in inches with a minimum depth of 2.5" (64 mm). For other depths of the 1.7E, 1.9E and 2.1E grades, the bending values shall be adjusted by a volume adjustment of $(12/d)^{0.25}$ where d is measured in inches with a minimum depth of 2.5" (64 mm). Bending values are further limited to 2455 psi for 1.9E and 2795 psi for 2.1E grades. For flatwise bending, values are permitted to be increased by a factor of 1.1 for 2" thick and 4" and larger widths.
6. The tension, F_t value for the 1.6E grade is based on a reference length of 24". For lengths up to 24', multiply F_t by a volume factor of $(24/L)^{0.15}$, where L is the length in inches.
7. The tension, F_t values for 1.7E and 1.9E grades are based on a reference length of 88" (7'4"). For lengths greater than 88", multiply F_t by a volume factor of $(88/L)^{0.1335}$, where L is the length in inches.
8. The tension, F_t value for the 2.1E grade is based on a reference length of 88" (7'4"). For lengths greater than 88", multiply F_t by K_L. $K_L = (88/L)^{0.125}$, where L is the length in inches.
9. When structural members qualify as repetitive members in accordance with the applicable code, a 4% increase is permitted to F_b.

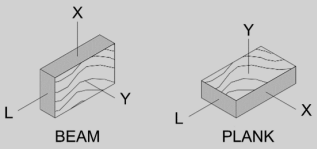
5.5.7 For compliance with the *NBC*, limit states design shall be in accordance with CSA O86. Specified Strength Values for Lamco LFL® for dry conditions of use are specified in Table 2.

TABLE 2. SPECIFIED STRENGTHS FOR LAMCO LFL® (LSD)[1,2,3,4]

Grade	Bending, F_b (MPa)	Tension[6,7,8], F_t (MPa)	Compression, F_c (MPa)		Horizontal Shear, F_v (MPa)	Modulus of Elasticity, E (MPa)	Modulus of Elasticity for Beam & Column Stability, E_{min} (MPa)
	Beam[5,9]	Parallel-to-Grain	Parallel-to-Grain	Perpendicular-to-Grain	Beam	True[5]	
1.6E	14.25	16.41[7]	17.61	5.33	1.72	10,859	8,998
1.7E	22.71	20.19[8]	21.21	7.46	2.29	11,802	9,778
1.9E	29.27	22.95[8]	24.10	8.47	2.60	13,257	10,984
2.1E	29.27	27.69[9]	29.31	8.47	3.20	14,227	11,788

SI: 1 psi = 0.00689 MPa or 1 MPa = 145 psi.

1. The reference design values in this table are applicable for the product used in dry, well-ventilated interior applications, in which the equivalent moisture content of sawn lumber is less than 16%.
2. The reference design values in this table are for normal load duration. Loads of longer or shorter duration shall be adjusted in accordance with the applicable code. Duration of load adjustments shall not be applied to $F_{c\perp}$,E and E_{min}.
3. Orientation nomenclature for Lamco LFL®.



4. Using True (shear free) E, deflection is calculated as follows for uniformly loaded simple span beams:

   $\Delta = [5WL^4/(32Ebh^3)] + [12WL^2/(5Ebh)]$

   where: Δ = deflection in inches (mm)
   W = uniform load in lbs./in. (N/mm)
   L = span in inches (mm)
   E = modulus of elasticity in psi (MPa)
   b = width of beam in inches (mm)
   h = depth of beam in inches (mm)

5. The bending values in these tables are based on a reference depth of 12" (305 mm). For other depths, the bending value for 1.6E grade shall be adjusted by a in bending of $(12/d)^{0.34}$, where d is measured in inches with a minimum depth of 2.5" (64 mm). For other depths of the 1.7E, 1.9E and 2.1E grades, the bending values shall be adjusted by a size factor in bending of $(12/d)^{0.25}$ where d is measured in inches with a minimum depth of 2.5" (64 mm). Bending values are further limited to 31.28 MPa for 1.9E and 35.61 MPa for 2.1E grades.
6. The tension, F_t value for the1.6E grade is based on a reference length of 24". For lengths up to 24', multiply F_t by a size factor in tension of $(24/L)^{0.15}$, where L is the length in inches.
7. The tension, F_t values for 1.7E and 1.9E grades are based on a reference length of 88" (7'4"). For lengths greater than 88", multiply F_t by a size factor in tension of $(88/L)^{0.1335}$, where L is the length in inches.
8. The tension, F_t value for the 2.1E grade is based on a reference length of 88" (7'4"). For lengths greater than 88", multiply F_t by a size factor in tension of $(88/L)^{0.125}$, where L is the length in inches.
9. When structural members qualify as repetitive members in accordance with the applicable code, a 4% increase is permitted to F_b.

5.5.8 *Connections:*

5.5.8.1 Lateral loads for nails, screws and bolts, and withdrawal loads for nails and screws, installed in Lamco LFL® shall be in accordance with the *NDS* and *CSA O86* for sawn lumber having a minimum specific gravity equal to that shown in Table 3.

5.5.8.2 Fastener spacing shall be as prescribed in the applicable code (for sawn lumber) unless specifically indicated in Figure 1 or Table 4 or as prescribed in *NDS* Chapter 12.

5.5.8.3 Other nail spacing for specific applications, such as prefabricated steel components or hangers, may be used. Nail spacing for these applications should follow what is specified and detailed in the proprietary catalogues for the specific gravities as defined in Table 3.

5.5.8.4 Allowable lateral loads for machine bolts installed perpendicular to the wide face of Lamco LFL® with loads applied parallel or perpendicular to the grain shall be as prescribed in the applicable code or in accordance with *NDS* or *CSA O86* for sawn lumber with the minimum specific gravity at least equivalent to that defined in Table 3.

TABLE 3. EQUIVALENT SPECIFIC GRAVITIES & MINIMUM FASTENER SPACING FOR DESIGN OF MECHANICAL CONNECTIONS

Product	Fastener	Fastener Axis Location	Load Direction	Angle to Grain	Equivalent Specific Gravity for Design Purposes			Minimum Spacing
					Grades 1.6E & 1.7E	Grade 1.9E	Grades 2.1E	
Lamco LFL®	Nails & Screws (<0.25" dia.)	Wide Face	Lateral	Any	0.42	0.46	0.50	Per Applicable Code for Solid-Sawn Material
		Narrow Face	Lateral	Any				
		X & Y Axes	Withdrawal	–				
	Bolts	Wide Face	Lateral	0 degrees				
		Wide Face	Lateral	90 degrees				
		Narrow Face	Lateral	0 degrees				

5.5.8.5 Connection requirements for multiple member side-loaded beams are defined in the following assembly details and have the maximum uniformly distributed load carrying capacity as defined in Table 4.

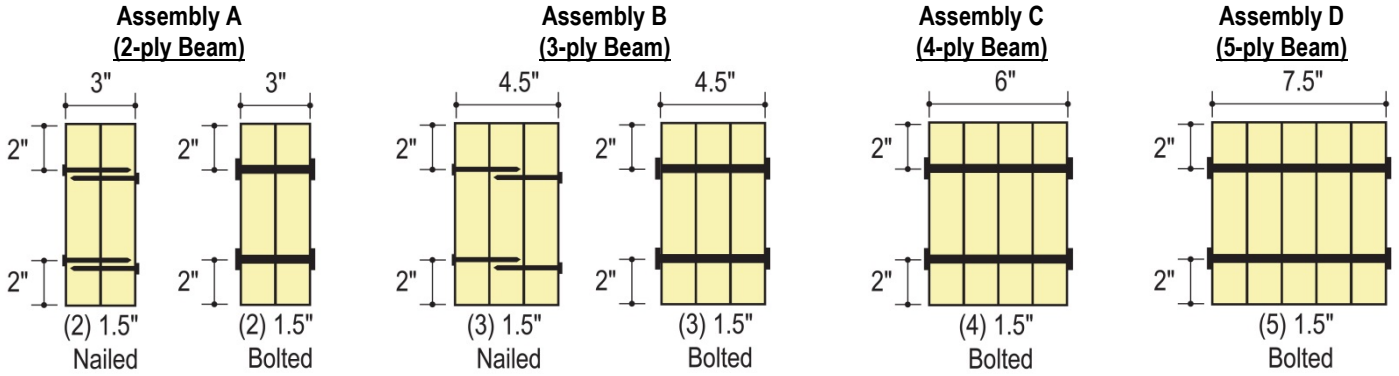


FIGURE 1. CONNECTION REQUIREMENTS FOR MULTIPLE MEMBER SIDE-LOADED BEAMS

TABLE 4. CONNECTION REQUIREMENTS & ALLOWABLE UNIFORM LOADS FOR MULTIPLE MEMBER SIDE-LOADED BEAMS[1, 2,4,5]

Assembly Detail (See Figure 1)	Allowable Load for Connection of Beams Loaded from One Side Only (lb)			Allowable Load (per side) for Connection of Beams Loaded from Both Sides[10] (lb)		
	2 Rows of 10d (0.148" x 3") Nails at 12" o.c.	3 Rows of 10d (0.148" x 3") Nails at 12" o.c.	2 Rows of ½" Bolts at 12" o.c.[3,7,8]	2 Rows of 10d (0.148" x 3") Nails at 12" o.c.	3 Rows of 10d (0.148" x 3") Nails at 12" o.c.	2 Rows of ½" Bolts at 12" o.c.[3,7,8]
A	415	625	650	210	310	325
B[9]	310	465	485	210	310	325
C	–	–	430	–	–	325
D[6]	–	–	405	–	–	325

SI: 1" = 25.4 mm, 1 lb = 4.45 N

1. Multiply the appropriate table value by:
   a. 1.5 for nails or bolts spaced at 8" o.c. per row
   b. 2 for nails or bolts spaced at 6" o.c. per row
   c. 3 for nails or bolts spaced at 4" o.c. per row
   d. 0.5 for bolts spaced at 24" o.c. per row
2. Determine the appropriate beam size required to support the load before determining the connection requirements.
3. Screws can be used in place of bolts, provided additional fasteners are used such that the sum of the screw capacities is equal to or greater than that of the ½"-diameter bolts. Refer to the screw manufacturer's literature.
4. Tabulated values assume adequate end distance, edge distance and spacing per Chapter 12 of *NDS* or Chapter 12 of *CSA O86*.
5. Tabulated values are for normal load duration. Adjustment of the design stresses for duration of load shall be in accordance with the applicable code or *NDS*, as applicable.
6. For beams greater than 5-plies wide, consult a Registered Design Professional for the attachment requirements.
7. A standard cut steel washer of minimum 0.118" thickness, with a minimum outside dimension of 1⅜", is required on each side of the beam between the wood and bolt head and nut.
8. Bolted connections assume full diameter bolts with bending yield strength (F_{yb}) of 45,000 psi and lumber with a SG of 0.42.
9. Nailing is required from both sides for 3-ply beams.
10. The allowable loads provided above for connection of beams loaded from both sides are the maximum that can be applied to each side of the beam.

5.5.9 *Stair Stringer:*

5.5.9.1 Lamco LFL® is approved for use in stair stringer applications when designed and installed in accordance with Figure 2 and Table 5, Table 6, Table 7, Table 8 and Table 9.

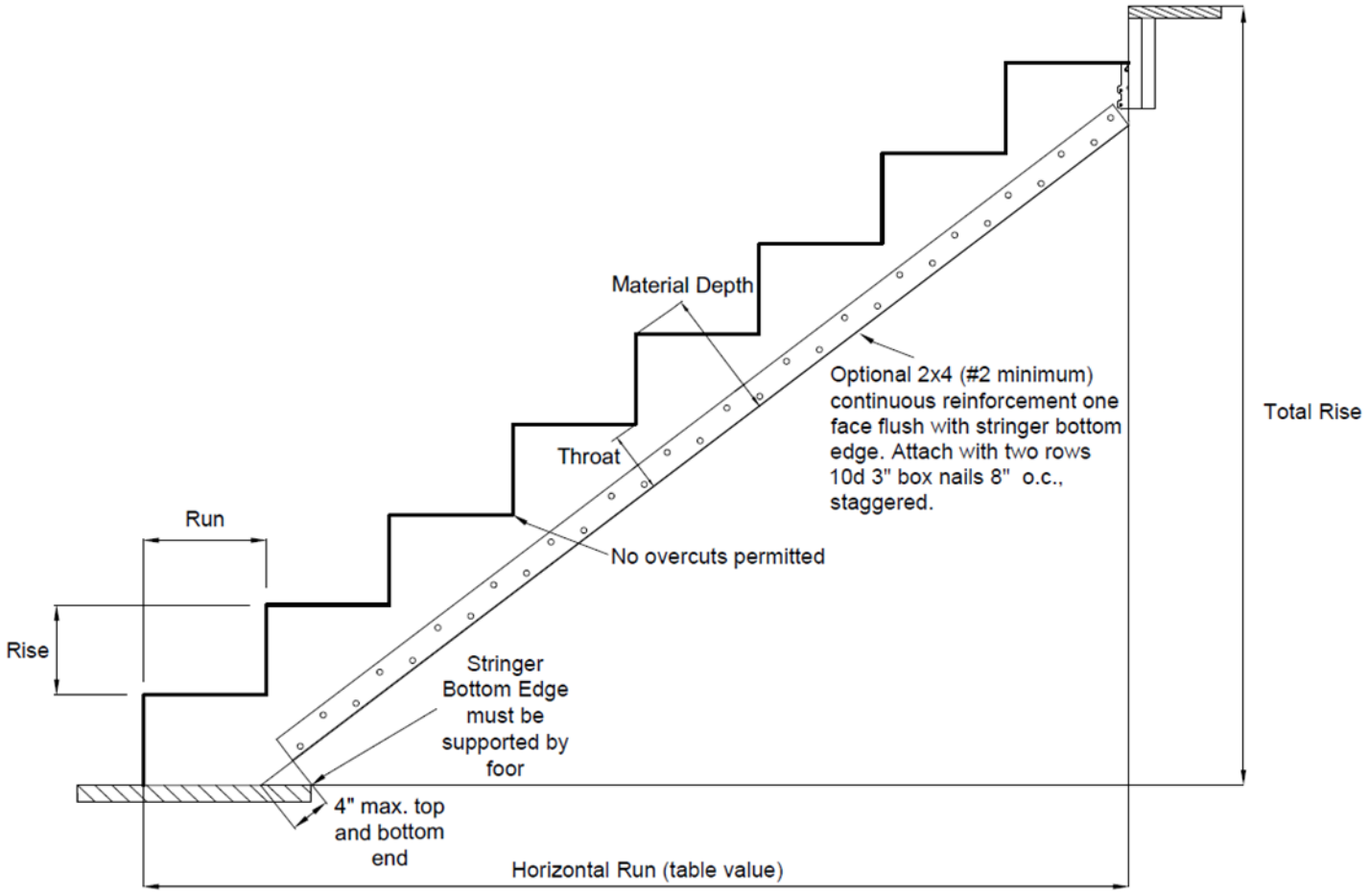


FIGURE 2. LAMCO LFL® STAR STRINGER SPECIFICATIONS

TABLE 5. LAMCO LFL® MINIMUM THROAT DEPTH

Stringer Depth (in)	Residential (7¾" rise/10" run)	Commercial (7" rise/11" run)
9 1/4	3 1/8"	3 3/8"
9 1/2	3 3/8"	3 5/8"
11 1/4	5 1/8"	5 3/8"
11 7/8	5 3/4"	6"
14	7 7/8"	8 1/8"
SI: 1" = 25.4 mm		

TABLE 6. RESIDENTIAL HORIZONTAL STRINGER RUN LENGTH OF LAMCO LFL® 1.6E – 40 PSF LIVE LOAD AND 12 PSF DEAD LOAD[1-14]

Stringer Depth (in)	36" Tread Width				42" Tread Width		44" Tread Width		48" Tread Width	
	2 stringers		3 stringers		3 stringers		3 stringers		3 stringers	
	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing
9 1/4	5'-0"	N/A	5'-0"	N/A	5'-0"	N/A	5'-0"	N/A	5'-0"	N/A
9 1/2	5'-0"	5'-0"	5'-10"	6'-8"	5'-10"	5'-10"	5'-10"	5'-10"	5'-0"	5'-10"
11 1/4	8'-4"	8'-4"	9'-2"	10'-0"	8'-4"	9'-2"	8'-4"	9'-2"	8'-4"	9'-2"
11 7/8	9'-2"	9'-2"	10'-0"	10'-10"	10'-0"	10'-0"	10'-0"	10'-0"	9'-2"	10'-0"
14	12'-6"	12'-6"	14'-2"	14'-2"	13'-4"	14'-2"	13'-4"	13'-4"	13'-4"	13'-4"
16	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"

SI: 1" = 25.4 mm

1. N/A=Bracing not permitted due to interference with step notches.
2. Stringer runs are based on a tread rise of 7.75" (maximum per 2015 *IRC*), a tread run of 10" (minimum per 2015 *IRC*), rounded down to the whole tread run.
3. Table based on deflection requirement of L/360 live load and L/240 total load; material thickness of 1.43475 in.; interior bearing length of 3 inches and a bearing plate capacity of 425 psi.
4. Stringers are unstable until treads are installed.
5. Use subfloor adhesive between treads and stringers to minimize squeaks.
6. Avoid direct contact between stringers and concrete or masonry by using flashing or a vapor barrier.
7. Bracing must be 2x4 No. 1/No. 2 SPF (E=1.4), one face (see details above).
8. Do not ship precut stringers. Cut on jobsite or ship as complete stair units.
9. Table presumes stair width is equally shared by all stringers.
10. Maximum stair stringer run is capped based on the difference between floors of 12.25 ft (Residential) & 12 ft (Commercial).
11. Design of tread is done by others; a tread thickness of 1 in. was assumed for geometry.
12. Stringer self-weight is considered in addition to the stated design dead load.
13. Do not overcut the notch corner. Drill 0.25 in. diameter hole at stringer notch corner during fabrication.
14. Repetitive bending factor of 1.04 used where permitted by *NDS*.

TABLE 7. RESIDENTIAL HORIZONTAL STRINGER RUN LENGTH OF LAMCO LFL® 1.7E – 40 PSF LIVE LOAD AND 12 PSF DEAD LOAD[1-14]

Stringer Depth (in)	36" Tread Width				42" Tread Width		44" Tread Width		48" Tread Width	
	2 stringers		3 stringers		3 stringers		3 stringers		3 stringers	
	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing
9 1/4	5'-0"	N/A	5'-10"	N/A	5'-0"	N/A	5'-0"	N/A	5'-0"	N/A
9 1/2	5'-0"	6'-8"	5'-10"	7'-6"	5'-10"	6'-8"	5'-10"	6'-8"	5'-10"	6'-8"
11 1/4	8'-4"	9'-2"	9'-2"	10'-0"	9'-2"	10'-0"	8'-4"	10'-0"	8'-4"	9'-2"
11 7/8	9'-2"	10'-0"	10'-10"	11'-8"	10'-0"	10'-10"	10'-0"	10'-10"	10'-0"	10'-10"
14	12'-6"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	13'-4"	14'-2"	13'-4"	14'-2"
16	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"	14'-2"

SI: 1" = 25.4 mm

1. N/A=Bracing not permitted due to interference with step notches.
2. Stringer runs are based on a tread rise of 7.75" (maximum per 2015 *IRC*), a tread run of 10" (minimum per 2015 *IRC*), rounded down to the whole tread run.
3. Table based on deflection requirement of L/360 live load and L/240 total load; material thickness of 1.43475 in.; and interior bearing length of 3 inches and a bearing plate capacity of 425 psi.
4. Stringers are unstable until treads are installed.
5. Use subfloor adhesive between treads and stringers to minimize squeaks.
6. Avoid direct contact between stringers and concrete or masonry by using flashing or a vapor barrier.
7. Bracing must be 2x4 No. 1/No. 2 SPF (E=1.4), one face (see details above).
8. Do not ship precut stringers. Cut on jobsite or ship as complete stair units.
9. Table presumes stair width is equally shared by all stringers.
10. Maximum stair stringer run is capped based on the difference between floors of 12.25 ft (Residential) & 12 ft (Commercial).
11. Design of tread is done by others; a tread thickness of 1 in. was assumed for geometry.
12. Stringer self-weight is considered in addition to the stated design dead load.
13. Do not overcut the notch corner. Drill 0.25 in. diameter hole at stringer notch corner during fabrication.
14. Repetitive bending factor of 1.04 used where permitted by *NDS*.

TABLE 8. COMMERCIAL HORIZONTAL STRINGER RUN LENGTH OF LAMCO LFL® 1.6E – 100 PSF LIVE LOAD AND 12 PSF DEAD LOAD[1-14]

Stringer Depth (in)	36" Tread Width				42" Tread Width		44" Tread Width		48" Tread Width	
	2 stringers		3 stringers		3 stringers		3 stringers		3 stringers	
	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing
9 1/4	3'-8"	3'-8"	4'-7"	4'-7"	4'-7"	4'-7"	4'-7"	4'-7"	3'-8"	3'-8"
9 1/2	3'-8"	3'-8"	4'-7"	4'-7"	4'-7"	4'-7"	4'-7"	4'-7"	4'-7"	4'-7"
11 1/4	6'-5"	6'-5"	7'-4"	7'-4"	7'-4"	7'-4"	6'-5"	6'-5"	6'-5"	6'-5"
11 7/8	6'-5"	6'-5"	8'-3"	8'-3"	7'-4"	7'-4"	7'-4"	7'-4"	7'-4"	7'-4"
14	9'-2"	9'-2"	11'-0"	11'-0"	10'-1"	10'-1"	10'-1"	10'-1"	10'-1"	10'-1"
16	11'-0"	11'-0"	13'-9"	13'-9"	12'-10"	12'-10"	12'-10"	12'-10"	11'-11"	11'-11"

SI: 1" = 25.4 mm

1. N/A=Bracing not permitted due to interference with step notches.
2. Stringer runs are based on a tread rise of 7.75" (maximum per 2015 *IRC*), a tread run of 10" (minimum per 2015 *IRC*), rounded down to the whole tread run.
3. Table based on deflection requirement of L/360 live load and L/240 total load; material thickness of 1.43475 in.; and interior bearing length of 3 inches and a bearing plate capacity of 425 psi.
4. Stringers are unstable until treads are installed.
5. Use subfloor adhesive between treads and stringers to minimize squeaks.
6. Avoid direct contact between stringers and concrete or masonry by using flashing or a vapor barrier.
7. Bracing must be 2x4 No. 1/No. 2 SPF (E=1.4), one face (see details above).
8. Do not ship precut stringers. Cut on jobsite or ship as complete stair units.
9. Table presumes stair width is equally shared by all stringers.
10. Maximum stair stringer run is capped based on the difference between floors of 12.25 ft (Residential) & 12 ft (Commercial).
11. Design of tread is done by others; a tread thickness of 1 in. was assumed for geometry.
12. Stringer self-weight is considered in addition to the stated design dead load.
13. Do not overcut the notch corner. Drill 0.25 in. diameter hole at stringer notch corner during fabrication.
14. Repetitive bending factor of 1.04 used where permitted by *NDS*.

TABLE 9. COMMERCIAL HORIZONTAL STRINGER RUN LENGTH OF LAMCO LFL® 1.7E – 100 PSF LIVE LOAD AND 12 PSF DEAD LOAD[1-14]

Stringer Depth (in)	36" Tread Width				42" Tread Width		44" Tread Width		48" Tread Width	
	2 stringers		3 stringers		3 stringers		3 stringers		3 stringers	
	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing	No Bracing	Bracing
9 1/4	3'-8"	4'-7"	4'-7"	5'-6"	4'-7"	5'-6"	4'-7"	5'-6"	4'-7"	4'-7"
9 1/2	4'-7"	4'-7"	4'-7"	6'-5"	4'-7"	5'-6"	4'-7"	5'-6"	4'-7"	5'-6"
11 1/4	6'-5"	7'-4"	7'-4"	8'-3"	7'-4"	8'-3"	7'-4"	8'-3"	7'-4"	7'-4"
11 7/8	7'-4"	8'-3"	8'-3"	9'-2"	8'-3"	9'-2"	8'-3"	9'-2"	7'-4"	8'-3"
14	10'-1"	11'-0"	11'-11"	12'-10"	11'-0"	11'-11"	11'-0"	11'-11"	11'-0"	11'-11"
16	12'-10"	12'-10"	14'-8"	16'-6"	13'-9"	15'-7"	13'-9"	14'-8"	13'-9"	13'-9"

SI: 1" = 25.4 mm

1. N/A=Bracing not permitted due to interference with step notches.
2. Stringer runs are based on a tread rise of 7.75" (maximum per 2015 *IRC*), a tread run of 10" (minimum per 2015 *IRC*), rounded down to the whole tread run.
3. Table based on deflection requirement of L/360 live load and L/240 total load; material thickness of 1.43475 in.; and interior bearing length of 3 inches and a bearing plate capacity of 425 psi.
4. Stringers are unstable until treads are installed.
5. Use subfloor adhesive between treads and stringers to minimize squeaks.
6. Avoid direct contact between stringers and concrete or masonry by using flashing or a vapor barrier.
7. Bracing must be 2x4 No. 1/No. 2 SPF (E=1.4), one face (see details above).
8. Do not ship precut stringers. Cut on jobsite or ship as complete stair units.
9. Table presumes stair width is equally shared by all stringers.
10. Maximum stair stringer run is capped based on the difference between floors of 12.25 ft (Residential) & 12 ft (Commercial).
11. Design of tread is done by others; a tread thickness of 1 in. was assumed for geometry.
12. Stringer self-weight is considered in addition to the stated design dead load.
13. Do not overcut the notch corner. Drill 0.25 in. diameter hole at stringer notch corner during fabrication.
14. Repetitive bending factor of 1.04 used where permitted by *NDS*.

6 INSTALLATION

6.1 Installation shall comply with the manufacturer's installation instructions and this TER. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.

6.2 Lamco LFL® shall be installed in accordance with the applicable code, the approved construction documents, this TER, the manufacturer's installation instructions, *NDS* or *CSA O86* and standard framing practice as applied to solid-sawn lumber.

7 SUBSTANTIATING DATA

7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

7.1.1 Mechanical properties testing in accordance with *ASTM D5456* and *EN 14374*

7.2 Information contained herein is the result of testing and/or data analysis by sources which conform to *IBC* Section 1703 and/or professional engineering regulations. DrJ relies upon accurate data to perform its ISO/IEC 17065 evaluations.

7.3 Where appropriate, DrJ's analysis is based on provisions that have been codified into law through state or local adoption of codes and standards. The providers of the codes and standards are legally responsible for their content. DrJ analysis may use code-adopted provisions as a control sample. A control sample versus a test sample establishes a product as being equivalent to that prescribed in this code in quality, *strength*, effectiveness, *fire resistance*, durability, and safety. Where the accuracy of the provisions provided herein is reliant upon the published properties of materials, DrJ relies upon the grade mark, grade stamp, mill certificate, and/or test data provided by material suppliers to be minimum properties. DrJ analysis relies upon these properties to be accurate.

8 FINDINGS

8.1 When used in accordance with the manufacturer's installation instructions and this TER, Lamco LFL® complies with, or is a suitable alternative to, the requirements of *IBC* Chapter 23; *IRC* Chapter 5, Chapter 6 and Chapter 8; *NBC* Articles 1.2, 4.3.11 and 9.23; and *CSA O86*.

8.2 Building codes require data from valid *research reports* be obtained from *approved sources* (i.e., licensed *registered design professionals* [RDPs]).

8.2.1 Building official approval of a licensed RDP is performed by verifying the RDP and/or their business entity is listed by the licensing board of the relevant *jurisdiction*.

8.3 Agencies who are accredited through ISO/IEC 17065 have met the code requirements for approval by the *building official*. DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131 and employs RDPs.

8.4 Through ANAB accreditation and the IAF MLA, DrJ certification can be used to obtain product approval in any *jurisdiction* or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – "certified once, accepted everywhere."

8.5 *IBC* Section 104.11 (*IRC* Section R104.11 and *IFC* Section 104.10[5] are similar) states:

> **104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code…Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.

[5] 2018 *IFC* Section 104.9

9 CONDITIONS OF USE

9.1 Lamco LFL® shall be installed in accordance with the applicable code, the approved construction documents, this TER and the manufacturer's installation instructions. If there is a conflict between this TER and the manufacturer's instructions, the more restrictive shall govern.

9.2 The manufacturer's published installation instructions shall be available at the jobsite at all times during installation.

9.3 Lamco LFL® complies with, or is a suitable alternative to, sawn lumber as permitted by the codes listed in Section 2, subject to the following conditions:

9.3.1 The service conditions for Lamco LFL® are dry conditions of use, for which the equilibrium moisture content must be less than 16%. Use in applications exceeding 16% moisture content is outside the scope of this TER.

9.3.2 The service conditions for Lamco LFL® with fire-retardant or preservative chemical treatments are outside the scope of this TER.

9.3.3 Fastener design values shall be determined using equivalent specific gravities specified in Table 3 of this TER.

9.3.4 Cutting and notching of Lamco LFL® is prohibited, except where specifically permitted by the manufacturer's recommendations, this TER or where the effects of such alterations are specifically considered in the design of the member by a *registered design professional*.

9.3.5 Increases for duration of load shall be in accordance with the limitations of the applicable building code for sawn lumber.

9.3.6 The product is considered acceptable for using the creep factors applicable to sawn lumber in accordance with the applicable building code.

9.3.7 Where use of Lamco LFL® qualifies as repetitive members as defined in *NDS*, an increase of 4% is permitted in allowable bending stresses.

9.3.8 Lamco LFL® may be cut to the specified length and width as appropriate for the application, provided the depth is no less than 2½". The thickness may not be cut.

9.3.9 Minimum bearing length and anchorage of Lamco LFL® shall meet the requirements of *IBC* Chapter 23 or Division B, Article 9.23 of the *NBC*, and *CSA O86* for sawn lumber.

9.3.10 Lamco LFL® shall be fabricated by Produits Forestiers Lamco Inc. at its facility in Saint-Félicien, Quebec, with quality control inspections by an approved third-party quality control inspection agency.

9.4 Where required by the *building official*, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of *permit* application.

9.5 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.

9.6 Design loads shall be determined in accordance with the building code adopted by the *jurisdiction* in which the project is to be constructed and/or by the building designer (e.g., *owner* or RDP).

9.7 At a minimum, this product shall be installed per Section 6 of this TER.

9.8 This product has an internal quality control program and a third-party quality assurance program in accordance with *IBC* Section 104.4 and Section 110.4 and *IRC* Section R104.4 and Section R109.2.

9.9 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the *owner* or the owner's authorized agent.

9.10 This TER shall be reviewed for code compliance by the AHJ in concert with *IBC* Section 104.

9.11 The implementation of this TER for this product is dependent on the design, quality control, third-party quality assurance, proper implementation of installation instructions, inspections required by *IBC* Section 110.3, and any other code or regulatory requirements that may apply.

10 IDENTIFICATION

10.1 The product(s) listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance.

10.2 Where intended for use in fire-resistive construction, the designation "HRA" shall be included on the product marking.

10.3 Additional technical information can be found at lamcofp.com.

11 REVIEW SCHEDULE

11.1 This TER is subject to periodic review and revision. For the most recent version, visit drjcertification.org.

11.2 For information on the current status of this TER, contact DrJ Certification.

Issue Date: January 12, 2022
Subject to Renewal: July 1, 2023

FBC Supplement to TER 1211-01

REPORT HOLDER: Produits Forestiers Lamco Inc.

1 Evaluation Subject

1.1 Lamco LFL® (Laminated Finger-Jointed Lumber) Structural Wood Based Lumber or Advanced Engineered Lumber

2 Purpose and Scope

2.1 *Purpose*

2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show Lamco LFL® (Laminated Finger-Jointed Lumber) Structural Wood Based Lumber or Advanced Engineered Lumber, recognized in TER 1211-01, has also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

2.2 *Applicable Code Editions*

2.2.1 *FBC-B—17, 20: Florida Building Code – Building*

2.2.2 *FBC-R—17, 20: Florida Building Code – Residential*

3 Conclusions

3.1 Lamco LFL® (Laminated Finger-Jointed Lumber) Structural Wood Based Lumber or Advanced Engineered Lumber, described in TER 1211-01, complies with the *FBC-B* and *FBC-R* and is subject to the conditions of use described in this supplement.

3.2 Where there are variations between the *IBC* and *IRC* and the *FBC-B* and *FBC-R* applicable to this TER, they are listed here.

3.2.1 *FBC-B* Section 104.4 and Section 110.4 are reserved.

3.2.2 *FBC-R* Section R104 and Section R109 are reserved.

3.2.3 *FBC-B* Section 2301.3 replaces *IBC* Section 2301.1.

4 Conditions of Use

4.1 Lamco LFL® (Laminated Finger-Jointed Lumber) Structural Wood Based Lumber or Advanced Engineered Lumber, described in TER 1211-01, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 1211-01

4.1.2 The design, installation, and inspections are in accordance with additional requirements of *FBC-B* Chapter 16 and Chapter 17, as applicable.