# Technical Evaluation Report™ - Canada

**A Duly Authenticated Report from an Approved Agency**

**Report No: 2405-112**

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## Performance Characteristics of Owens Corning® Lumber - Canada

### Trade Secret Report Holder:


**Owens Corning® (OC™)**
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### CSI Designations:

**DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES**
Section: 06 05 23 - Wood, Plastic, and Composite Fastenings
Section: 06 73 00 - Composite Decking
Section: 06 73 13 - Composite Structural Decking

## 1 Innovative Product Evaluated[1]

1.1 Owens Corning Lumber (OC Lumber)

## 2 Product Description and Materials

2.1 The innovative product evaluated in this report is shown in **Figure 1**, available colors are presented in **Figure 2**, and OC Lumber is described in **Table 1**.

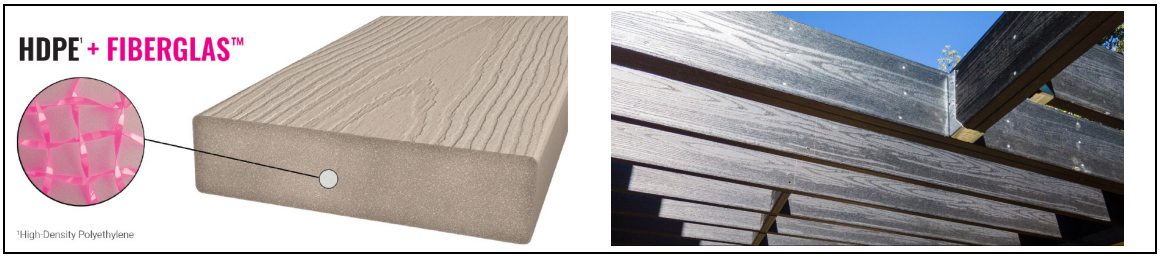



**Figure 1**. Owens Corning Lumber (OC Lumber)


**Figure 2**. OC Lumber – Available Colors

**Table 1**. OC Lumber Description

| OC Lumber | Description |
|---|---|
| ***Product Type*** | Continuous Glass fiber, Advantex® Fiberglas™, reinforced High Density Polyethylene (HDPE) with less than twenty-five percent (25%) calcium carbonate in base HDPE resin.<br>≥ 5% of overall total weight is fibrous glass<br>< 2.5% by weight of organic surface binder |
| ***Application*** | Reinforced and semi-reinforced extruded products for use in non-structural and structural applications |
| ***Joists***<br>(OC Lumber) | Reinforced polymeric lumber for joist applications (edgewise orientation) available in the following sizes in (mm):<br>38 x 89, 38 x 140, 38 x 190, 38 x 235, and 38 x 285<br>Nominal Sizes:<br>2 x 4, 2 x 6, 2 x 8, 2 x 10, and 2 x 12 |
| ***Decking***[1]<br>(OC Lumber WEARDECK™ Decking) | Reinforced polymeric lumber for decking applications (flatwise orientation) available in the following sizes in (mm):<br>26 x 140, 26 x 185, and 35 x 140 |
| ***Posts***[2]<br>(OC Lumber Structural Composite Posts) | Chopped fiberglass reinforced PVC extrusion with an acrylic surface coating:<br>≥ 15% of overall total weight is fibrous glass<br>< 2.5% by weight of organic surface binder |
| Imperial Units: 1 mm = 0.0394 in<br>1. See DrJ Report Number 2404-113 for material properties.<br>2. See DrJ Report Number 2307-07 for material properties. | |

2.2 As needed, review material properties for design in **Section 4** and the regulatory evaluation in **Section 5**.

## 3 Applicable Codes and Standards[2]

3.1 *Codes*

3.1.1 *NBC — 15, 20, 25: National Building Code of Canada*

3.1.2 *O Reg. 332/12: Ontario Building Code (OBC)*[3]

3.2 *Standards and Referenced Documents*

3.2.1 *ASTM D143: Standard Test Methods for Small Clear Specimens of Timber*

3.2.2 *ASTM D198: Standard Test Methods of Static Tests of Lumber in Structural Sizes*

3.2.3 *ASTM D1037: Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials*

3.2.4 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood and Wood-Based Materials*

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

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

3.2.7 *ASTM D6109: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products*

3.2.8 *ASTM D7147: Standard Specification for Testing and Establishing Allowable Loads of Joist Hangers*

3.2.9 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

3.2.10 *CSA O86: Engineering Design in Wood*

## 4 Tabulated Properties Generated from Nationally Recognized Standards

4.1 OC Lumber was tested and/or evaluated for:

4.1.1 Structural capacities for gravity loads when used as deck posts, joists, beams, headers, stair treads, stair stringers, and foundation sill plates.

4.1.2 Fastener and hanger connection capacities.

4.1.3 Flame spread.

4.2 Decks shall be supported on footings designed in accordance with NBC Subsection 9.15.3 and Section 9.17.

4.2.1 Bottom of posts shall be restrained to prevent lateral displacement as specified in NBC Article 9.17.2.2.

4.2.1.1 In accordance with CSA O86 Section 6.5.3.2.3, the lateral-stability factor, $K_L$, may be taken as unity if the maximum depth-to-width ratio of the member does not exceed 6.5:1.

4.2.2 Maximum allowable joist spans are provided in **Table 2** through **Table 5**.

4.2.2.1 **Table 2** provides the maximum allowable joist span based on a Live Load (LL) of 1.92 kPa

4.2.2.2 **Table 3** provides the maximum allowable joist span based on a LL of 2.87 kPa

4.2.2.3 **Table 4** provides the maximum allowable joist span based on a LL of 3.83 kPa

4.2.2.4 **Table 5** provides the maximum allowable joist span based on a LL of 4.79 kPa

**Table 2**. Maximum Joist Spans (m) and Cantilever Lengths (cm)
Using OC Lumber at Various Deflection Limits – 1.92 kPa Live Load[3,4]

| OC Lumber Profile (Nominal Size) | Joist Spacing (mm o.c.) | Deflection Limits | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L/360 | | L/240 | | L/180 | | L/150 | | L/120 | |
| | | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever |
| 2 x 6 | 305 | 2.0 | 15.2 | 2.3 | 20.3 | 2.5 | 25.4 | 2.6 | 27.9 | 2.8 | 33.0 |
| | 405 | 1.8 | 17.8 | 2.1 | 22.9 | 2.3 | 27.9 | 2.4 | 30.5 | 2.6 | 35.6 |
| | 610 | 1.6 | 17.8 | 1.8 | 25.4 | 2.0 | 30.5 | 2.1 | 33.0 | 2.3 | 38.1 |
| 2 x 8 | 305 | 2.7 | 27.9 | 3.1 | 38.1 | 3.4 | 45.7 | 3.6 | 50.8 | 3.9 | 58.4 |
| | 405 | 2.4 | 30.5 | 2.8 | 40.6 | 3.1 | 48.3 | 3.3 | 55.9 | 3.5 | 61.0 |
| | 610 | 2.1 | 35.6 | 2.4 | 45.7 | 2.7 | 53.3 | 2.9 | 61.0 | 3.1 | 61.0 |
| 2 x 10 | 305 | 3.3 | 43.2 | 3.8 | 55.9 | 4.2 | 61.0 | 4.4 | 61.0 | 4.8 | 61.0 |
| | 405 | 3.0 | 48.3 | 3.4 | 61.0 | 3.8 | 61.0 | 4.0 | 61.0 | 4.3 | 61.0 |
| | 610 | 2.6 | 53.3 | 3.0 | 61.0 | 3.3 | 61.0 | 3.5 | 61.0 | 3.8 | 61.0 |

**Table 2**. Maximum Joist Spans (m) and Cantilever Lengths (cm)
Using OC Lumber at Various Deflection Limits – 1.92 kPa Live Load[3,4]

| OC Lumber Profile (Nominal Size) | Joist Spacing (mm o.c.) | Deflection Limits | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L/360 | | L/240 | | L/180 | | L/150 | | L/120 | |
| | | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever |
| 2 x 12 | 305 | 3.9 | 61.0 | 4.5 | 61.0 | 5.0 | 61.0 | 5.3 | 61.0 | 5.7 | 61.0 |
| | 405 | 3.6 | 61.0 | 4.1 | 61.0 | 4.5 | 61.0 | 4.8 | 61.0 | 5.2 | 61.0 |
| | 610 | 3.1 | 61.0 | 3.6 | 61.0 | 3.9 | 61.0 | 4.2 | 61.0 | 4.5 | 61.0 |

Imperial Units: 1 m = 3.281 ft, 1 mm = 0.0398 in

1. Joist spans are based on a design live load of 1.92 kPa (40-psf) only.
2. Maximum cantilever based on twice the joist span deflection limit and a 99.8 kg (220 lb) point load applied to the end. Joist cantilever shall be limited to 0.61 m (2' 0"), a cantilever length that results in twice the deflection limit for the main span, or twenty-five percent (25%) of the length of the joist span, whichever is less.
3. Owens Corning decks use proprietary materials and conditions not prescribed in CSA O86.
4. Joist spans are based on a factor of 1.0 for temperature, freeze-thaw cycles, and UV exposure.

**Table 3**. Maximum Joist Spans (m) and Cantilever Lengths (cm)
Using OC Lumber at Various Deflection Limits – 2.87 kPa Live Load[3,4]

| OC Lumber Profile (Nominal Size) | Joist Spacing (mm o.c.) | Deflection Limits | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L/360 | | L/240 | | L/180 | | L/150 | | L/120 | |
| | | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever |
| 2 x 6 | 305 | 1.7 | 17.8 | 2.0 | 22.9 | 2.2 | 27.9 | 2.3 | 30.5 | 2.5 | 35.6 |
| | 405 | 1.6 | 17.8 | 1.8 | 25.4 | 2.0 | 30.5 | 2.1 | 33.0 | 2.3 | 38.1 |
| | 610 | 1.4 | 20.3 | 1.6 | 27.9 | 1.7 | 33.0 | 1.8 | 38.1 | 2.0 | 43.2 |
| 2 x 8 | 305 | 2.4 | 33.0 | 2.7 | 43.2 | 3.0 | 50.8 | 3.1 | 55.9 | 3.4 | 61.0 |
| | 405 | 2.1 | 35.6 | 2.4 | 45.7 | 2.7 | 53.3 | 2.9 | 61.0 | 3.1 | 61.0 |
| | 610 | 1.9 | 38.1 | 2.1 | 50.8 | 2.4 | 58.4 | 2.5 | 61.0 | 2.7 | 61.0 |
| 2 x 10 | 305 | 2.9 | 48.3 | 3.3 | 61.0 | 3.6 | 61.0 | 3.9 | 61.0 | 4.2 | 61.0 |
| | 405 | 2.6 | 53.3 | 3.0 | 61.0 | 3.3 | 61.0 | 3.5 | 61.0 | 3.8 | 61.0 |
| | 610 | 2.3 | 55.9 | 2.6 | 61.0 | 2.9 | 61.0 | 3.1 | 61.0 | 3.3 | 61.0 |
| 2 x 12 | 305 | 3.4 | 61.0 | 3.9 | 61.0 | 4.3 | 61.0 | 4.6 | 61.0 | 5.0 | 61.0 |
| | 405 | 3.1 | 61.0 | 3.6 | 61.0 | 3.9 | 61.0 | 4.2 | 61.0 | 4.5 | 61.0 |
| | 610 | 2.7 | 61.0 | 3.1 | 61.0 | 3.4 | 61.0 | 3.7 | 61.0 | 3.9 | 61.0 |

Imperial Units: 1 m = 3.281 ft, 1 mm = 0.0398 in

1. Joist spans are based on a design live load of 2.87 kPa (60-psf).
2. Maximum cantilever based on twice the joist span deflection limit and a 99.8 kg (220 lb) point load applied to the end. Joist cantilever shall be limited to 0.61 m (2' 0"), a cantilever length that results in twice the deflection limit for the main span, or twenty-five percent (25%) of the length of the joist span, whichever is less.
3. Owens Corning decks use proprietary materials and conditions not prescribed in CSA O86.
4. Joist spans are based on a factor of 1.0 for temperature, freeze-thaw cycles, and UV exposure.

**Table 4**. Maximum Joist Spans (m) and Cantilever Lengths (cm)
Using OC Lumber at Various Deflection Limits – 3.83 kPa Live Load[3,4]

| OC Lumber Profile (Nominal Size) | Joist Spacing (mm o.c.) | Deflection Limits | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L/360 | | L/240 | | L/180 | | L/150 | | L/120 | |
| | | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever |
| 2 x 6 | 305 | 1.6 | 17.8 | 1.8 | 25.4 | 2.0 | 30.5 | 2.1 | 33.0 | 2.3 | 38.1 |
| | 405 | 1.4 | 20.3 | 1.6 | 27.9 | 1.8 | 33.0 | 1.9 | 35.6 | 2.1 | 40.6 |
| | 610 | 1.2 | 22.9 | 1.4 | 30.5 | 1.6 | 35.6 | 1.7 | 40.6 | 1.8 | 43.2 |
| 2 x 8 | 305 | 2.1 | 35.6 | 2.4 | 45.7 | 2.7 | 53.3 | 2.9 | 61.0 | 3.1 | 61.0 |
| | 405 | 1.9 | 38.1 | 2.2 | 48.3 | 2.4 | 58.4 | 2.6 | 61.0 | 2.8 | 61.0 |
| | 610 | 1.7 | 40.6 | 1.9 | 48.3 | 2.1 | 50.8 | 2.3 | 55.9 | 2.4 | 61.0 |
| 2 x 10 | 305 | 2.6 | 53.3 | 3.0 | 61.0 | 3.3 | 61.0 | 3.5 | 61.0 | 3.8 | 61.0 |
| | 405 | 2.4 | 55.9 | 2.7 | 61.0 | 3.0 | 61.0 | 3.2 | 61.0 | 3.4 | 61.0 |
| | 610 | 2.1 | 50.8 | 2.4 | 58.4 | 2.6 | 61.0 | 2.8 | 61.0 | 3.0 | 61.0 |
| 2 x 12 | 305 | 3.1 | 61.0 | 3.6 | 61.0 | 3.9 | 61.0 | 4.2 | 61.0 | 4.5 | 61.0 |
| | 405 | 2.8 | 61.0 | 3.2 | 61.0 | 3.6 | 61.0 | 3.8 | 61.0 | 4.1 | 61.0 |
| | 610 | 2.5 | 61.0 | 2.8 | 61.0 | 3.1 | 61.0 | 3.3 | 61.0 | 3.6 | 61.0 |

Imperial Units: 1 m = 3.281 ft, 1 mm = 0.0398 in

1. Joist spans are based on a design live load of 3.83 kPa (80-psf).
2. Maximum cantilever based on twice the joist span deflection limit and a 99.8 kg (220 lb) point load applied to the end. Joist cantilever shall be limited to 0.61 m (2' 0"), a cantilever length that results in twice the deflection limit for the main span, or twenty-five percent (25%) of the length of the joist span, whichever is less.
3. Owens Corning decks use proprietary materials and conditions not prescribed in CSA O86.
4. Joist spans are based on a factor of 1.0 for temperature, freeze-thaw cycles, and UV exposure.

**Table 5**. Maximum Joist Spans (m) and Cantilever Lengths (cm)
Using OC Lumber at Various Deflection Limits – 4.79 kPa Live Load[3,4]

| OC Lumber Profile (Nominal Size) | Joist Spacing (mm o.c.) | Deflection Limits | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L/360 | | L/240 | | L/180 | | L/150 | | L/120 | |
| | | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever | Joist Span[1] | Maximum[2] Cantilever |
| 2 x 6 | 305 | 1.5 | 20.3 | 1.7 | 25.4 | 1.8 | 33.0 | 1.9 | 35.6 | 2.1 | 40.6 |
| | 405 | 1.3 | 22.9 | 1.5 | 27.9 | 1.7 | 33.0 | 1.8 | 38.1 | 1.9 | 43.2 |
| | 610 | 1.2 | 22.9 | 1.3 | 30.5 | 1.5 | 35.6 | 1.5 | 38.1 | 1.7 | 40.6 |
| 2 x 8 | 305 | 2.0 | 38.1 | 2.3 | 48.3 | 2.5 | 58.4 | 2.7 | 61.0 | 2.9 | 61.0 |
| | 405 | 1.8 | 40.6 | 2.1 | 50.8 | 2.3 | 55.9 | 2.4 | 58.4 | 2.6 | 61.0 |
| | 610 | 1.6 | 38.1 | 1.8 | 43.2 | 2.0 | 48.3 | 2.1 | 50.8 | 2.3 | 55.9 |
| 2 x 10 | 305 | 2.4 | 55.9 | 2.8 | 61.0 | 3.1 | 61.0 | 3.3 | 61.0 | 3.5 | 61.0 |
| | 405 | 2.2 | 53.3 | 2.5 | 61.0 | 2.8 | 61.0 | 3.0 | 61.0 | 3.2 | 61.0 |
| | 610 | 1.9 | 48.3 | 2.2 | 53.3 | 2.4 | 61.0 | 2.6 | 61.0 | 2.8 | 61.0 |
| 2 x 12 | 305 | 2.9 | 61.0 | 3.3 | 61.0 | 3.7 | 61.0 | 3.9 | 61.0 | 4.2 | 61.0 |
| | 405 | 2.6 | 61.0 | 3.0 | 61.0 | 3.3 | 61.0 | 3.5 | 61.0 | 3.8 | 61.0 |
| | 610 | 2.3 | 55.9 | 2.6 | 61.0 | 2.9 | 61.0 | 3.1 | 61.0 | 3.3 | 61.0 |

Imperial Units: 1 m = 3.281 ft, 1 mm = 0.0398 in

1. Joist spans are based on a design live load of 4.79 kPa (100-psf).
2. Maximum cantilever based on twice the joist span deflection limit and a 99.8 kg (220 lb) point load applied to the end. Joist cantilever shall be limited to 0.61 m (2' 0"), a cantilever length that results in twice the deflection limit for the main span, or twenty-five percent (25%) of the length of the joist span, whichever is less.
3. Owens Corning decks use proprietary materials and conditions not prescribed in CSA O86.
4. Joist spans are based on a factor of 1.0 for temperature, freeze-thaw cycles, and UV exposure.

4.2.3 In general, the maximum joist cantilever length is either 0.6 m (2' 0"), a cantilever length that results in twice the deflection limit for the main span, or twenty-five percent (25%) of the length of the joist span, whichever is less.

4.2.4 The length of the cantilever is measured from the exterior side of the post or beam to the end of the rim joist.

4.2.5 OC Lumber joist deflection limits are based upon empirical testing of OC Lumber decks. Identical deck configurations were constructed. OC Lumber deck performance was compared directly to decks constructed of competing materials. These deflection limits are considered proprietary intellectual property and trade secrets.

4.2.6 An example of OC Lumber joist installation is shown in **Figure 3**.

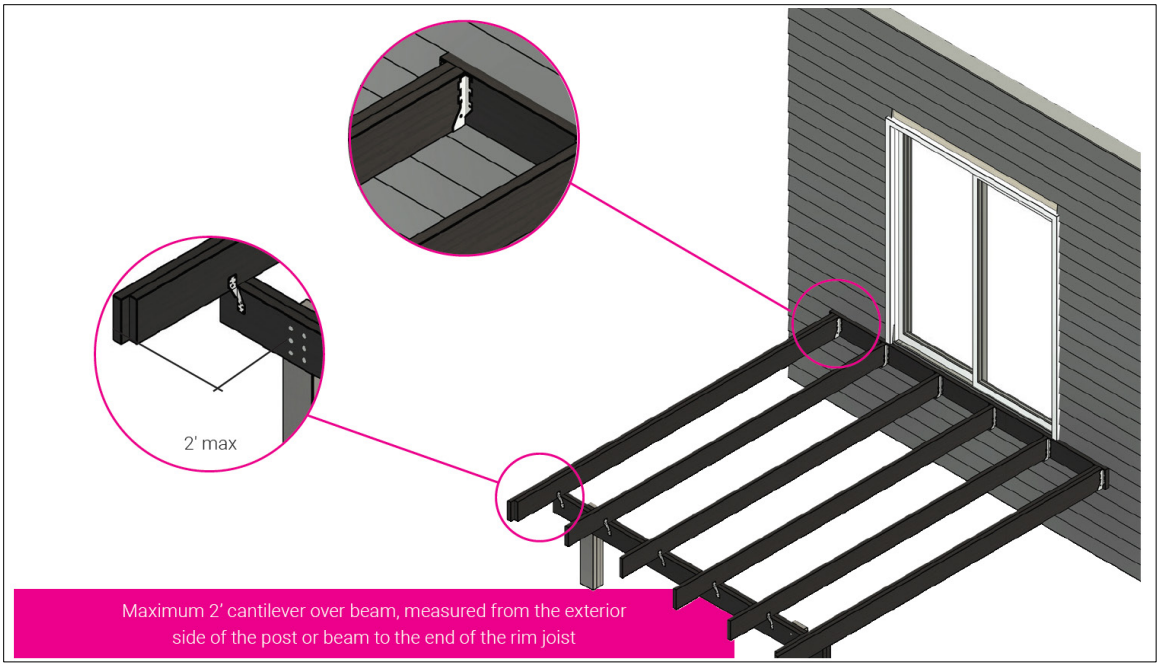



**Figure 3**. OC Lumber Joist Installation

4.3 Maximum post spacing recommended for support of deck beams with two supports are depicted in **Figure 4** and **Table 6**.

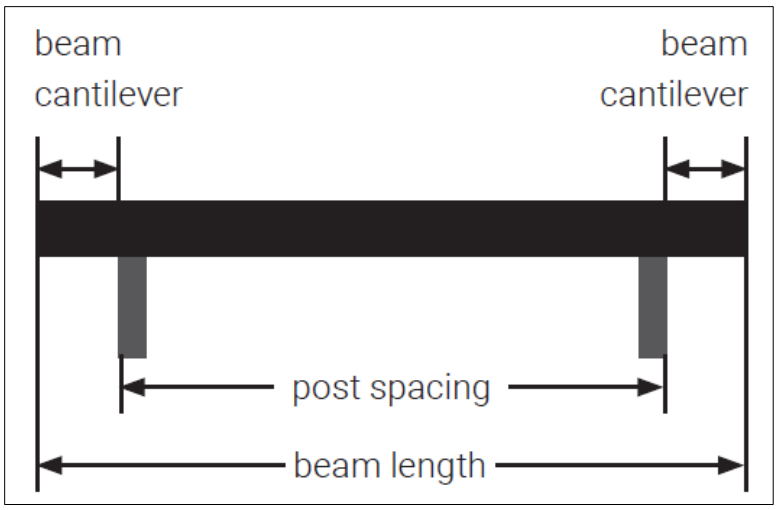



**Figure 4**. Post Spacing for Support of Beams at Two (2) Locations

**Table 6**. Maximum Post Spacing (Beam Span) and Cantilever Lengths (m) for Support of Beams at Two (2) Locations[1,2,3,4,5] – 1.92 kPa Live Load

| OC Lumber Profile | Number of Plies | Length of Owens Corning Joist (m) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.2 | | 1.5 | | 1.8 | | 2.1 | | 2.4 | |
| | | Beam Span | Maximum Cantilever | Beam Span | Maximum Cantilever | Beam Span | Maximum Cantilever | Beam Span | Maximum Cantilever | Beam Span | Maximum Cantilever |
| 2 x 6 | 2 | 1.8 | 0.43 | 1.7 | 0.41 | 1.7 | 0.41 | 1.6 | 0.38 | 1.6 | 0.38 |
| | 3 | 2.0 | 0.51 | 2.0 | 0.48 | 1.9 | 0.46 | 1.8 | 0.46 | 1.8 | 0.43 |
| 2 x 8 | 2 | 2.4 | 0.61 | 2.3 | 0.58 | 2.3 | 0.56 | 2.2 | 0.53 | 2.1 | 0.51 |
| | 3 | 2.8 | 0.61 | 2.7 | 0.61 | 2.6 | 0.61 | 2.5 | 0.61 | 2.4 | 0.61 |
| 2 x 10 | 2 | 3.0 | 0.61 | 2.9 | 0.61 | 2.8 | 0.61 | 2.7 | 0.61 | 2.6 | 0.61 |
| | 3 | 3.4 | 0.61 | 3.3 | 0.61 | 3.2 | 0.61 | 3.1 | 0.61 | 3.0 | 0.61 |
| 2 x 12 | 2 | 3.6 | 0.61 | 3.4 | 0.61 | 3.3 | 0.61 | 3.2 | 0.61 | 3.1 | 0.61 |
| | 3 | 4.1 | 0.61 | 3.9 | 0.61 | 3.8 | 0.61 | 3.7 | 0.61 | 3.6 | 0.61 |
| | | 2.7 | | 3.0 | | 3.4 | | 3.7 | | 4.0 | |
| 2 x 6 | 2 | 1.5 | 0.36 | 1.5 | 0.36 | 1.5 | 0.36 | 1.4 | 0.33 | 1.4 | 0.33 |
| | 3 | 1.7 | 0.43 | 1.7 | 0.41 | 1.7 | 0.41 | 1.6 | 0.41 | 1.6 | 0.38 |
| 2 x 8 | 2 | 2.1 | 0.51 | 2.0 | 0.48 | 2.0 | 0.48 | 1.9 | 0.48 | 1.9 | 0.46 |
| | 3 | 2.4 | 0.58 | 2.3 | 0.56 | 2.3 | 0.56 | 2.2 | 0.53 | 2.2 | 0.53 |
| 2 x 10 | 2 | 2.6 | 0.61 | 2.5 | 0.61 | 2.4 | 0.61 | 2.4 | 0.58 | 2.3 | 0.58 |
| | 3 | 2.9 | 0.61 | 2.9 | 0.61 | 2.8 | 0.61 | 2.7 | 0.61 | 2.7 | 0.61 |
| 2 x 12 | 2 | 3.0 | 0.61 | 3.0 | 0.61 | 2.9 | 0.61 | 2.8 | 0.61 | 2.8 | 0.61 |
| | 3 | 3.5 | 0.61 | 3.4 | 0.61 | 3.3 | 0.61 | 3.2 | 0.61 | 3.2 | 0.61 |
| | | 4.3 | | 4.6 | | 4.9 | | | | | |
| 2 x 6 | 2 | 1.4 | 0.33 | 1.3 | 0.33 | 1.3 | 0.31 | | | | |
| | 3 | 1.6 | 0.38 | 1.5 | 0.38 | 1.5 | 0.36 | | | | |
| 2 x 8 | 2 | 1.9 | 0.46 | 1.8 | 0.46 | 1.8 | 0.43 | | | | |
| | 3 | 2.1 | 0.51 | 2.1 | 0.51 | 2.1 | 0.51 | | | | |
| 2 x 10 | 2 | 2.3 | 0.56 | 2.3 | 0.56 | 2.2 | 0.53 | | | | |
| | 3 | 2.6 | 0.61 | 2.6 | 0.61 | 2.5 | 0.61 | | | | |
| 2 x 12 | 2 | 2.7 | 0.61 | 2.7 | 0.61 | 2.6 | 0.61 | | | | |
| | 3 | 3.1 | 0.61 | 3.1 | 0.61 | 3.0 | 0.61 | | | | |

Imperial Units: 1 m = 3.281 ft, 1 mm = 0.0394 in

1. Post spacing is based on joists with a design live load of 1.92 kPa (40-psf) per NBC Table 4.1.5.3 for residential areas and a deflection limit of L/240 per NBC Table 9.4.3.1.
2. Maximum beam cantilever is based on twice the joist span deflection limit and a 1.92 kPa (40-psf) LL applied on the cantilever. Beam cantilever shall be limited to 0.61 m (2' 0"), a cantilever length that results in twice the deflection limit for the main span, or twenty-five percent (25%) of the length of the joist span, whichever is less.
3. Post spacing is based on a temperature factor of 1.0.
4. Table is applicable for decks serving single dwelling units only.
5. Owens Corning decks use proprietary materials and conditions not prescribed in CSA O86.

4.3.1 Refer to **Section 4.2.3** for the maximum beam cantilever length.

4.3.2 The length of the cantilever is measured from the exterior side of the post to the end of the beam length.

4.3.3 The procedure for using **Table 6** is as follows:

4.3.3.1 Determine the length of joist to be used for your deck (e.g., 3.0 m).

4.3.3.2 Find the *"Length of Joist"* column in **Table 6** (in this case, 3.0 m).

4.3.3.3 Using the beam size and number of plies (50 mm x 203 mm [2" x 8"] beam that is 3-ply), find the maximum Owens Corning post spacing that supports a 3.0 m joist (this is a 2.3 m post spacing – see **bold red numbers** in **Table 6**).

4.3.3.4 If applicable, add cantilever length(s) to determine final beam length (i.e., if the 2.3 m post spacing has a beam with 0.56 m cantilevers on each end [25% of post spacing] the maximum beam length is 3.42 m).

4.4 Maximum post spacing recommended for support of deck beams with three supports are depicted in **Figure 5** and **Table 7**.

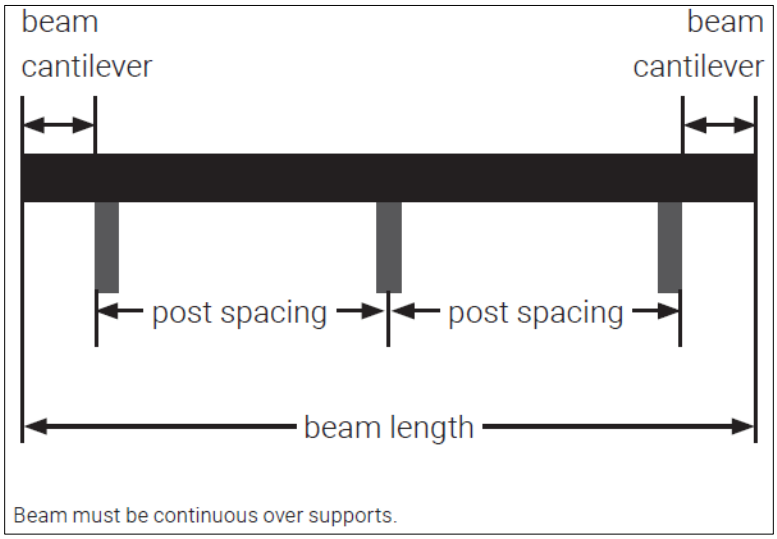



**Figure 5**. Post Spacing for Support of Beams at Three (3) or More Locations

**Table 7**. Maximum Post Spacing (Beam Span) and Cantilever Lengths (m) for Support of Beams at Three (3) Locations[1,2,3,4,5,6] – 1.92 kPa Live Load

| OC Lumber Profile | Number of Plies | Length of Owens Corning Joist (m) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.2 | | 1.5 | | 1.8 | | 2.1 | | 2.4 | |
| | | Beam Span | Maximum Cantilever | Beam Span | Maximum Cantilever | Beam Span | Maximum Cantilever | Beam Span | Maximum Cantilever | Beam Span | Maximum Cantilever |
| 2 x 6 | 2 | 1.9 | 0.43 | 1.8 | 0.41 | 1.7 | 0.41 | 1.7 | 0.38 | 1.6 | 0.38 |
| | 3 | 2.1 | 0.51 | 2.0 | 0.48 | 2.0 | 0.46 | 1.9 | 0.46 | 1.9 | 0.43 |
| 2 x 8 | 2 | 2.5 | 0.61 | 2.4 | 0.58 | 2.4 | 0.56 | 2.3 | 0.53 | 2.2 | 0.51 |
| | 3 | 2.9 | 0.61 | 2.8 | 0.61 | 2.7 | 0.61 | 2.6 | 0.61 | 2.5 | 0.61 |
| 2 x 10 | 2 | 3.1 | 0.61 | 3.0 | 0.61 | 2.9 | 0.61 | 2.8 | 0.61 | 2.7 | 0.61 |
| | 3 | 3.6 | 0.61 | 3.4 | 0.61 | 3.3 | 0.61 | 3.2 | 0.61 | 3.1 | 0.61 |
| 2 x 12 | 2 | 3.7 | 0.61 | 3.6 | 0.61 | 3.4 | 0.61 | 3.3 | 0.61 | 3.2 | 0.61 |
| | 3 | 4.2 | 0.61 | 4.1 | 0.61 | 3.9 | 0.61 | 3.8 | 0.61 | 3.7 | 0.61 |
| | | 2.7 | | 3.0 | | 3.4 | | 3.7 | | 4.0 | |
| 2 x 6 | 2 | 1.6 | 0.36 | 1.5 | 0.36 | 1.5 | 0.36 | 1.5 | 0.33 | 1.4 | 0.33 |
| | 3 | 1.8 | 0.43 | 1.8 | 0.41 | 1.7 | 0.41 | 1.7 | 0.41 | 1.7 | 0.38 |
| 2 x 8 | 2 | 2.2 | 0.51 | 2.1 | 0.48 | 2.1 | 0.48 | 2.0 | 0.48 | 2.0 | 0.46 |
| | 3 | 2.5 | 0.58 | 2.4 | 0.56 | 2.4 | 0.56 | 2.3 | 0.53 | 2.3 | 0.53 |
| 2 x 10 | 2 | 2.7 | 0.61 | 2.6 | 0.61 | 2.5 | 0.61 | 2.5 | 0.58 | 2.4 | 0.58 |
| | 3 | 3.0 | 0.61 | 3.0 | 0.61 | 2.9 | 0.61 | 2.8 | 0.61 | 2.8 | 0.61 |
| 2 x 12 | 2 | 3.2 | 0.61 | 3.1 | 0.61 | 3.0 | 0.61 | 2.9 | 0.61 | 2.9 | 0.61 |
| | 3 | 3.6 | 0.61 | 3.5 | 0.61 | 3.4 | 0.61 | 3.4 | 0.61 | 3.3 | 0.61 |
| | | 4.3 | | 4.6 | | 4.9 | | | | | |
| 2 x 6 | 2 | 1.4 | 0.33 | 1.4 | 0.33 | 1.4 | 0.31 | | | | |
| | 3 | 1.6 | 0.38 | 1.6 | 0.38 | 1.6 | 0.36 | | | | |
| 2 x 8 | 2 | 1.9 | 0.46 | 1.9 | 0.46 | 1.9 | 0.43 | | | | |
| | 3 | 2.2 | 0.51 | 2.2 | 0.51 | 2.1 | 0.51 | | | | |
| 2 x 10 | 2 | 2.4 | 0.56 | 2.3 | 0.56 | 2.3 | 0.53 | | | | |
| | 3 | 2.7 | 0.61 | 2.7 | 0.61 | 2.6 | 0.61 | | | | |
| 2 x 12 | 2 | 2.8 | 0.61 | 2.8 | 0.61 | 2.7 | 0.61 | | | | |
| | 3 | 3.2 | 0.61 | 3.2 | 0.61 | 3.1 | 0.61 | | | | |

Imperial Units: 1 m = 3.281 ft, 1 mm = 0.0394 in

1. Post spacing is based on joists with a design live load of 1.92 kPa (40-psf) per NBC Table 4.1.5.3 for residential areas and a deflection limit of L/240 per NBC Table 9.4.3.1.
2. The spans shown in this table assume the beams are continuous across all supports.
3. Maximum beam cantilever is based on twice the joist span deflection limit and a 1.92 kPa (40-psf) LL applied on the cantilever. Beam cantilever shall be limited to 0.61 m (2' 0"), a cantilever length that results in twice the deflection limit for the main span, or twenty-five percent (25%) of the length of the joist span, whichever is less.
4. Post spacing is based on a temperature factor of 1.0.
5. Table is applicable for decks serving single dwelling units only.
6. Owens Corning decks use proprietary materials and conditions not prescribed in CSA O86.

4.4.1 Refer to **Section 4.2.3** for the maximum beam cantilever length.

4.4.2 The length of the cantilever is measured from the exterior side of the exterior post to the end of the beam length.

4.4.3 Deflection limits used to create post spacing are based upon empirical testing of OC Lumber decks. Identical deck configurations were constructed. OC Lumber deck performance was compared directly to decks constructed of competing materials. These deflection limits are considered proprietary intellectual property and trade secrets.

4.4.4 The procedure for using **Table 7** is as follows:

4.4.4.1 Determine the length of joist to be used for your deck (e.g., 3.0 m).

4.4.4.2 Find the *"Length of Joist"* column in **Table 7** (in this case, 3.0 m).

4.4.4.3 Using the beam size and number of plies (50 mm x 203 mm [2" x 8"] beam that is 3-ply), find the maximum Owens Corning post spacing that supports a 3.0 m joist (this is a 2.4 m post spacing – see **bold red numbers** in **Table 7**).

4.4.4.4 If applicable, add cantilever(s) to determine final beam length (i.e., if the 2.4 m post spacing has a beam with 0.56 m cantilevers on each end, the maximum beam length is 3.52 m).

4.5 The maximum bearing capacity of built-up OC Lumber posts that are used to support 2-ply and 3-ply OC Lumber beams are provided in **Figure 6**, **Figure 7**, and **Table 8**.

4.5.1 See **Section 6.3.2** for assembly details of built-up OC Lumber posts.

4.5.2 For hollow OC Lumber Posts, see DrJ Report Number 2307-07.

4.5.3 The maximum post height is 2.74 m (9' 0").

4.5.4 All posts shall be diagonally braced to prevent side-sway and/or buckling when post height exceeds 2.74 m (9' 0") in order to achieve the loads listed in **Table 8**.

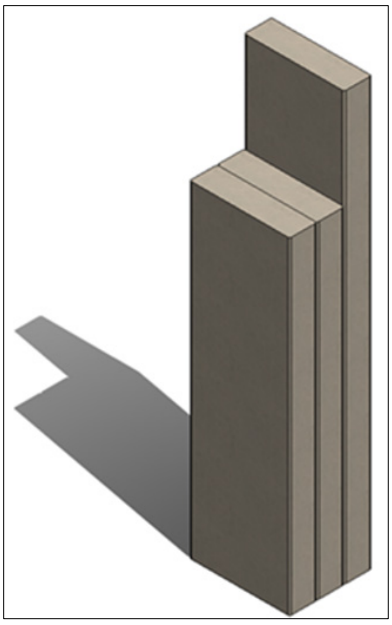


**Figure 6**. OC Lumber Post Supporting a 2-Ply Beam

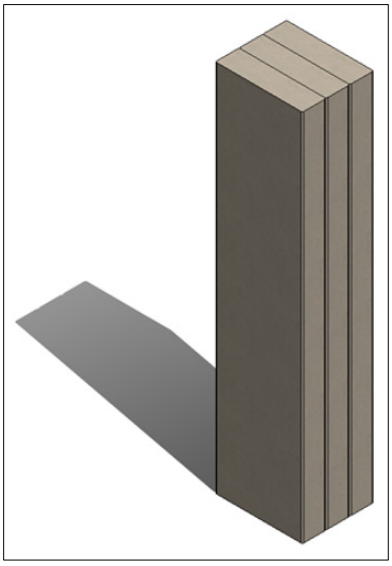


**Figure 7**. OC Lumber Post Supporting a 3-Ply Beam

**Table 8**. Maximum Bearing Capacity of Posts to Support 2-Ply and 3-Ply Beams[1]

| Maximum Factored Bearing Capacity to Support a 2-Ply Beam (See Figure 6) | Maximum Factored Bearing Capacity to Support a 3-Ply Beam (See Figure 7) |
|---|---|
| 42.7 | 67.6 |
| Imperial Units: 1 N = 0.225 lb<br>1. Maximum post height is 2.74 m (9 ft).<br>***Important Note:*** All posts shall be diagonally braced to prevent side-sway and buckling. | |

4.6 General application information regarding fasteners to be used with OC Lumber are as follows:

4.6.1 *Dowel-Type Fasteners:*

4.6.1.1 Starborn® CAP-TOR® xd 305 Stainless Steel Composite/PVC Screw, #10 x2$^{3}/_{4}$"

4.6.1.2 CAMO® Premium 316 Stainless Steel (SS) Deck Screw, #10 x 2$^{1}/_{2}$"

4.6.1.3 Simpson Strong-Drive® SD Connector SS Screw, #9 x 2$^{1}/_{2}$"

4.6.1.4 Simpson Strong-Drive® SD Connector SS Screw, #9 x 1$^{1}/_{2}$"

4.6.2 *Equivalent Specific Gravity for Use in Accordance with CSA O86:*

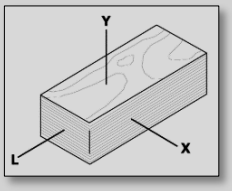
4.6.2.1 Dowel bearing strength for nails, screws and bolts, and withdrawal loads for nails and screws installed in OC Lumber are permitted to be determined in accordance with CSA O86 using the equivalent specific gravity listed in **Table 9**.

4.6.2.2 The equivalent specific gravity values in **Table 9** apply to all OC Lumber profiles based on consistent glass fiber reinforced HDPE material composition across all profiles.

**Table 9**. Equivalent Specific Gravities for Design of Mechanical Connections per CSA O86[2,3]

| Product | Fastener | Fastener Axis Orientation[1] | Load Direction | Equivalent Specific Gravity for Design Purposes |
|---|---|---|---|---|
| OC Lumber | Nails | Y axis | Withdrawal | 0.35 |
| | | X axis | | 0.34 |
| | Screws | Y axis | | 0.53 |
| | | X axis | | 0.51 |
| | Nails | Y axis | L axis | 0.46 |
| | | | X axis | 0.46 |
| | Bolts | Y axis | L axis | 0.28 |
| | | | X axis | 0.54 |

1. Orientation nomenclature for OC Lumber:




2. Adjustment of the fastener values for duration of load in accordance with CSA O86 is not applicable.
3. Lateral resistance and withdrawal values are as provided in CSA O86 for sawn lumber having equivalent specific gravities as shown.

## 4.7 *Fastener Connection Performance*

4.7.1 Head-pull through and withdrawal resistance when installed in OC Lumber were evaluated, and the factored connection design values for the specified fasteners are presented in **Table 10** and **Table 11**.

**Table 10**. Reference Factored Head-Pull-Through Design Values (N)

| OC Lumber Profile | CAMO Premium 316 Stainless Steel Deck Screw, #10 x 2 1/2" | Starborn CAP-TOR xd 305 Stainless Steel Composite/PVC Screw, #10 x 2 3/4" |
|---|---|---|
| 1/2" x 6" or 1/2" x 10" | 1,115 | 535 |
| 5/4" x 6" or 5/4" x 8" | 1,170 | 1,335 |
| Scant 2" x 6" | 1,645 | 1,645 |

Imperial Units: 1 N = 0.225 lb, 1 mm = 0.0394 in

**Table 11**. Reference Factored Withdrawal Design Values (N)[1]

| Fastener | End Grain Installation | Narrow Edge/Wide Face Installation |
|---|---|---|
| CAMO Premium 316 Stainless Steel Deck Screw, #10 x 2 1/2" | 2,000 | 2,070 |
| Starborn CAP-TOR xd 305 Stainless Steel Composite/PVC Screw, #10 x 2 3/4" | 2,600 | 2,735 |

Imperial Units: 1 N = 0.225 lb, 1 mm = 0.0394 in

1. Minimum penetration into OC Lumber profiles shall be 38 mm (1 1/2".)

4.7.2 *Metal Connectors:*

4.7.2.1 Beam-to-post connectors with a minimum uplift capacity of 8.90 kN (2,000 lbs).

4.7.2.2 Hurricane ties and angle brackets with minimum uplift capacity of 2.22 kN (500 lbs).

4.8 General application information regarding WEARDECK follows:

4.8.1 *Minimum Screw Lengths:*

4.8.1.1 63 mm ($2^1/_2$") screws for $^5/_4$" x 8" Owens Corning WEARDECK

4.8.1.2 38 mm ($1^1/_2$") screws for $^1/_2$" x 6" and $^1/_2$" x 10" Owens Corning WEARDECK

4.8.2 Nails connecting Owens Corning WEARDECK to the supporting members must be at least 63 mm ($2^1/_2$") long in accordance with CSA O86 Section 6.5.10.2.1.

4.8.3 *Minimum Spacing:*

4.8.3.1 *End to End:* 2 mm ($^1/_{16}$"); 5 mm ($^3/_{16}$" recommended)

4.8.3.2 *Side to Side:* 2 mm ($^1/_{16}$"); 5 mm ($^3/_{16}$" recommended)

4.9 As an alternative to sawn lumber, flexural and compression perpendicular to extrusion (bearing) design properties of OC Lumber is determined in accordance with the provisions for proprietary structural products in CSA O86 Section 16.3.

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

4.9.2 The design provisions for wood construction in compliance with the NBC using Limit State Design shall be in accordance with CSA O86.

4.9.3 Limit State Design properties in dry and ambient conditions for various OC Lumber member sizes are provided in **Table 12**.

**Table 12**. OC Lumber Specified Limit States Design (LSD) Values[1,2,3]

| OC Lumber Profile | $F_b$ (MPa) | EI (kN•mm²) | MOE (MPa) | Bearing Strength (MPa) | | $I_x$ (cm⁴) | $S_x$ (cm³) |
|---|---|---|---|---|---|---|---|
| | | | | Edgewise | Flatwise | | |
| 2 x 4 | 13 | 2,400,000 | 1,069 | 3.46 | 8.36 | 223 | 50 |
| 2 x 6 | 14 | 20,900,000 | 2,413 | | | 866 | 124 |
| 2 x 8 | 15 | 52,900,000 | 2,413 | | | 2,194 | 230 |
| 2 x 10 | 16 | 99,400,000 | 2,413 | | | 4,117 | 351 |
| 2 x 12 | 14 | 166,000,000 | 2,241 | | | 7,409 | 518 |

Imperial Units: 1 MPa = 145.038-psi, 1 kN-mm² = 0.348 lb-in², 1 cm⁴ = 0.24 in⁴, 1 cm³ = 0.061 in³

1. Listed $F_b$, EI, MOE, and bearing strengths are based on a temperature factor of 1.0.
2. Listed $F_b$, EI, and MOE values are the effective flexural strength and stiffness of the evaluated composite product in the edgewise orientation.
3. Nominal section properties are determined using the nominal width and depth of the composite product in the edgewise orientation.

4.9.4 The effects of temperature and freeze-thaw cycles on OC Lumber were evaluated.

4.9.4.1 For design considerations, reductions in bending strength and stiffness shall be considered when OC Lumber products will experience sustained exposure to elevated temperatures.

4.9.4.2 Temperature factors are presented in **Table 13**.

**Table 13**. Temperature Factors

| Property | T ≤ 23° C | 23° C ≤ T ≤ 30° C | 30° C ≤ T ≤ 37° C | 37° C ≤ T ≤ 45° C | 45° C ≤ T ≤ 52° C |
|---|---|---|---|---|---|
| $f_b$ | 1.00 | 0.90 | 0.81 | 0.71 | 0.62 |
| MOE | 1.00 | 0.95 | 0.90 | 0.85 | 0.81 |

4.9.5 For time dependent deformations (creep), the total deflection, $D_T$, shall be calculated as follows:

$$D_T = (K_{CR} \times D_{LT}) + D_{ST}$$

where:

$K_{CR}$ = 2.0, time dependent deformation (creep) factor

$D_{LT}$ = immediate deflection due to long-term component of design load (in)

$D_{ST}$ = deflection due to short-term or normal component of design load (in)

4.9.6 Applications of OC Lumber that require professional engineering are those conditions where the joist, beam, and column application is outside of the prescriptive design properties provided in **Table 2** through **Table 8**, **Table 17** for sill plate bearing, and **Table 18** for anchor bolt member-side bearing design values.

4.9.6.1 A deck design that requires higher applied loads, longer spans, multiple joist spans, a cantilever, a concentrated load, multiple applied loads, etc., will require an engineered design.

4.9.7 The engineered design drawing development process includes, but is not limited to, the following guidelines:

4.9.7.1 To size OC Lumber structural members, use the specified LSD values found in **Table 12**.

4.9.7.1.1 Analyze the resistance needed for the pertinent member size designated in **Table 12** using the specified LSD properties and standard engineering equations.[4]

4.9.7.1.2 These design properties are based upon test data and use actual design dimensions, (i.e., 38 mm x 140 mm [$1^1/_2$" by $5^1/_2$"] for 2 x 6 section properties).

4.9.7.2 Create an engineered design drawing for the application which includes, but is not limited to, span, depth, applied loads, support conditions, anchorage, reaction limits, component connections, deflection limits, moisture conditions, serviceability conditions, durability conditions, end connection details, boundary condition application details, and so forth.

4.9.7.3 Each OC Lumber engineered design and associated engineered design drawing shall provide sufficient detailing for the specific floor, wall, or roof installation.

4.9.7.4 Each OC Lumber structural member design is defined as an engineered design pursuant to the building code and professional engineering law, which requires the design to be performed by an RDP, where all loading and boundary conditions are provided by the owner or the Registered Design Professional in Responsible Charge of the project.

4.9.7.4.1 Where assistance is needed regarding OC Lumber specialty engineered designs, please contact Owens Corning technical support.

4.9.8 To establish a complete load path, all connections shall be designed separately to transfer load from OC Lumber to other structural members and then onto the foundation.

4.10 *Owens Corning Standard Deck Tested and Analyzed – Load Resistance for a Specific Owens Corning Deck Design*

4.10.1 OC Lumber decks were constructed as detailed in **Figure 8**.

4.10.2 3.66 m x 3.05 m (12' x 10') decks were constructed with joists spaced at 610 mm (24") on center, 406 mm (16") on center, and at 305 mm (12") on center.

4.10.3 These decks were constructed with a 610 mm (24") cantilever on one side of the deck and the joists were installed using 2 x 8 OC Lumber.

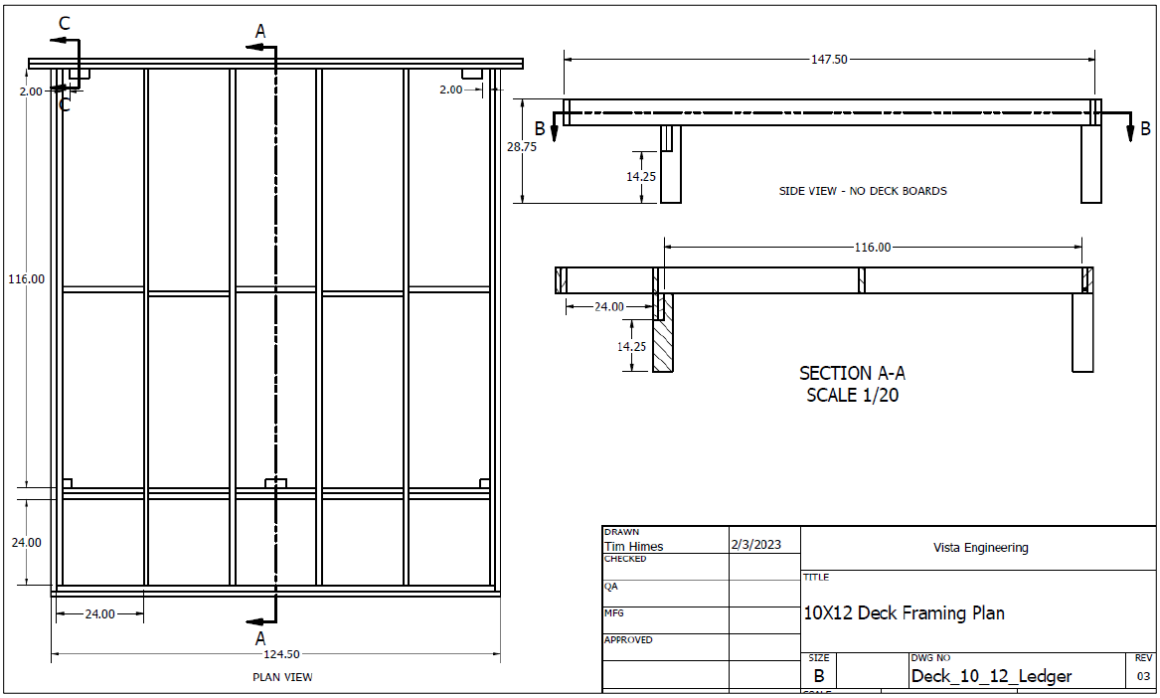



**Figure 8**. Tested Deck Framing Plan

4.10.4 Based upon this Owens Corning deck standard design for the specific **Figure 8** installation details, the factored design values for OC Lumber Composite Assemblies are found in **Table 14**.

**Table 14**. Composite Floor Joist Assembly Applications[1,2]

| Product | 3.66 m (12 ft) Long OC Lumber Joist with 0.61 m (2-foot) Cantilever Live Load, (kPa) | | |
|---|---|---|---|
| | Joist Spaced 610 mm (24" o.c.) | Joist Spaced 406 mm (16" o.c.) | Joist Spaced 305 mm (12" o.c.) |
| OC Lumber 2 x 8 Joist Assemblies | 1.8 | 2.4 | 3.0 |

SI: 1 in = 25.4 mm, 1 ft = 0.305 m, 1-psf = 0.0479 kPa

1. Factored loads applicable to decks serving a single dwelling unit only.
2. Factored loads based on L/240.

4.11 *Fire Performance*

4.11.1 OC Lumber was evaluated for surface burning characteristics (flame spread) in accordance with ASTM E84.

4.11.2 The flame spread index is presented in **Table 15**.

**Table 15**. Surface Burning Characteristics[1]

| Product Description | Flame Spread Index (FSI) |
|---|---|
| OC Lumber Joists | ≤ 75 |
| OC Lumber Deck Boards | |

1. Tested in accordance with ASTM E84 and meets Class B requirements for Flame Spread.

4.12 *OC Lumber Stair Tread Application*

4.12.1 OC Lumber was evaluated for its performance for use as stair treads in accordance with NBC Section 9.8.

4.12.1.1 OC Lumber may be used as stair treads for exterior decks serving single dwelling units.

4.12.2 Stair tread dimensions shall follow the requirements of NBC Subsection 9.8.4.

4.12.3 Minimum of a three span configuration shall be installed when OC Lumber is used for stair tread applications.

4.13 *OC Lumber Stair Stringer Application*

4.13.1 OC Lumber was evaluated for its performance as stair stringers.

4.13.1.1 OC Lumber may be used as stair stringers for exterior decks serving single dwelling units.

4.13.1.2 Minimum of a three span configuration shall be installed when OC Lumber is used for stair stringer applications.

4.13.1.3 Stringers shall be reinforced with blocking.

4.13.2 **Table 16** demonstrates maximum stair stringer spans per loading condition and stringer spacing.

**Table 16**. Maximum Allowable Stair Stringer Spans (m) Per Loading Criteria[2,3,4]

| Live Load (kPa) | Stringer Spacing mm (in) o.c. | Total Load[1] (Dead Load + Live Load) | | Live Load Only | |
|---|---|---|---|---|---|
| | | L/180 | L/240 | L/360 | L/480 |
| 1.99 | 203 (8) | 2.4 | 2.2 | 2.3 | 2.0 |
| | 254 (10) | 2.4 | 2.2 | 2.1 | 1.9 |
| | 305 (12) | 2.3 | 2.1 | 2.0 | 1.8 |
| | 356 (14) | 2.2 | 2.0 | 1.9 | 1.7 |
| 2.49 | 203 (8) | 2.5 | 2.2 | 2.1 | 1.9 |
| | 254 (10) | 2.3 | 2.1 | 1.9 | 1.8 |
| | 305 (12) | 2.1 | 1.9 | 1.8 | 1.7 |
| | 356 (14) | 2.0 | 1.9 | 1.7 | 1.6 |
| 2.98 | 203 (8) | 2.3 | 2.1 | 2.0 | 1.8 |
| | 254 (10) | 2.2 | 2.0 | 1.8 | 1.7 |
| | 305 (12) | 2.0 | 1.9 | 1.7 | 1.6 |
| | 356 (14) | 1.9 | 1.8 | 1.6 | 1.5 |
| 3.48 | 203 (8) | 2.2 | 2.0 | 1.9 | 1.7 |
| | 254 (10) | 2.1 | 1.9 | 1.7 | 1.6 |
| | 305 (12) | 2.0 | 1.8 | 1.6 | 1.5 |
| | 356 (14) | 1.9 | 1.7 | 1.6 | 1.4 |
| 3.98 | 203 (8) | 2.2 | 2.0 | 1.8 | 1.6 |
| | 254 (10) | 2.0 | 1.8 | 1.7 | 1.5 |
| | 305 (12) | 1.9 | 1.7 | 1.6 | 1.4 |
| | 356 (14) | 1.8 | 1.6 | 1.5 | 1.4 |

Imperial Units: 1 m = 3.281 ft, 1 mm = 0.0394 in

1. Total load includes a 0.575 kPa (12-psf) dead load
2. Minimum throat depth of 127mm (5").
3. Minimum of three stringer stair assemblies tied together with stair treads.
4. Joist spans are based on a factor of 1.0 for temperature, freeze-thaw cycles, and UV exposure.

4.14 Railings and rail posts are outside of the scope of this report. For more information, please contact Owens Corning technical support.

4.15 *OC Lumber Sill Pate Application*

4.15.1 OC Lumber is permitted for use as a foundation sill plate for buildings within the scope of NBC Division B, Part 9 and for engineered applications when the design conditions are within the limits of this report.

4.15.1.1 The recognized sill plate application is the foundation sill plate that bears on a concrete or masonry foundation and anchored in accordance with NBC Subsection 9.23.6.

4.15.1.1.1 Use as a bottom wall plate for shear walls, diaphragm collector, hold-down boundary element, or sheathing nailing substrate requires engineered design.

4.15.2 OC Lumber sill plates are recognized as an alternative solution to the prescriptive 38 mm by 89 mm sill plates addressed in NBC Article 9.23.7.1 when installed in accordance with NBC Article 9.23.7.2 and anchored in accordance with NBC Article 9.23.6.1 or design in accordance with NBC Part 4 where required by NBC Sentence 9.23.6.1(6).

4.15.2.1 OC Lumber contains no wood or cellulosic materials and is recognized for conditions where protection against decay (NBC Article 9.3.2.9, NBC Article 9.23.2.2), dampness (NBC Article 9.23.2.3), and termite attack (NBC Article 9.3.2.9) is required.

4.15.2.1.1 Adjacent wood framing, barriers, sealants, capillary breaks, and drainage details remain subject to the applicable code sections.

4.15.2.2 Design loads and anchor bolt-spacing shall be determined in accordance with NBC Article 9.23.6.1 for construction of buildings under NBC Part 9 or in accordance with NBC Part 4 where required. Anchor bolts, nuts, washers, hold-down, concrete, masonry, and foundation embedment shall designed and installed by others, and shall be detailed in approved construction documents.

4.15.2.3 Uniform vertical bearing capacity and factored anchor bolt member-side bearing values are provided in **Table 17** and **Table 18**.

**Table 17**. OC Lumber Foundation Sill Plate Uniform Vertical Bearing Capacity (LSD)[1,2,3,4,5]

| OC Lumber Profile | Nominal Flatwise Width, mm (in) | Plate Thickness, mm (in) | Bearing Strength, MPa (psi) | Factored Bearing Capacity, kN/m (lb/ft) |
|---|---|---|---|---|
| 2 x 4 | 89 (3.5) | 38 (1.5) | 8.36 (1,212) | 595 (40,770) |
| 2 x 6 | 140 (5.5) | | | 936 (64,140) |
| 2 x 8 | 191 (7.5) | | | 1,277 (87,500) |
| 2 x 10 | 235 (9.25) | | | 1,572 (107,720) |
| 2 x 12 | 286 (11.25) | | | 1,913 (131,080) |

SI: 1 lb/ft = 0.01459 kN/m.

1. Uniform vertical bearing capacities are factored capacities.
2. Values are calculated using the flatwise-bearing strength from **Table 12** multiplied by actual plate width and 1.0 m per linear meter.
3. Values apply only to uniform vertical bearing conditions with full bearing contact over the actual flatwise width of the OC Lumber foundation sill plate.
4. Concentrated bearing/localized compression, washer bearing, anchor bolt bearing, bottom member-to-OC Lumber fastening, lateral load-path effects, uplift, overturning, braced wall anchorage, shear wall anchorage, and concrete/masonry anchorage require project-specific engineered design.
5. Long-term creep deformation under sustained compression from building weight, anchor clamping forces, or other sustained load effects are not considered in the tabulated factored bearing capacities.

4.15.3 The equivalent specific gravity values in **Table 9** are permitted to be used for engineered member-side fastener and anchor checks into OC Lumber foundation sill plates in accordance with CSA O86, Section 12.4.

4.15.4 Reference member-side lateral design values for anchors installed through OC Lumber foundation sill plates are provided in **Table 18**.

**Table 18**. OC Lumber 2 x 4 Sill Plate Anchor Bolt Lateral Design Values[1,2,3,4,5]

| Anchor Bolt[7] Diameter mm (in) | Member Thickness mm (in) | Load Direction[6] | Factored Lateral Strength, N (lb) |
|---|---|---|---|
| 12.7 (1/2) | 38 (1 1/2) | L-Axis | 2,981 (671) |
| | | X-Axis | 2,710 (610) |
| 15.9 (5/8) | | L-Axis | 3,357 (755) |
| | | X-Axis | 2,848 (641) |

SI: 1 lb = 4.45 N

1. Values in this table apply to the OC Lumber member-side lateral check for the listed anchors installed in OC Lumber foundation sill plates. This check is one component of the complete foundation anchorage design.
2. The factored lateral, uplift, or combined capacity of the foundation anchorage shall be the lowest of the following: the listed side-member bearing, washer bearing, localized compression, anchor steel strength, concrete/masonry breakout, pryout, and pullout, where applicable.
3. Concrete anchorage shall be designed in accordance with the applicable building code and CSA A23.1, where applicable.
4. Masonry anchorage shall be designed in accordance with the applicable building code and CSA A165.1, where applicable.
5. Lateral design values are determined in accordance with the yield methodology in CSA O86 Section 12.4 for single-shear bolt connections from OC Lumber sill plate to concrete/masonry foundation. Embedment strength of concrete and masonry is assumed 125 MPa per CSA O86 Section 12.4.4.3.3.2(b).Values address side-member bearing only.
6. See **Table 9**, Footnote 1 for axis orientation. Anchors are installed along the Y-axis.
7. Yield strength of anchor bolt was assumed to be 310 MPa per CSA O86 Section 12.4.4.3.3.3.

4.16 For more information, see the manufacturer installation guide or contact Owens Corning technical support.

4.17 Alternative techniques shall be permitted in accordance with accepted engineering practice and experience. These provisions for the use of alternative materials, designs, and methods of construction are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed herein. This includes, but is not limited to, the following areas of engineering: mechanics of materials, structures, building science, and fire science.

## 5 Regulatory Evaluation and Accepted Engineering Practice

5.1 OC Lumber was tested and/or evaluated for:

5.1.1 Structural capacities for gravity loads when used as deck posts, joists, beams, and headers.

5.1.1.1 Edgewise flexural testing in accordance with ASTM D198 and ASTM D6109 where the use is for joists, beams, and headers

5.1.1.2 Axial compression testing in accordance with ASTM D198 where the use is for posts and ASTM D143 for bearing capacities

5.1.1.3 Determination of the equivalent specific gravities in accordance with ASTM D5456

5.1.1.4 Connection capacities of composite deck screws in accordance with ASTM D1037

5.1.1.5 Vertical load-bearing capacities of hanger connections in accordance with ASTM D7147

5.1.1.6 Surface burning characteristics in accordance with CAN/ULC-S102 equivalent

5.1.1.7 Flatwise bearing for use as foundation sill plate

5.1.2 Decay, termite, and dampness use conditions for OC Lumber foundation sill plates as an alternative solution to conventional wood sill plate.

5.2 Any building code, regulation and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this report were performed by DrJ, which is an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP or approved sources. DrJ is qualified[5] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[6] respectively.

5.3 Testing and related engineering evaluations are defined as intellectual property and/or trade secrets.[7]

5.4 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise that is also its areas of professional engineering competence.[8]

## 6 Installation

6.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report, and the applicable building code.

6.2 In the event of a conflict between the manufacturer installation instructions and this report, contact the manufacturer for counsel on the proper installation method.

6.3 *Exterior Deck Installation Procedure*

6.3.1 Install a ledger board to the desired structure in accordance with either top or side-mounting methods as described in NBC Article 9.23.9.2.

6.3.1.1 For fasteners not specified in building codes, fastener spacing provisions from other approved sources may be permitted for the installation of the ledger board.

6.3.1.2 Ledger board shall be greater than or equal to the joist size.

6.3.1.3 For hollow OC Lumber Structural Posts, see DrJ Listing 2307-07.

6.3.2 Assemble 3-ply posts using 2 x 6 OC Lumber and #10 x 4" screws as shown in **Figure 9** notched post for a 2-ply beam, and **Figure 10** for a 3-ply beam.

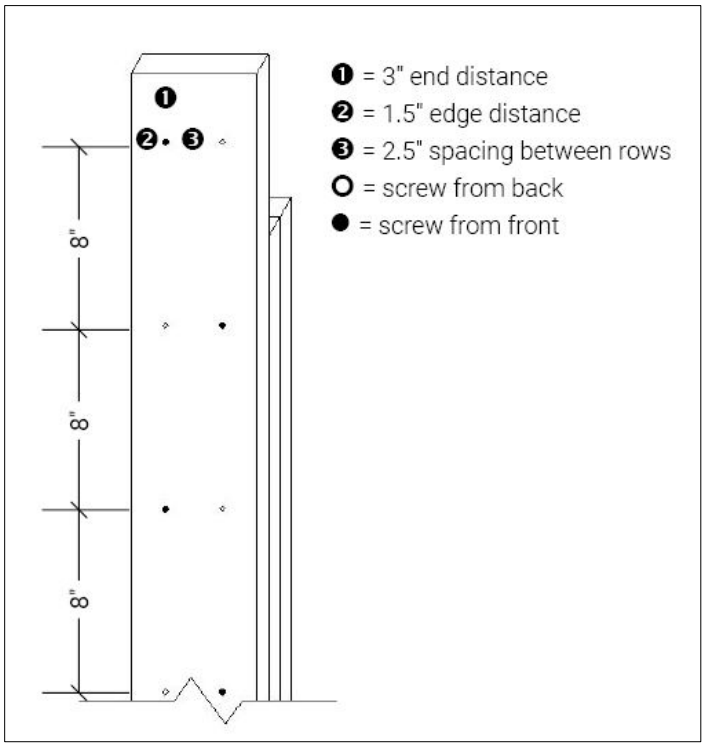



**Figure 9**. Post Supporting a 2-Ply Beam

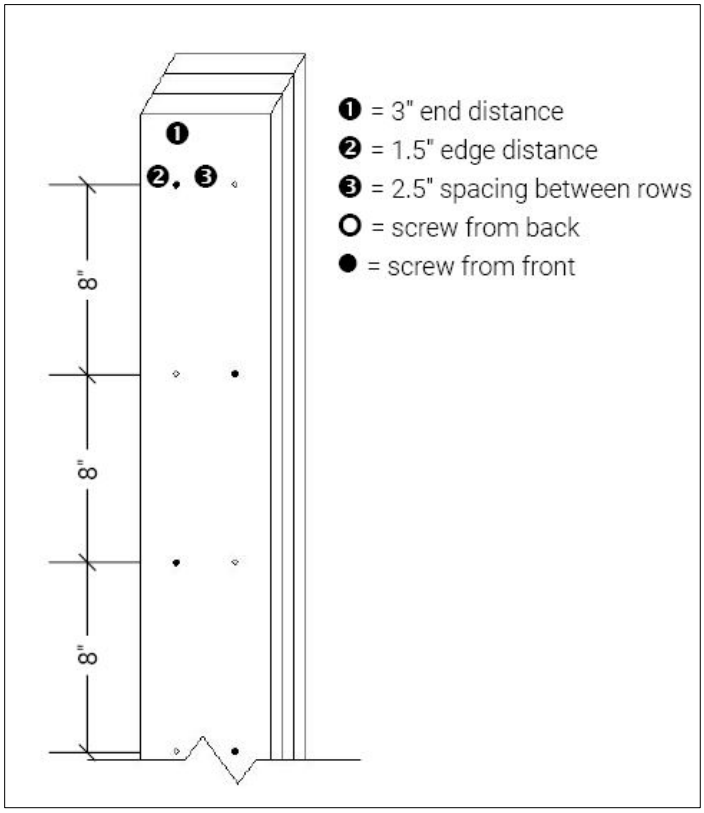



**Figure 10**. Post Supporting a 3-Ply Beam

6.3.2.1 Screws securing the OC Lumber plies for use as posts shall be staggered and placed 203 mm (8") o.c.

6.3.2.2 A 2-ply beam shall be fastened to each notched 3-ply OC Lumber post with two rows of #10 x 3" screws as shown in **Figure 11**. Minimum edge distance shall be 38 mm ($1^1/_2$").

6.3.2.2.1 2 x 6 beams require two (2) screws per row at each notched post.

6.3.2.2.2 2 x 8 beams require three (3) screws per row at each notched post.

6.3.2.2.3 2 x 10 beams require four (4) screws per row at each notched post.

6.3.2.2.4 2 x 12 beams require four (4) screws per row at each notched post.

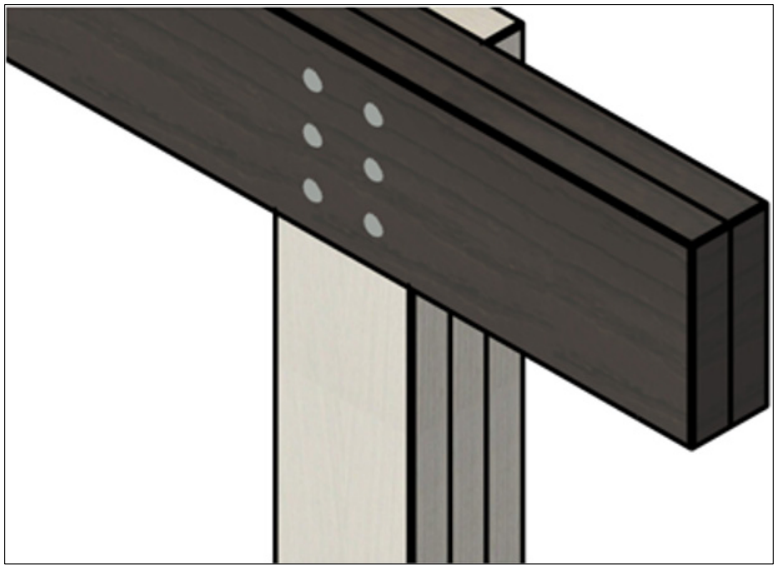


**Figure 11**. 2-ply Beam with Notched Post (2-ply 2 x 8 Beam Shown)

6.3.2.3 A 3-ply beam shall be secured to the 3-ply OC Lumber post with a code-compliant post cap connector with a minimum uplift capacity of 905 kg (2,000 lb) as shown in **Figure 12**.

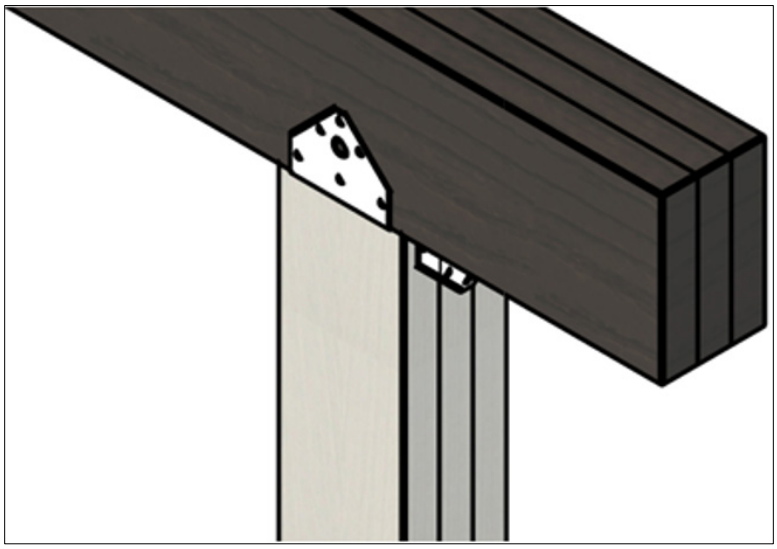


**Figure 12**. 3-ply Beam with Notched Post (3-ply 2 x 8 Beam Shown)

6.3.2.4 Posts shall be anchored to footings in compliance with the applicable building codes.

6.4 *Assemble 2-Ply or 3-Ply Beams 2x OC Lumber*

6.4.1 Beams shall be secured using #10 x 3" screws staggered in two rows, as shown in **Figure 13**.

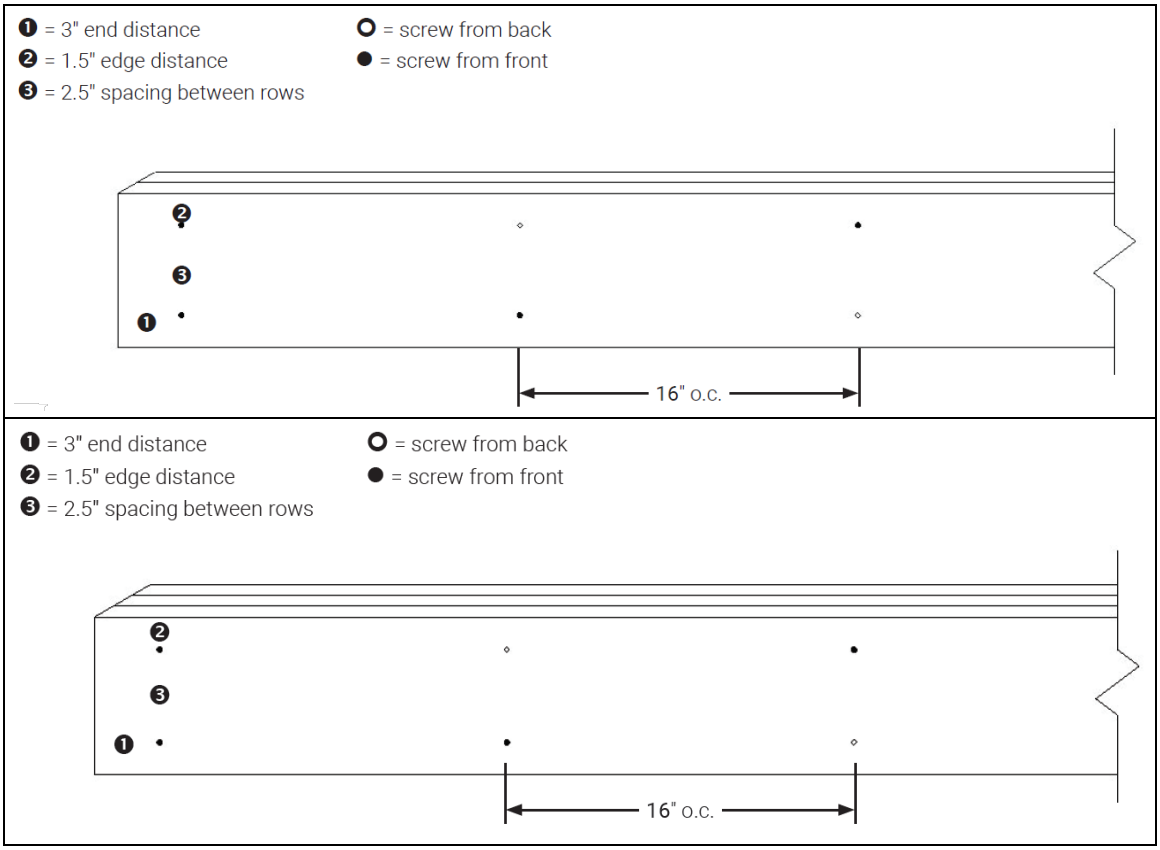



**Figure 13**. OC Lumber Beams – 2-Ply (Top) and 3-Ply (Bottom)

6.4.2 OC Lumber beams shall be installed onto OC Lumber posts in accordance with **Section 6.3.2**.

6.4.2.1 Overhangs up to 0.61 m (2') over the sides of the joists may be permitted.

6.4.2.2 Overhangs are limited to the lesser of 0.61 m (2') or twenty-five percent (25%) of the length of the beam span between posts.

6.4.3 A 2-ply OC Lumber beam shall be used as the band joist and assembled as shown in **Figure 13**. However, spacing of rows of fasteners shall be 305 mm (12") o.c. instead of 406 mm (16") o.c.

6.4.3.1 The outer ply shall overhang the inner ply by 38 mm ($1^1/_2$") at the free end of the band joist.

6.4.3.1.1 For ease, length of inner ply of the band joist and deck joists are equivalent.

6.4.3.1.2 Joist hangers shall be sized appropriately and in accordance with **Table 19**.

**Table 19**. Minimum Design Values for Hangers Attached to OC Lumber[1]

| Hanger Type | Minimum Factored Resistance Capacity for Gravity (N) | Minimum Factored Resistance Capacity for Uplift (N) |
|---|---|---|
| Single 2 x 6 Joist Hanger | 2,000 | 2,000 |
| Single 2 x 8 Joist Hanger | 2,000 | 2,000 |
| Single 2 x 10 Joist Hanger | 2,000 | 2,000 |
| Double 2 x 6 Joist Hanger | 3,000 | 2,000 |
| Double 2 x 8 Joist Hanger | 4,000 | 2,000 |
| Double 2 x 10 Joist Hanger | 5,000 | 2,000 |

Imperial Units: 1 N = 0.225 lb

1. Tested in accordance with ASTM D7147.

6.4.3.2 Hurricane ties shall be used to secure deck joists to deck beams for dropped beam installation.

6.4.4 Install blocking between each joist every 1.2 m to 1.5 m (4' to 5') using #10 x 76 mm (3") composite deck screws.

6.4.4.1 Blocking shall be staggered.

6.4.4.2 Installation of blocking over the drop beam is recommended.

6.4.4.3 Screws shall be installed along the centerline of each blocking with a minimum edge distance of 38 mm ($1^1/_2$").

6.4.5 Install first rim joist, a single-ply OC Lumber beam, using #10 x 3" composite deck screws through the side of the rim joist into each deck joist.

6.4.5.1 2 x 6 beams require two (2) screws along the centerline of each blocking with a minimum edge distance of 38 mm ($1^1/_2$").

6.4.5.2 2 x 8 beams require three (3) screws along the centerline of each blocking with a minimum edge distance of 38 mm ($1^1/_2$").

6.4.5.3 2 x 10 beams require four (4) screws along the centerline of each blocking with a minimum edge distance of 38 mm ($1^1/_2$").

6.4.6 Install the second rim joist in front of the first rim joist using two rows of #10 x 76 mm (3") screws staggered 305 mm (12") o.c. with a minimum edge distance of 38 mm ($1^1/_2$").

6.4.6.1 Secure the corners of the second rim joist to the outer ply of the band joist using the applicable provisions as in the subsections of **Section 6.4.5**.

6.5 *Stair Stringer Application*

6.5.1 When OC Lumber is used as stair stringers, fabrication of the stringers shall comply with NBC Article 9.8.9.4.

6.5.2 Choose an appropriate size OC Lumber that will satisfy a minimum throat depth of 127 mm (5") for project specific stair riser and tread depth parameters.

6.6 *Foundation Sill Plate Application*

6.6.1 OC Lumber foundation sill plates must be installed flatwise over concrete or masonry foundation elements.

6.6.2 The selected OC Lumber profile must provide a nominal 2" or larger plate thickness and a width compatible with the supported wall bottom plate, sole plate, cold-formed steel track, or other approved wall-framing bottom member.

6.6.3 Anchor bolts, anchor straps, hold-downs, washers, nuts, clips, fasteners, and connectors used with OC Lumber foundation sill plates must be corrosion-resistant or otherwise suitable for the exposure condition, and adjacent materials.

6.6.3.1 Anchor bolts shall conform to NBC Article 9.23.6.1.

6.6.3.1.1 Minimum diameter 12.7 mm ($^1/_2$"), fastened to the sill plate with nuts and washers, embedded not less than 100 mm (4") in the foundation, and spaced not more than 2,400 mm (8') on center. Where anchorage of braced wall panels is required, not less than two anchor bolts shall be provided per braced wall panel, located not more than 300 mm (12") from each panel edge, in accordance with NBC Table 9.23.6.1.

6.6.3.2 Sill plate material shall conform to NBC Article 9.23.6.3 and shall be not less than 38 mm x 89 mm ($1^1/_2$" x $3^1/_2$").

6.6.3.3 Sill plates shall be levelled on a full bed of mortar, or laid directly on the foundation where the top of the foundation is level. The joint between the sill plate for exterior walls and the foundation shall be sealed in accordance with NBC Subsection 9.25.3.

## 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 Flexural testing in accordance with ASTM D198

7.1.2 Flexural test data in accordance with ASTM D6109 from approved sources

7.1.3 Vista Engineering Full Deck Assembly Report

7.1.4 Compression testing (short and long specimens) in accordance with ASTM D198

7.1.5 Bearing capacity testing in accordance with ASTM D143

7.1.6 Dowel bearing strength testing in accordance with ASTM D5764

7.1.7 Withdrawal resistance testing of nails and screws in accordance with ASTM D1761

7.1.8 Fastener head-pull through and withdrawal data in accordance with ASTM D1037 from approved sources

7.1.9 Joist hanger assembly testing in accordance with ASTM D7147

7.1.10 Span and post spacing calculations from approved sources

7.1.11 Surface burning characteristics in accordance with ASTM E84

7.2 Information contained herein is the result of testing and/or data analysis by sources that conform to the evaluation requirements of NBC Volume 1 Relationship of the NBC to Standards Development and Conformity Assessment 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 provincial, territorial, or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published 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.

7.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, listings, certified reports, duly authenticated reports from approved agencies, and research reports prepared by approved agencies and/or approved sources provided by the suppliers of products, materials, designs, assemblies and/or methods of construction. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this report, may be dependent upon published design properties by others.

7.5 *Testing and Engineering Analysis*

7.5.1 The strength, rigidity and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.

7.6 Where additional condition of use and/or code compliance information is required, please search for OC Lumber on the DrJ Certification website.

## 8 Findings

8.1 As outlined in **Section 4**, OC Lumber has performance characteristics that were tested and/or meet applicable regulations. In addition, they are suitable for use pursuant to its specified purpose.

8.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, OC Lumber shall be approved for the following applications:

8.2.1 Joists as permitted in **Table 2** through **Table 5**.

8.2.2 Posts as permitted in **Table 6** and **Table 7**.

8.2.3 Built-up Posts as permitted in **Table 8**.

8.2.4 Equivalent specific gravities for use in accordance with the NDS per **Table 9**.

8.2.5 Ledgers as permitted in **Table 12**.

8.2.6 Headers and beams as permitted in **Table 12**.

8.2.7 Temperature adjustment factors as provided in **Table 13**.

8.2.8 Surface Burning Characteristics per flame spread index shown in **Table 15**.

8.2.9 Stair treads and stair stringers as permitted in **Section 4.12**, **Section 4.13**, and **Table 16**.

8.2.10 Evaluated fastener properties used with OC Lumber are provided in **Table 10** and **Table 11**.

8.2.11 Foundation sill plates as permitted in **Section 4.15** and **Table 17**.

8.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Owens Corning.

8.4 This innovative product has been evaluated in the context of the codes listed in **Section 3** and is compliant with all known provincial, territorial, and local building codes. Where there are known variations in provincial, territorial, or local codes applicable to this report, they are listed here:

8.4.1 No known variations

8.5 NBC Volume 1 Relationship of the NBC to Standards Development and Conformity Assessment:

> **Certification**
>
> Certification is the confirmation by an independent organization that a product, service, or system meets a requirement…Certification bodies publish lists of certified products and companies…Several organizations, including the Canadian Construction Materials Centre (CCMC), offer such evaluation services.
>
> **Evaluation**
>
> An evaluation is a written opinion by an independent professional organization that a product will perform its intended function. An evaluation is very often done to determine the ability of an innovative product, for which no standards exist, to satisfy the intent of the Code requirement...

8.6 ISO/IEC 17065 accredited third-party certification bodies,[9] including but not limited to, Standards Council of Canada (SCC)[10] and ANSI National Accreditation Board (ANAB),[11] confirm that product certification bodies have the expertise to provide technical evaluation services within their scope of accreditation. All SCC and ANAB product certification bodies meet NBC requirements to offer evaluation services for alternative solutions.[12]

8.6.1 DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131[13] and employs professional engineers.[14]

8.7 Through ANAB accreditation and the IAF Multilateral Agreements, this report 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*." IAF specifically says, "*Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope*."[15]

8.8 Product certification organizations, accredited by the SCC and ANAB, are defined as equivalent evaluation services:

8.8.1 Canada-United States-Mexico Agreement (CUSMA), Article 11.6 Conformity Assessment confirms mutual recognition by stating, "*...each Party shall accord to conformity assessment bodies located in the territory of another Party treatment no less favorable than that it accords to conformity assessment bodies located in its own territory or in the territory of the other Party*."

8.8.2 The SCC National Conformity Assessment Principles states, "*SCC is a member of a number of international organizations developing voluntary conformity assessment agreements that help ensure the international acceptance of Canadian conformity assessment results. Signatories to these agreements (like SCC) recognize each other's accreditations as being equivalent to their own*."[16]

8.9 Building official approval of a licensed professional engineer is performed by verifying the professional engineer and/or their business entity are listed by the engineering regulators of the relevant jurisdiction.

## 9 Conditions of Use

9.1 As defined in **Section 4**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

9.2 As listed herein, OC Lumber shall be used:

9.2.1 As balconies, decks, and other accessible exterior platforms intended for Group C occupancy (residential).

9.2.2 For all other applications, assistance is available from Owens Corning technical support.

9.3 When used as stair stringers, OC Lumber shall only be used in buildings that serves a single dwelling unit in accordance with NBC Article 9.8.9.1.

9.4 When used as foundation sill plates, OC Lumber is subjected to the following conditions:

9.4.1 Where supported wall-framing bottom member is wider than the OC Lumber foundation sill plate, or where bearing is eccentric, the condition shall be designed by an RDP.

9.4.2 Concentrated bearing, washer bearing, anchor bolt bearing, localized compression, bottom member-to-OC Lumber fastening, lateral load-path effects, uplift, overturning, braced wall anchorage, shear wall anchorage, and concrete or masonry anchorage shall be designed and verified by an RDP.

9.4.3 Long-term deformation under sustained loads is outside the scope of this report and shall be verified by an RDP.

9.4.4 Where dampness protection, capillary break material, air sealing, termite protection, or decay protection is required by the adopted code, those measures must remain in the approved construction documents. Use of OC Lumber as the foundation sill plate does not eliminate code-required protection for adjacent wood framing, the foundation, or site conditions.

9.5 When required by regulation and enforced by the building official, also known as the Authority Having Jurisdiction (AHJ) in which the project is to be constructed:

9.5.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

9.5.2 This report and the installation instructions shall be submitted at the time of permit application.

9.5.3 This innovative product has an internal quality control program and a third-party quality assurance program.

9.5.4 At a minimum, this innovative product shall be installed per **Section 6** of this report.

9.5.5 This report shall be reviewed for code compliance by the AHJ in concert with the duties and powers granted to the building official by the provincial regulations governing such duties and powers.

9.5.6 The application of this innovative product in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspections, and any other regulatory requirements that may apply.

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 (i.e., owner).

9.7 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

## 10 Identification

10.1 Owens Corning Lumber (OC Lumber), as listed in **Section 1.1**, is identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.

10.2 Additional technical information can be found at www.owenscorning.com/en-us/lumber/glas-powered-lumber.

## 11 Review Schedule

11.1 This report is subject to periodic review and revision. For the latest version, visit www.drjcertification.org.

11.2 For information on the status of this report, please contact DrJ Certification.

# Notes

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

2 Unless otherwise noted, all references in this report are from the 2020 version of the NBC. This alternative solution is also approved for use with the 2010 and 2015 NBC and the standards referenced therein.

3 References in this report to the National Building Code of Canada (NBC) apply to the Ontario Building Code (OBC), unless noted otherwise.

4 https://ctscivil.com/wp-content/uploads/2019/08/V-M-D-Diagrams.pdf; https://engineering.purdue.edu/~ce474/Docs/DA6-BeamFormulas.pdf. For assistance with beam or post specialty engineered design, please contact Owens Corning via email at oclumber@owenscorning.com.

5 Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

6 https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?prgID=1&orgID=2125&statusID=4#:~:text=Bill%20Payment%20Date-,Accredited%20Scopes,-13%20ENVIRONMENT.%20HEALTH

7 18 U.S. Code § 1831 - Economic espionage - Whoever, intending or knowing that the offense will benefit any foreign government, foreign instrumentality, or foreign agent, knowingly steals, or without authorization appropriates, takes, carries away, or conceals, or by fraud, artifice, or deception obtains a trade secret shall be fined not more than $5,000,000 or imprisoned not more than 15 years, or both. Any organization that commits any offense described shall be fined not more than the greater of $10,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. https://www.law.cornell.edu/uscode/text/18/part-I/chapter-90.

8 ANAB is part of the USMCA and IAF MLA, where the purpose of these agreements are to ensure mutual recognition of accredited certification and validation/verification statements between agreement signatories, and subsequent acceptance of ANAB accredited certification and validation/verification statements by professional engineers based upon having one universal approval process for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction.

9 https://anabpd.ansi.org/Accreditation/product-certification/DirectoryListingAccredited?menuID=1&prgID=1

10 https://iaf.nu/en/member-details/?member_id=91

11 https://iaf.nu/en/member-details/?member_id=14

12 NBC Division A Clause A-1.2.1.1.(1)(b) provides information on code compliance via alternative solutions and defines alternative solutions as *"...achiev[ing] at least the minimum level of performance required by Division B."* NBC Division C Section 2.3 includes additional guidance for documentation of alternative solutions.

13 https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?&prgID=1&OrgId=2125&statusID=4

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

15 https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise

16 The National Conformity Assessment Principles states, "*Product regulations and standards may vary from country to country. If these are set arbitrarily, they could be deemed as protectionist. The World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) is intended to ensure that technical regulations, standards and conformity assessment procedures of member countries do not create unnecessary obstacles to trade. Under the TBT Agreement, members of the WTO agree to use international standards, including conformity assessment standards and guides, as a basis for their technical requirements.*"