Listing and Technical Evaluation Report™

Report No: 1703-02

Issue Date: November 7, 2019

Revision Date: October 30, 2024

Subject to Renewal: January 1, 2026

Starborn® Structural H19 Screws: Truss or Rafter to Top Plate and Bottom Plate to Rim Board

Trade Secret Report Holder:

Starborn® Industries, Inc.

Phone: 800-596-7747 Website: www.starbornindustries.com Email: info@starbornindustries.com

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 Starborn Structural H19 Screws

2 Product Description and Materials

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

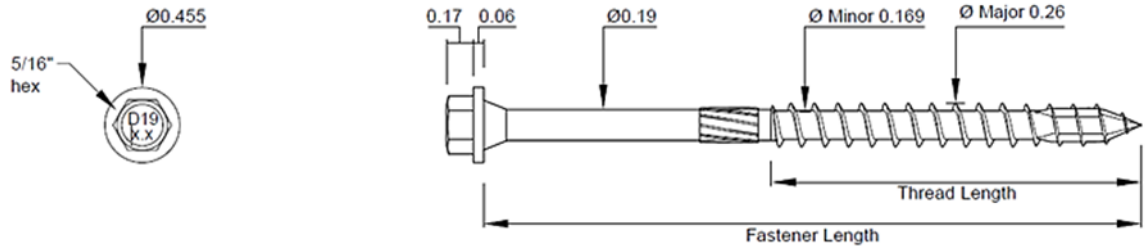

Figure 1. Starborn Structural H19 Screw

2.2 *General*

2.2.1 Starborn Structural H19 Screws are partially threaded, self-drilling, dowel-type fasteners that are manufactured using standard cold-forming processes and are subsequently heat-treated and coated with a proprietary coating comprising of a zinc layer and an epoxy-based polymer resin overcoat.

2.2.1.1 Starborn Structural H19 Screws are hex-driven ($^{5}/_{16}$") screws with an integrated washer.

2.3 *Fastener Material*

2.3.1 Starborn Structural H19 Screws are manufactured with heat-treated carbon steel grade 10B21 wire using a standard cold-forming process. All fasteners are produced in accordance with the approved quality control procedures referred to in **Section 12**.

2.4 *Corrosion Resistance*

2.4.1 Starborn Structural H19 Screws have a proprietary epoxy coating and are alternatives to hot-dip zinc galvanized fasteners.

2.4.1.1 Starborn Structural H19 Screws were evaluated for use in wood chemically treated with waterborne alkaline copper quaternary, type D (ACQ-D).

2.4.1.2 The proprietary coating system meets or exceeds the corrosion protection of hot-dipped galvanizing per ASTM A153 in accordance with IBC Section 2304.10 and IRC Section R317.3.

2.4.2 Starborn Structural H19 Screws are designed for exterior use and may be used where fasteners are required to exhibit corrosion resistance when exposed to adverse environmental conditions and/or in preservative treated wood.

2.4.2.1 Subject to the limitations specified in **Section 12**.

2.5 *Pressure-Preservative Treated (PPT) Wood Applications*

2.5.1 Starborn Structural H19 Screws with the proprietary coating are recognized for use in PPT lumber provided the conditions set forth by the PPT lumber manufacturer be met, including appropriate strength reductions.

2.6 *Fire-Retardant Treated (FRT) Wood Applications*

2.6.1 Starborn Structural H19 Screws with the proprietary coating are recognized for use in FRT lumber provided the conditions set forth by the FRT lumber manufacturer be met, including appropriate strength reductions.

2.7 *Wood Members*

2.7.1 Solid sawn wood members connected with Starborn Structural H19 Screws shall consist of lumber species or species combinations having a specific gravity of 0.42 to 0.55.

2.7.2 Structural composite lumber (i.e., LVL, PSL, LSL, etc.) connected with Starborn Structural H19 Screws shall be recognized in evaluation reports having published equivalent specific gravities for lateral and withdrawal resistance. Equivalent specific gravities for structural composite lumber may be used in the design of connections using the specific gravities of the sawn lumber shown in **Table 2** and **Table 3**.

2.8 *Fastener Specifications*

2.8.1 **Table 1** lists the dimensions and mechanical properties of Starborn Structural H19 Screws that are evaluated in this report.

Table 1. Fastener Specifications

Product Name	Head Marking	Fastener Length[1] (in)	Thread Length[2] (in)	Unthreaded Shank Diameter[3] (in)	Thread Diameter (in)		Nominal Bending Yield, F_{yb} (psi)	Allowable Fastener Strength (lb)	
					Minor[4]	Major		Tensile	Shear
Starborn Structural H19 Screws	D19 4	4	2 1/4	0.189	0.169	0.260	196,700	1,280	1,085
	D19 6	6	2 1/2						
	D19 8	8							
	D19 10	10							

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psi = 0.00689 MPa

1. Measured from the underside of the head to the tip.
2. Includes tip.
3. Unthreaded shank diameter is measured on uncoated parts. Finished part dimensions are larger due to the thickness of the proprietary coating.
4. Minor thread diameter is calculated as the average value of upper and lower manufacturing tolerances.

2.9 As needed, review material properties for design in **Section 6** and to regulatory evaluation in **Section 8**.

3 Definitions

3.1 New Materials[2] are defined as building materials, equipment, appliances, systems or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[3] The design strengths and permissible stresses shall be established by tests[4] and/or engineering analysis.[5]

3.2 Duly authenticated reports[6] and research reports[7] are test reports and related engineering evaluations, which are written by an approved agency[8] and/or an approved source.[9]

3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).[10]

3.3 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[11]

3.5 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body and/or a licensed Registered Design Professional (RDP).

3.5.1 The Center for Building Innovation (CBI) is ANAB[12] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[13] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[14] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept duly authenticated reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[15]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.[16] Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.[17]

3.9 Approval equity is a fundamental commercial and legal principle.[18]

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation[19]

4.1 *Standards*

4.1.1 *AISI S904: Standard Test Methods for Determining the Tensile and Shear Strengths of Screws*

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

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

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

4.1.5 *AWC TR 12: General Dowel Equations for Calculating Lateral Connection Values*

4.2 *Regulations*

4.2.1 *IBC – 15, 18, 21: International Building Code®*

4.2.2 *IRC – 15, 18, 21: International Residential Code®*

5 Listed[20]

5.1 Equipment, materials, products or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), approved agency (i.e., CBI and DrJ), and/or approved source (i.e., DrJ) or other organization concerned with product evaluation (i.e., DrJ) that maintains periodic inspection (i.e., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 *General*

6.1.1 Starborn Structural H19 Screws are self-tapping fasteners used for connections in conventional light frame wood construction and provide resistance against withdrawal, head pull-through, axial and shear loads. See **Section 9** for installation requirements.

6.1.2 Starborn Structural H19 Screws are used to attach minimum $1^1/_2$" wide wood trusses and sawn lumber rafters to wood wall top plates and wall bottom plates to rim board in the construction of walls that meet the requirements of IRC Section R602 or IBC Section 2308 for wood structural framing members. The fasteners provide resistance to uplift or lateral loads applied parallel and/or perpendicular to the wall or structural framing member.

6.1.2.1 Walls shall consist of a single or double top plate designed in accordance with IRC Section R602.3.2 or IBC Section 2308.5.3.2.

6.1.2.2 See **Table 2** and **Table 3** for the design procedure and the Starborn Structural H19 Screws allowable design values.

6.1.2.3 See **Section 9** for installation requirements.

6.1.2.4 Starborn Structural H19 Screws are used in buildings requiring wind analysis in accordance with IRC Section R301.2.1, or design in accordance with IBC Section 1609.

6.1.2.5 Starborn Structural H19 Screws are used in buildings requiring seismic analysis in accordance with IRC Section R301.2.2, or design in accordance with IBC Section 1613.

6.1.3 Starborn Structural H19 Screws may be installed without lead holes:

6.1.3.1 Lead holes may be used where lumber is prone to splitting, using the provisions as prescribed in NDS.

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

6.2 *Design Concepts and Allowable Design Loads*

6.2.1 Allowable design loads for uplift and lateral resistance (F1 Parallel to Wall and F2 Perpendicular to Wall, see **Figure 2**) are provided in **Table 2** for Starborn Structural H19 Screws. Allowable design loads are applicable to fasteners installed in accordance with the procedures described in **Section 9**. Allowable design loads are applicable for both single and double top plate applications as shown in **Figure 3** and **Figure 4**.

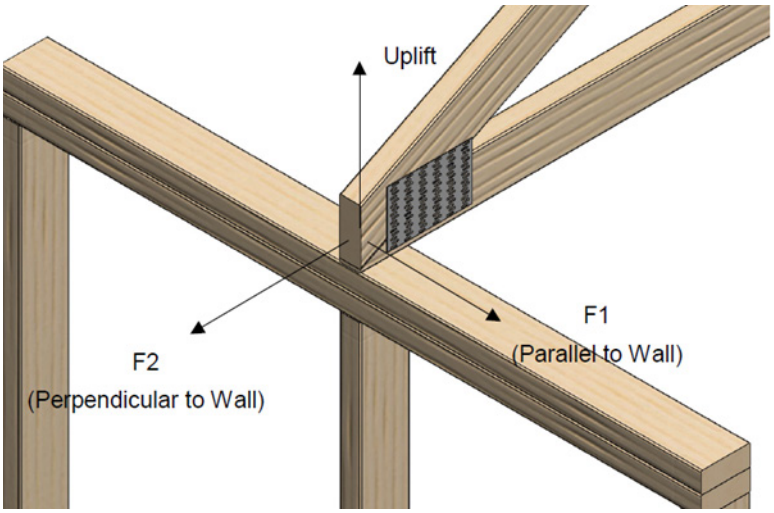

Figure 2. Uplift & Lateral Load (F1 & F2) Orientations

Table 2. Allowable Loads for Uplift & Lateral Resistance (lb) for Selected Load Durations and Wood-Specific Gravities[1,2]

Product Name	Species Group (Specific Gravity)[3,4]	Fastener Length (in)	Top Plate	Fastener Angle to Truss[6]	Uplift[5]	Lateral[5]	
						F1 – Parallel to Wall	F2 – Perpendicular to Wall
Starborn Structural H19 Screws	Spruce-Pine-Fir (0.42)	4.0	Single Top Plate	22.5°	445	315	500
				90°	470	360	600
		6.0	Double Top Plate	22.5°	515	365	570
				90°	465	445	635

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

1. Wood truss and rafter members shall be a minimum of 2" nominal thickness. Design of truss and rafter members by others.
2. Minimum screw penetration into truss/rafter members is 2".
3. Equivalent specific gravity of Structural Composite Lumber (SCL) shall be equal to or greater than the specific gravities provided in this table. Refer to product information from SCL manufacturer.
4. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity.
5. Includes 1.6 Duration of Load increase. No further duration of load increases permitted.
6. Install screw at an upward angle from vertical of 20° - 30° (22.5° is optimal) or 90° angle and should penetrate the wood truss or rafter within ¼" of the centerline. For installation between 20° - 30°, design values for 22.5° may be used.

6.2.2 For bottom plate to rim board connections, allowable design loads are provided in **Table 3** and are applicable for single bottom plates with wood structural sheathing subfloor to blocking/rim board applications as shown in **Figure 5**.

Table 3. Allowable Loads (lb) in Plate to Rim Board Configurations Using Starborn Structural H19 Screws[1,2,3]

Product Name	Load Direction	Configuration	Rim Board Species (Specific Gravity)	
			HF/SPF (0.42)	DF/SP (0.50)
Starborn Structural H19 Screws	Uplift	Single Bottom Plate to Rim Board	650	960
	Lateral – Parallel to Grain		600	705
	Lateral – Perpendicular to Grain		365	395

SI: 1 lb = 4.45 N

1. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity. For EWP rim boards (i.e., OSB, LSL, and LVL), the bottom plates shall be minimum SPF dimensional lumber. Dimensional lumber members shall be minimum of 2" nominal thickness.
2. Design values are based on a duration of load, C_D, of 1.6. No further duration of load increases permitted. Reduce design values for other load durations as applicable.
3. Fastener length shall be at least 4" to insure minimum thread penetration of 1.75".

6.2.3 Where it is anticipated that loads will be applied to a single fastener simultaneously in more than one direction, additional evaluation is required to account for the combined effect of these loads using accepted engineering practice.

6.2.3.1 Consult a Registered Design Professional (RDP), as needed, for complex design conditions.

6.3 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.

7 Certified Performance[21]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[22]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[23]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 Starborn Structural H19 Screws comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Starborn Structural H19 Screws were evaluated using assembly tests to derive allowable design values as an alternate means of attaching metal plate connected wood trusses and rafters to the tops of walls for the purpose of providing uplift and lateral load resistance.

8.1.2 Starborn Structural H19 Screws were also evaluated as an alternative means of attaching wall bottom plates to the rim board. The following conditions were evaluated:

8.1.2.1 Withdrawal strength for use as an alternative to toenail connections, metal hurricane and seismic clips/straps or nails in tension (uplift) loaded applications.

8.1.2.2 Shear strength for use as an alternative to toenail connections, hurricane and seismic clips/straps or nails in shear (lateral) loaded applications either parallel or perpendicular to wood grain.

8.1.2.3 Head pull through strength for use as an alternative to toenail connections, hurricane and seismic clips/straps or nails in tension (uplift) loaded applications.

8.2 Connections other than those addressed herein are outside the scope of this report.

8.3 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this report.

8.4 Any building code, regulation and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified[24] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.

8.5 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.

8.6 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

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

9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.

9.3 *Installation Procedure*

9.3.1 *General:*

9.3.1.1 Starborn Structural H19 Screws shall be installed using a high-torque, low-speed drill in accordance with the manufacturer installation instructions, applicable code, the approved construction documents, this report, NDS and standard framing practice as applied to wood fasteners.

9.3.1.2 The fasteners must be installed using a $^{5}/_{16}$" hex driver bit. Pre-drilling of pilot holes is not required but may be used where lumber is prone to splitting.

9.3.1.3 Minimum penetration is 2" unless otherwise stated in this report.

9.3.1.4 Install screw head flush to the surface of the connected member.

9.3.1.5 Ensure angle of fastener is such that fastener does not protrude out of the wood truss or rafter.

9.3.2 *Top Plate to Truss:*

9.3.2.1 Install one (1) of the Starborn Structural H19 Screws upward through the wall top plates or wood structural framing member at the bottom corner of the top plate(s) and into the center of the wood truss or rafter. The fastener should be installed at an upward angle from vertical of 20° - 30° (22.5° is optimal) and should penetrate the wood truss or rafter within 1/4" of the centerline. Fasteners located between studs may be installed at a 90° angle. See **Figure 3** and **Figure 4**. Fastener heads may be countersunk to avoid interfering with interior finishes.

9.3.2.1.1 If the wood truss or rafter is located directly over a top plate splice, offset the screw 1/4" to one side of the splice, and insert the screw upward through the wall top plates or wood structural framing member at the bottom corner of the top plates, and into the truss or rafter as close to the centerline as possible. Note that the splice may be in either top plate.

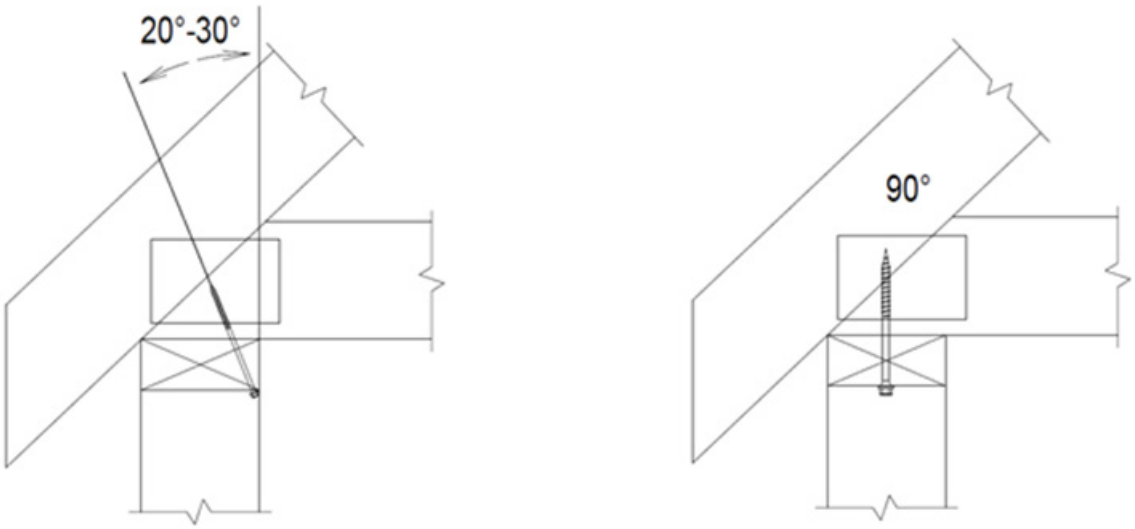

Figure 3. Installation of Starborn Structural H19 Screws into Wood Truss or Rafter through Single Top Plate

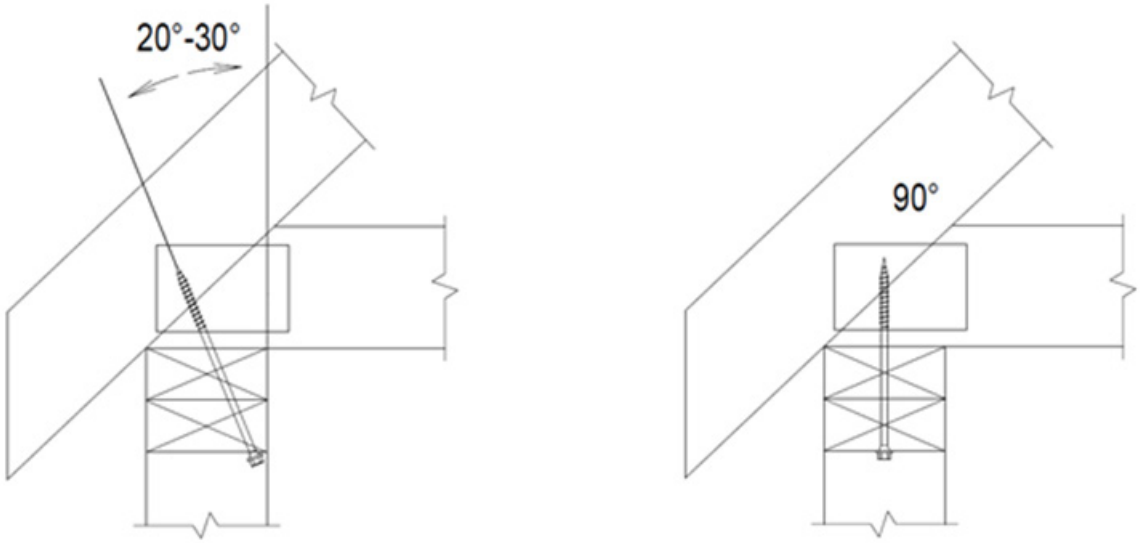

Figure 4. Installation of Starborn Structural H19 Screws into Wood Truss or Rafter through Double Top Plate

9.3.3 *Bottom Plate to Rim Board:*

9.3.3.1 Install one (1) of the Starborn Structural H19 Screws downward at a 90° angle, a minimum of $^1/_2$" from outside face of wall, through the plate and into the rim board (see **Figure 5**).

9.3.3.2 Do not countersink screw heads.

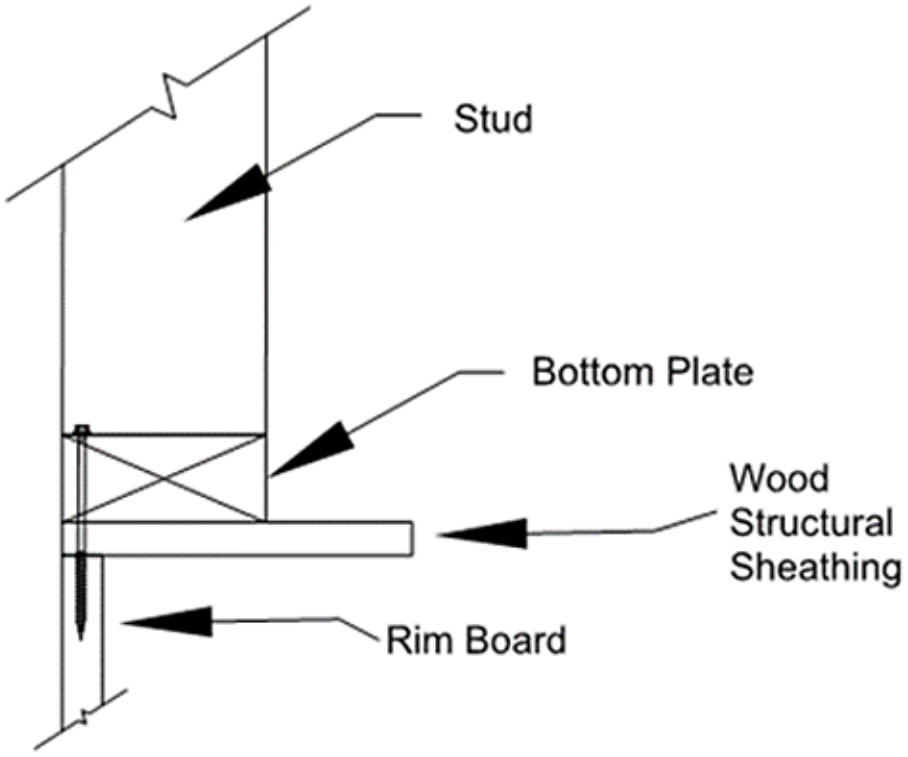

Figure 5. Installation of Starborn Structural H19 Screws through Bottom Plate into Rim Board

10 Substantiating Data

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

10.1.1 Withdrawal and head pull-through in accordance with ASTM D1761

10.1.2 Shear strength in accordance with ANSI-AISI S904-13

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

10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where applicable, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability and safety.

10.4 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 or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.5 Testing and engineering analysis: 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.[25]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Starborn Structural H19 Screws on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, Starborn Structural H19 Screws have performance characteristics that were tested and/or meet applicable regulations and are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, Starborn Structural H19 Screws shall be approved for the following applications:

11.2.1 Alternative to toenail connections, metal hurricane and seismic clips/straps or nails to resist the uplift and lateral loads due to wind and seismic conditions as provided for in **Table 2**.

11.2.2 Resistance to uplift loads due to wind negative pressure applied from the truss above lifting up on the top plate of the wall, per **Table 2**.

11.2.3 Resistance to lateral loads due to wind or seismic loads applied parallel or perpendicular to the wall, per **Table 2**.

11.2.4 Alternative fastening of single bottom plate to blocking/rim board per **Table 3**.

11.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Starborn Industries, Inc.

11.4 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[26] are similar) in pertinent part states:

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

11.5 **Approved**:[27] Building regulations require that the building official shall accept duly authenticated reports.[28]

11.5.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited.

11.5.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce.

11.5.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.6 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.

11.7 Through the IAF Multilateral Agreements (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[29]

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.

12.2 As defined in **Section 6**, 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.

12.3 As listed herein, Starborn Structural H19 Screws shall be:

12.3.1 Installed in accordance with this report and the manufacturer installation instructions.

12.4 When installed in preservative treated wood or fire-retardant treated wood, connections shall designed using the treatment manufacturers reductions for connections.

12.5 For conditions not covered in this report, connections shall be designed in accordance with generally accepted engineering practice. When the capacity of a connection is controlled by fastener metal strength rather than wood strength, the metal strength must not be multiplied by the adjustment factors specified in the NDS.

12.6 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report

12.7 Manufacturer installation instructions shall be followed as provided in **Section 9**.

12.8 Starborn Structural H19 Screws are produced by Starborn Industries at its facilities located in Edison, New Jersey.

12.9 Starborn Structural H19 Screws are produced under a quality control program subject to periodic inspections performed by an approved agency in accordance with IBC Section 1703.5.2.

12.10 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:

12.10.1 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.

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

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

12.10.4 At a minimum, this innovative product shall be installed per **Section 9** of this report.

12.10.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.

12.10.6 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4 and IRC Section R109.2.

12.10.7 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, inspection as required by IBC Section 110.3, IRC Section R109.2 and any other regulatory requirements that may apply.

12.11 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, "*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11*," all of IBC Section 104, and IBC Section 105.4.

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

12.13 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.

13 Identification

13.1 The innovative product 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.

13.2 Additional technical information can be found at www.starbornindustries.com.

14 Review Schedule

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

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

15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

15.1 Starborn Structural H19 Screws are included in this report published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services. This report states either that the material, product or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.

Appendix A

1 Legislation that Authorizes AHJ Approval

1.1 **Fair Competition**: State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:

1.1.1 Advance innovation

1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints

1.1.3 Benefit consumers through lower prices, better quality, and greater choice

1.2 **Adopted Legislation**: The following local, state and federal regulations affirmatively authorize this innovative product to be approved by AHJs, delegates of building departments and/or delegates of an agency of the federal government:

1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies, and/or methods of construction. The goal is to "*protect economic freedom and opportunity by promoting free and fair competition in the marketplace*."

1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.

1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),[30] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years[31] and/or a $5,000,000 fine or 3 times the value of[32] the Intellectual Property (IP) and Trade Secrets (TS).

1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.

1.2.4 For new materials[33] that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.

1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.[34]

1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation have been violated by an individual registered PE.

1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.[35]

1.3 **Approved**[36] **by Los Angeles**: The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.[37] The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.[38]

1.4 **Approved by Chicago**: The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).

1.5 **Approved by New York City**: The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed[39] an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement[40] (i.e., ANAB, International Accreditation Forum also known as IAF, etc.).

1.6 **Approved by Florida**: Statewide approval of products, methods or systems of construction shall be approved, without further evaluation by:

1.6.1 A certification mark or listing of an approved certification agency,

1.6.2 A test report from an approved testing laboratory,

1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or

1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.

1.6.5 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods:

1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,

1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,

1.6.5.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,

1.6.5.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or

1.6.5.5 A statewide product approval issued by the Florida Building Commission.

1.6.6 The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).

1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA])**: A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation 553.842 and 553.8425.

1.8 **Approved by New Jersey**: Pursuant to the 2018 Building Code of New Jersey in IBC Section 1707.1 General,[41] it states: "*In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)*".[42] Furthermore N.J.A.C 5:23-3.7 states: "*Municipal approvals of alternative materials, equipment, or methods of construction*."

1.8.1 **Approvals**: Alternative materials, equipment or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations.

1.8.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.8.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.8.2 The New Jersey Department of Community Affairs has confirmed that technical evaluation reports, from any accredited entity listed by ANAB, meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide "*reports of engineering findings*."

1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards**: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[43] and Part 3280,[44] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:

1.9.1 "*All construction methods shall be in conformance with accepted engineering practices*."

1.9.2 "*The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur*."

1.9.3 "*The design stresses of all materials shall conform to accepted engineering practice*."

1.10 **Approval by US, Local and State Jurisdictions in General**: In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:

1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.[45]

1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept duly authenticated reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.[46]

1.10.2.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.

1.10.2.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[47]

1.10.3 The design strengths and permissible stresses of any structural material…shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.[48]

1.11 **Approval by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:

1.11.1 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.

1.11.2 **Approved**: The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services, and/or methods of construction.

1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.[49]

1.11.4 Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.[50]

1.12 Approval equity is a fundamental commercial and legal principle.[51]

Notes

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

2 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702

3 Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11

4 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as

5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice

6 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies

7 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2

8 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency

9 https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source

10 https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 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. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

11 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

12 https://www.cbitest.com/accreditation/

13 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104:~:text=to%20enforce%20the%20provisions%20of%20this%20code

14 https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1:~:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore

15 https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11

16 https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

17 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

18 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

19 Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.

20 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed AND https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled

21 https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4

22 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

23 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

24 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.

25 See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

26 2018 IFC Section 104.9

27 Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

28 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1

29 Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

30 http://www.drjengineering.org/AppendixC AND https://www.drjcertification.org/cornell-2016-protection-trade-secrets

31 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years

32 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided

33 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2

34 IBC 2021, Section 1706.1 Conformance to Standards

35 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

36 See **Section 11** for the distilled building code definition of **Approved**

37 Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

38 https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

39 New York City, The Rules of the City of New York, § 101-07 Approved Agencies

40 New York City, The Rules of the City of New York, § 101-07 Approved Agencies

41 https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

42 https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

43 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

44 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

45 IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.

46 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.

47 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

48 IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.

49 https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

50 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

51 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission