Technical Evaluation Report™ - Canada

A Duly Authenticated Report from an Approved Agency

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Big Timber® WTX Wood Screw Properties - Canada

Trade Secret Report Holder:

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CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES Section: 06 05 23 - Wood, Plastic, and Composite Fastenings

1 Innovative Product Evaluated[1]

1.1 WTX Wafer Head Wood Screws

2 Product Description and Materials

2.1 WTX Wafer Head Wood Screws have a round wafer head with a star drive (Torx screw) and are partially threaded, with a Type 17 tip.

2.2 The innovative product evaluated in this report is shown in **Figure 1**.

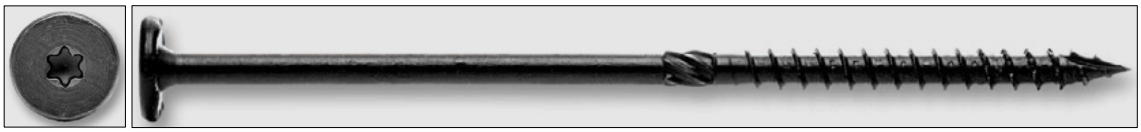

Figure 1. WTX Wafer Head Screw

2.3 WTX Wafer Head Wood Screws are manufactured using a standard cold-formed process followed by a heat-treating process.

2.4 WTX Wafer Head Wood Screws are coated with a proprietary coating, designated as Black.

2.5 WTX Wafer Head Wood Screws are approved for use in chemically treated or untreated lumber where ASTM A153, Class D coatings are approved for use in accordance with NBC Subsection 5.9.1.[2]

2.5.1 The proprietary coating has been tested and found to exceed the protection provided by code approved hot-dipped galvanized coatings meeting ASTM A153, Class D (NBC Subsection 5.9.18), allowing for its use in pressure treated wood.

2.6 WTX Wafer Head Wood Screws are approved for use in fire-retardant treated lumber, provided the conditions set forth by the fire-retardant treated lumber manufacturer be met, including appropriate strength reductions.

2.7 The fasteners evaluated in this report are set forth in **Table 1**.

Table 1. Fastener Specifications

Fastener Name	Size	Head in (mm)		Nominal Length[1] in. (mm)	Thread Length[2] in. (mm)	Shank Diameter[3] in. (mm)	Thread Diameter in. (mm)		Specified Min. Core Hardness[5] (HV 0.3)	Nominal Bending Yield,[6] F_{yb} psi (MPa)	Factored Fastener Strength lbf (kN)	
		Diameter	Drive Type				Minor	Major			Tensile	Shear[4]
WTX	15 x 3"	0.659 (16.7)	Torx 30	3 (76)	2 3/4 (70)	0.205 (5.2)	0.187 (4.7)	0.274 (6.9)	286	190,000 (1,310)	2,780 (12.4)	2,095 (9.3)
	15 x 3 1/2"			3 1/2 (89)	2 (51)							
	15 x 4"			4 (102)	2 (51)							
	15 x 4 1/2"			4 1/2 (114)	2 (51)							
	15 x 5"			5 (127)	2 (51)							
	15 x 6"			6 (152)	2 1/2 (64)							
	15 x 8"			8 (203)	2 1/2 (64)							

Imperial: 25.4 mm = 1 in, 1 N = 0.225 lb, 1 MPa = 145 psi

1. Fastener length is measured from the top of the head to the tip.
2. Thread length excludes the knurl. The WTX 15 x 3" is fully threaded (no knurl).
3. Shank diameter based on manufactured thickness. Finished dimensions are larger due to the proprietary coatings.
4. Shear determined at thread or smooth shank diameter.
5. Based on a 300-gram load using the Vickers indenter.
6. Bending yield strength is determined in accordance with ASTM F1575 and is based on the minor diameter.

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

3 Applicable Codes and Standards[3]

3.1 *Standards and Referenced Documents*

3.1.1 *AISI S904: Standard Test Methods for Determining the Tensile and Shear Strength of Screws*

3.1.2 *ANSI/APA PRS 610.1: Standard for Performance-Rated Structural Insulated Panels in Wall Applications*

3.1.3 *ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*

3.1.4 *ASTM A510: Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel*

3.1.5 *ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus*

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

3.1.7 *ASTM D2395: Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials*

3.1.8 *ASTM D2915: Standard Practice for Sampling and Data-Analysis for Structural Wood and Wood-Based Products*

3.1.9 *ASTM D4442: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials*

3.1.10 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails*

3.1.11 *ASTM G85: Standard Practice for Modified Salt Spray (Fog) Testing*

3.1.12 *CSA O86: Engineering Design in Wood*

3.1.13 *CSA O325: Construction Sheathing*

3.2 *Codes*

3.2.1 *NBC—10, 15, 20: National Building Code of Canada*

3.2.2 *O Reg. 332/12: Ontario Building Code (OBC)*[4]

4 Tabulated Properties Generated from Nationally Recognized Standards

4.1 *General*

4.1.1 WTX Wafer Head Wood Screws are used to attach wood framing members in conventional light-frame construction and provide resistance against withdrawal, head pull-through, axial and shear loads. See **Section 6** for installation requirements.

4.1.2 WTX Wafer Head Wood Screws are installed without lead holes, as prescribed in CSA O86 Article 12.11.2.1.

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

4.2 *Design*

4.2.1 The design of WTX Wafer Head Wood Screws is governed by the applicable code and the provisions for wood screws in CSA O86.

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

4.3 *WTX Factored Lateral Design Values (N_r)*

4.3.1 The factored lateral design values for shear load perpendicular to grain and parallel to grain for WTX Wafer Head Wood Screws in sawn lumber are specified in **Table 2**.

Table 2. WTX Screw Factored Lateral Design Values for Connections in Solid Sawn Lumber (N_r)

Fastener Name	Designation	Nominal Length in. (mm)	Thread Length in. (mm)	Minimum Side Member Thickness in. (mm)	Minimum Main Member Penetration[5] in. (mm)	Factored Lateral Design Values[1,2] lbf (N) (N_r)			
						Wood Species[3,4] (Relative Density)			
						HF/SPF (0.42)		DF-L (0.49)	
						$N_{r\perp}$	$N_{r\parallel}$	$N_{r\perp}$	$N_{r\parallel}$
WTX	15 x 3"	3 (76)	2 3/4 (70)	1 1/2 (38)	1 1/2 (38)	605 (2,690)	485 (2,155)	670 (2,980)	605 (2,690)
	15 x 3 1/2"	3 1/2 (89)	2 (51)						
	15 x 4"	4 (102)	2 (51)						
	15 x 4 1/2"	4 1/2 (114)	2 (51)						
	15 x 5"	5 (127)	2 (51)						
	15 x 6"	6 (152)	2 1/2 (64)						
	15 x 8"	8 (203)	2 1/2 (64)						

Imperial: 25.4 mm = 1 in, 1 N = 0.225 lb

1. $N_{r\perp}$ = Lateral Design Values Perpendicular to Grain, $N_{r\parallel}$ = Lateral Design Values Parallel to Grain.
2. Tabulated values are for a standard load duration. Values shall be factored by all applicable modification factors per CSA O86.
3. Factored lateral design values apply to two-member single shear connections where both members are of the same relative density, and the fastener is oriented perpendicular to grain. Where the members are of different relative densities, use the lower of the two.
4. For wood species with a relative density between 0.42 and 0.49, use the tabulated values for relative density of 0.42.
5. Fastener main member penetration is the length embedded in the main member, including the tip.

4.3.2 Factored lateral design values (lbf) for Structural Insulation Panels (SIPs) are detailed in **Table 3**.

Table 3. WTX Screw Factored Lateral Design Values for Connections in SIPs (N_r)

Fastener Name	Designation	Nominal Length in (mm)	Thread Length in (mm)	SIP Total Thickness[1,2,3] in (mm)	Main Member Wood Species[4] (Relative Density)	Factored Lateral Design Values,[5,6] lbf (N) (N_r)
WTX	15 x 5"	5 (127)	2 (51)	3 1/2 (89)	HF/SPF (0.42)	585 (2,600)
	15 x 8"	8 (203)	2 1/2 (64)	6 1/2 (165)		585 (2,600)
	15 x 5"	5 (127)	2 (51)	3 1/2 (89)	DF-L (0.49)	625 (2,780)
	15 x 8"	8 (203)	2 1/2 (64)	6 1/2 (165)		625 (2,780)

Imperial: 25.4 mm = 1 in, 1 N = 0.225 lb

1. SIP thickness is measured from exterior face to exterior face. Each SIP consists of two 11 mm (7/16") Oriented Strand Board (OSB) faces with a foam core in between.
2. The OSB faces on the SIPs shall comply with ANSI/APA PRS 610.1.
3. Fastener shall be driven so that the underside of the head is flush with the face of the SIP.
4. For main member wood species with a relative density between 0.42 and 0.49, use the tabulated values for relative density of 0.42.
5. The fastener is driven into the face of the main member and is loaded parallel to grain.
6. Tabulated values are for a standard load duration. Values shall be factored by all applicable modification factors per CSA O86.

4.4 *WTX Factored Withdrawal Design Values in Side Grain Applications (P_{rw})*

4.4.1 Unless otherwise noted in this report, the design provisions for withdrawal noted in CSA O86 Subsection 12.11.4 apply to WTX Wafer Head Wood Screws. Factored withdrawal design values for WTX Wafer Head Wood Screws in select lumber species are specified in **Table 4**.

Table 4. WTX Screw Factored Withdrawal Design Values (P_{rw}) – Side Grain applications

Fastener Name	Designation	Nominal Length in. (mm)	Thread Length in. (mm)	Factored Withdrawal Design Values,[1,2,3] lbf/in. (N/mm) (P_{rw})	
				Wood Species[4] (Relative Density)	
				HF/SPF (0.42)	DF-L (0.49)
WTX	15 x 3"	3 (76)	2 3/4 (70)	495 (87)	520 (91)
	15 x 3 1/2"	3 1/2 (89)	2 (51)		
	15 x 4"	4 (102)	2 (51)		
	15 x 4 1/2"	4 1/2 (114)	2 (51)		
	15 x 5"	5 (127)	2 (51)		
	15 x 6"	6 (152)	2 1/2 (64)		
	15 x 8"	8 (203)	2 1/2 (64)		

Imperial: 25.4 mm = 1 in, 1 N/mm = 5.71 lbf/in

1. Tabulated values are for a standard load duration. Values shall be factored by all applicable modification factors per CSA O86 for wood screws.
2. Minimum fastener penetration into main member of 25.4 mm (1") is required. Fastener penetration is the threaded length embedded in the main member, including the tip.
3. The full factored design withdrawal value is equal to the tabulated withdrawal value multiplied by the length of the threaded portion of the fastener embedded in the main member.
4. For wood species with a relative density between 0.42 and 0.49, use the tabulated values for relative density of 0.42.

4.5 *WTX Factored Head Pull-Through Design Values (P_{pt})*

4.5.1 The factored design value for head pull-through for WTX Wafer Head Wood Screws are shown in **Table 5**.

Table 5. WTX Screw Factored Head Pull-Through Design Values (P_{pt})

Fastener Name	Designation	Nominal Length in (mm)	Thread Length in (mm)	Factored Head Pull-Through Design Value,[1] lbf (N) (P_{pt})	
				Assembly	
				$^{7}/_{16}$" (11 mm) OSB[2]	$^{7}/_{16}$" (11 mm) OSB[2] with Metal Washer[3]
WTX	15 x 3"	3 (76)	$2^{3}/_{4}$ (70)	65 (289)	72 (321)
	15 x $3^{1}/_{2}$"	$3^{1}/_{2}$ (89)	2 (51)		
	15 x 4"	4 (102)	2 (51)		
	15 x $4^{1}/_{2}$"	$4^{1}/_{2}$ (114)	2 (51)		
	15 x 5"	5 (127)	2 (51)		
	15 x 6"	6 (152)	$2^{1}/_{2}$ (64)		
	15 x 8"	8 (203)	$2^{1}/_{2}$ (64)		

Imperial: 25.4 mm = 1 in, 1 N = 0.225 lb

1. Tabulated values are for a standard load duration. Values shall be factored by all applicable modification factors per CSA O86 for wood screws.
2. OSB shall comply with CSA O325 and shall have a relative density of at least 0.42.
3. The fastener shall be installed with a minimum 2" (51 mm) diameter, 20-gauge (0.9 mm) metal washer between the fastener head and the face of the OSB. Washer minimum tensile strength shall be 310 MPa.

4.6 Where the application falls outside of the performance evaluation, conditions of use, and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

5 Regulatory Evaluation and Accepted Engineering Practice

5.1 WTX Wafer Head Wood Screws comply with the following adopted codes and/or accepted engineering practice for the following reasons:

5.1.1 Bending yield in accordance with ASTM F1575

5.1.2 Tensile strength in accordance with AISI S904

5.1.3 Shear strength in accordance with AISI S904

5.1.4 Lateral shear in accordance with ASTM D1761 per CSA O86 Subsection 12.11.3[5]

5.1.5 Withdrawal strength in accordance with ASTM D1761 per CSA O86 Subsection 12.11.4[6]

5.1.6 Head pull-through in accordance with ASTM D1761 per CSA O86 Article 12.11.4.3[7]

5.1.7 Corrosion resistance in accordance with ASTM B117 and ASTM G85

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[8] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[9] respectively.

5.3 Testing and related engineering evaluations are defined as intellectual property and/or trade secrets.[10]

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.[11]

5.5 Any code specific issues not addressed in this section are outside the scope of this report.

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 *Installation Procedure*

6.3.1 Unless otherwise stated in this report, minimum penetration is 25.4 mm (1").

6.3.2 Install fasteners with the underside of the head flush to the surface of the wood member.

6.3.3 Lead holes are not required.

6.3.4 Screws shall be installed with the appropriate rotating powered driver.

6.3.5 Minimum requirements for screw spacing, edge distance, and end distance shall be in accordance with **Table 6**.

Table 6. WTX Screw Spacing, Edge Distance and End Distance Requirements

Figure 2 Symbol	Dimension	Minimum Spacing[1,2] (mm)(in.)	
		Species (Relative Density)	
		HF/SPF	DF-L
S_P	Spacing parallel to grain	111 (4 3/8)	139 (5 1/2)
S_Q	Spacing perpendicular to grain	56 (2 1/4)	70 (2 3/4)
a	End distance parallel to grain	84 (3 5/16)	104 (4 1/8)
e	Edge distance perpendicular to grain	28 (1 1/8)	35 (1 3/8)

Imperial: 25.4 mm = 1 in, 1 N = 0.225 lb

1. Table values are based on the major thread diameter from **Table 1** in accordance with CSA O86 Table 12.25.
2. Spacing, edge distances, and end distances of fasteners shall be sufficient to prevent splitting of the wood or as shown in this table, whichever is more restrictive.
3. See **Figure 2** for fastener placements.

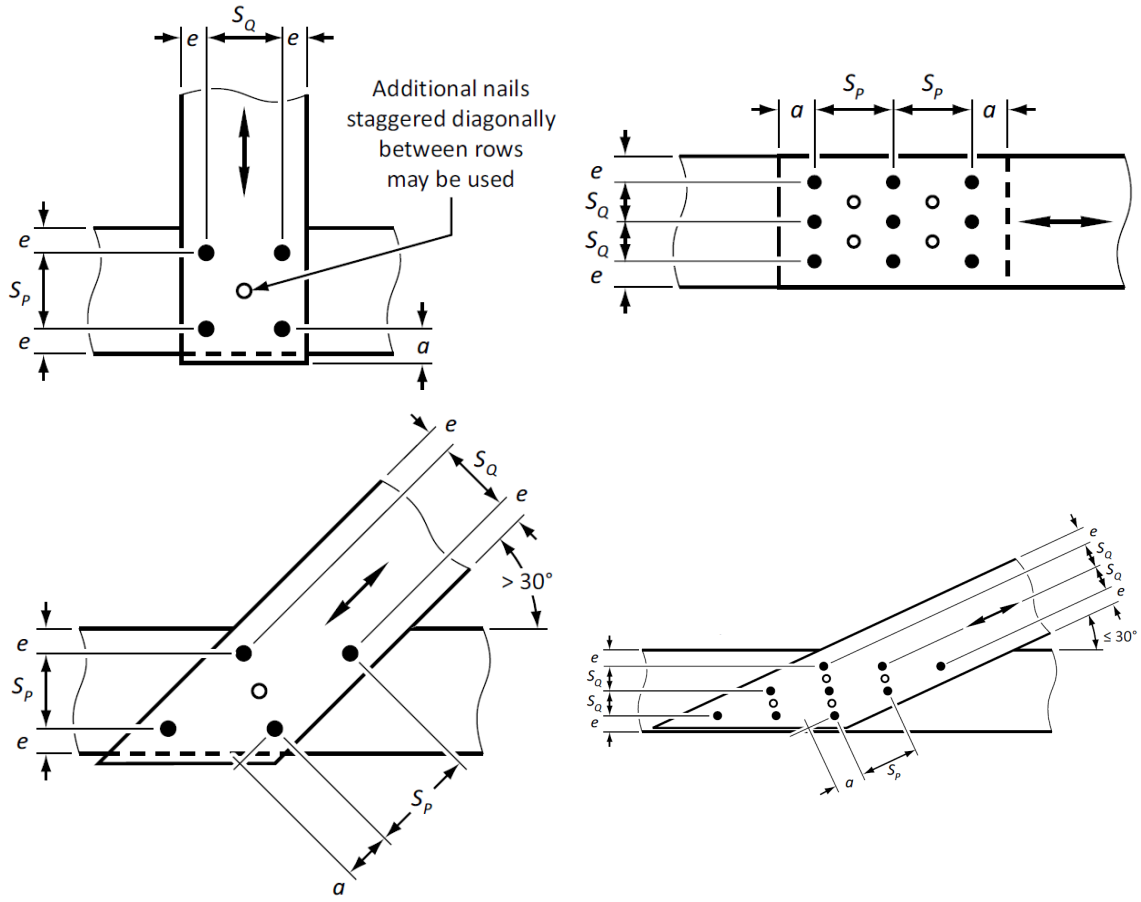

Figure 2. Example Diagrams Illustrating Fastener Spacings[12]

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 Bending yield testing in accordance with ASTM F1575

7.1.2 Shear and tensile testing in accordance with ASTM S904

7.1.3 Lateral strength testing in accordance with ASTM D1761

7.1.4 Withdrawal strength testing in accordance with ASTM D1761

7.1.5 Head pull-through testing in accordance with ASTM D1761

7.1.6 Corrosion resistance testing in accordance with ASTM B117 and ASTM G85

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 WTX Wafer Head Wood Screws on the DrJ Certification website.

8 Findings

8.1 As outlined in **Section 4**, WTX Wafer Head Wood Screws have 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, WTX Wafer Head Wood Screws shall be approved for the following applications:

8.2.1 Use as fasteners in accordance with the required codes and the design values listed above.

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

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,[13] including but not limited to, Standards Council of Canada (SCC)[14] and ANSI National Accreditation Board (ANAB),[15] 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.[16]

8.6.1 DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131[17] and employs professional engineers.[18]

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*."[19]

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*."[20]

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 Material properties shall not fall outside the boundaries defined in **Section 4**.

9.2 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.

9.3 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:

9.3.1 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.

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

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

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

9.3.5 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.

9.3.6 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.

9.4 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).

9.5 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 WTX Wafer Head Wood Screws, as listed in **Section 1.1**, are 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 bigtimberfasteners.com.

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] O Reg. 332/12 Subsection 5.10.1

[3] 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.

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

[5] 2014 CSA O86 Subsection 12.11.4

[6] 2014 CSA O86 Subsection 12.11.5

[7] 2014 CSA O86 Subsection 12.11.5.3

[8] 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.

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

[10] 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.

[11] 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.

[12] Graphics shown in **Figure 2** are as from CSA O86-19, Figure 12.16

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

[14] https://iaf.nu/en/member-details/?member_id=91

[15] https://iaf.nu/en/member-details/?member_id=14

[16] 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.

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

[18] 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*".

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

[20] 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.*"