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CCMC 13091-R

CCMC *EVALUATION REPORT*

DIVISION **06099.1**
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Timberlinx

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1. Purpose of Evaluation

The proponent sought confirmation from the Canadian Construction Materials Centre (CCMC) that “Timberlinx” can serve as a tensile and shear connector for heavy timber construction in compliance with the intent of the National Building Code of Canada (NBC) 1995.

2. Opinion

Subject to the limitations and conditions stated in this report, test results and assessments provided by the proponent show that “Timberlinx” complies with CCMC’s Technical Guide for Timber Connectors (tensile and shear), MasterFormat number 06099.1, dated 2001-01-09 and provides a level of performance equivalent to that required in:

- NBC 1995, Section 4.3. and Article 9.4.1.2., when designed in accordance with CSA O86-01, “Engineering Design in Wood.”

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

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3. Description

“Timberlinx” consists of a 241 mm-long steel pipe with a slot at each end that allows the insertion of expansion anchors. The expansion anchor is 100 mm long and consists of two cast-iron sleeves that push apart when a pair of wedge nuts are drawn together by the bolt tightening (see Figure 1). Two rings hold the parts together for easier installation.

An electroplating application of zinc with a yellow dichromate finish (as per ASTM B633 “Standard Specification for Electrodeposited Coatings of Zinc

on Iron and Steel”, class 3, type II) is applied to the steel pipe and the anchor sleeves. The bolts are zinc-plated in conformance with ASTM A 153 “Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.”

The steel pipe device “Timberlinx” is assembled and distributed by Micheal Preston Distributors Ltd. All related hardware is available from the manufacturer in the required grade, size and finish.

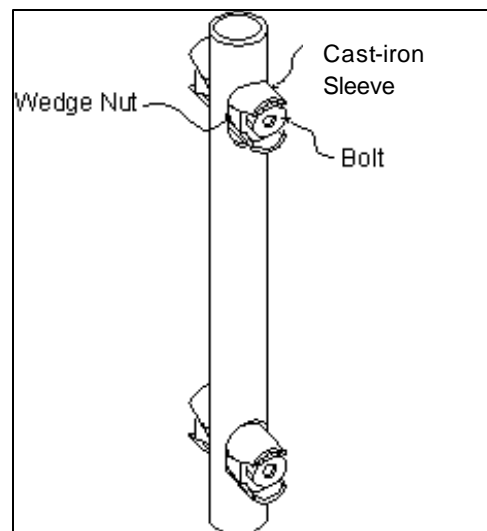
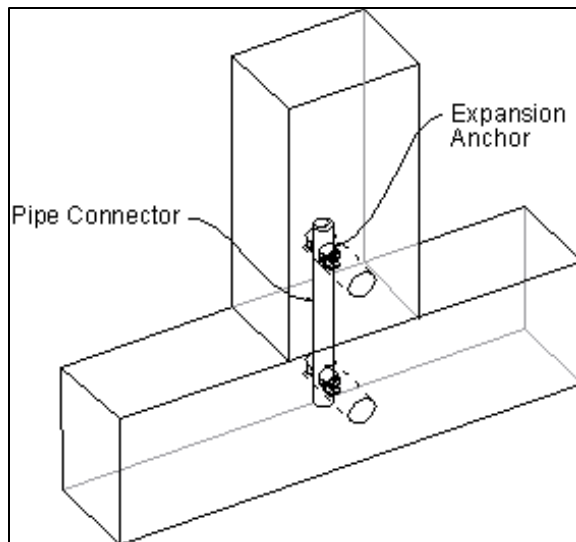


Figure 1. “Timberlinx” assembly

4. Usage and Limitations

“Timberlinx” may be used as a tensile and shear connector for post and beam connections, provided that it is installed and maintained according to the manufacturer’s current instructions.

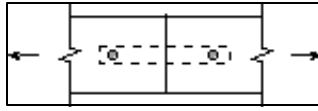
The connector assembly is an alternative to traditional wood mortise and tenon joinery used to connect timber. This anchoring system permits the fastening of one timber member to another

without the use of exposed surface plates and bolts.

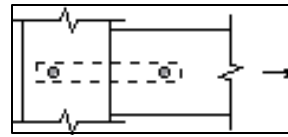
“Timberlinx” is intended to carry tensile loads (loads parallel to its axis) and also shear loads (loads perpendicular to its axis) as per the applications shown in Figure 2.

The design values provided in this report are valid when “Timberlinx” is used with pine timber

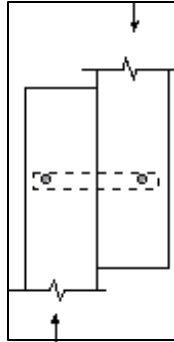
or any denser materials with higher specified strengths listed in CSA O86-01.



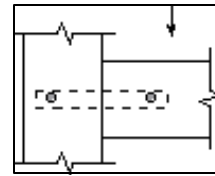
Tension parallel to grain



Tension perpendicular to grain



Shear parallel to grain



Shear perpendicular to grain

Figure 2. “Timberlinx” applications

“Timberlinx” must be installed as per the manufacturer’s installation manual entitled “Timberlinx Installation Manual,” dated 1 November 2002. Grade and size of all related hardware must conform to the manufacturer’s installation manual.

The connector shall display no fracturing in the protective coating. The pipe and anchor protective coating are currently manufactured with a minimum zinc coating of 12 μm (0.0005”). However, the user needs to consult with the manufacturer and a metal corrosion expert in order to determine the corrosion-resistant finish appropriate to be used with the expected application of “Timberlinx”.

Structural members assembled with the evaluated connector must be designed in accordance with CSA O86-01 and the NBC 1995, by a professional engineer licensed to practice under provincial or territorial legislation.

When the connector is used with unseasoned lumber, installation specifications to address

shrinkage issues should be determined in consultation with the manufacturer.

“Timberlinx” must be identified with the phrase “CCMC # 13091-R.”

5. Performance

Testing was conducted by an independent laboratory recognized by CCMC.

Ten “Timberlinx” specimens were tested for each application shown in Figure 2 using ASTM D 1761, “Standard Test Methods for Mechanical Fasteners in Wood,” as a general guideline. Also, five specimens with two “Timberlinx” were tested for tension parallel and perpendicular to grain applications.

The ultimate load results generated by the tests were used for the calculation of the characteristic tensile and shear strengths of “Timberlinx.” The characteristic strengths were derived from the lower fifth percentile estimate (R_{05}) using Weibull 2-parameters distribution model. A sample size

adjustment and a duration of load adjustment were applied to arrive at the specified strength. “Timberlinx” design values are summarized in Table 1.

Table 1. Factored Tensile and Shear Resistance of “Timberlinx” (steel pipe: 26.7 mm in diameter and 241 mm in length) (expansion anchor: 100 mm in length)

Property	Factored Resistance ^{(1) (3) (6)} (kN)			
	Standard-term Loading ⁽²⁾		Short-term Loading ⁽²⁾	
	Single Connector	Two Connectors ⁽⁴⁾	Single Connector	Two Connectors ⁽⁴⁾
Tension parallel to grain ⁽⁵⁾	12.0	17.4	13.7	20.0
Tension perpendicular to grain	11.2	17.4	12.9	20.0
Shear parallel to grain ⁽⁵⁾	16.4	–	18.9	–
Shear perpendicular to grain	7.3	–	8.4	–

Notes to table:

- (1) Factored tensile resistance is calculated in accordance with CSA O86-01, “Engineering Design in Wood,” taking into consideration dry service conditions and no fire retardant treatment.
- (2) Standard-term loading includes dead load plus snow load or loads from use and occupancy. Short-term loading includes wind and earthquake loads.
- (3) Values are for minimum 140 x 140 mm white pine timber or denser material.
- (4) Where two connectors are used, the minimum spacing between both pipe centres must be 65 mm.
- (5) In parallel-to-grain applications, the edge distance shall be 38 mm minimum.
- (6) In all applications, the pipe connector should be equally embedded into the two timber members. The diameter of the hole drilled to insert the pipe and the expansion anchor shall be 27 mm. For unseasoned lumbers the diameter of the hole shall be 28 mm.

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