Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

Report No: 1703-03

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Starborn® Structural F19, F23-W, F23-E, and F23 Screws: Multi-Ply Applications

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 Products Evaluated[1]

1.1 Starborn Structural Screws:

1.1.1 Starborn Structural F19 Screws

1.1.2 Starborn Structural F23-W Screws

1.1.3 Starborn Structural F23-E Screws

1.1.4 Starborn Structural F23 Screws

2 Product Description and Materials

2.1 The innovative products evaluated in this report are shown in **Figure 1** through **Figure 4** and are described in **Table 1**.

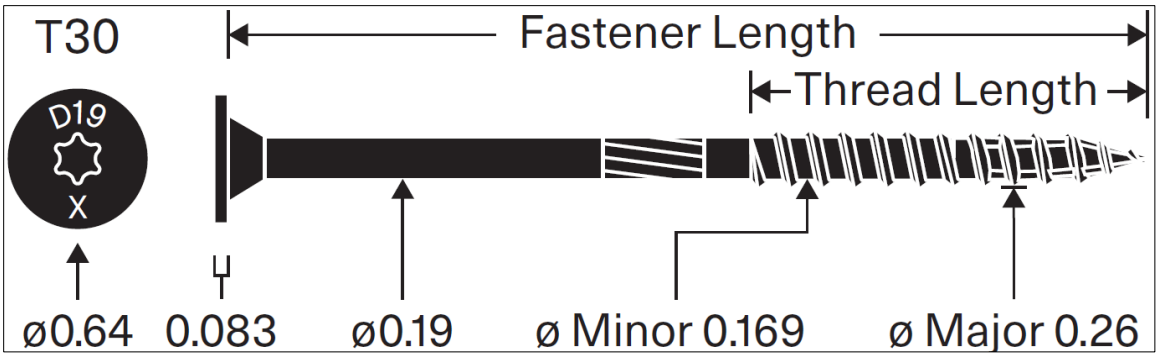

Figure 1. Starborn Structural F19 Screw

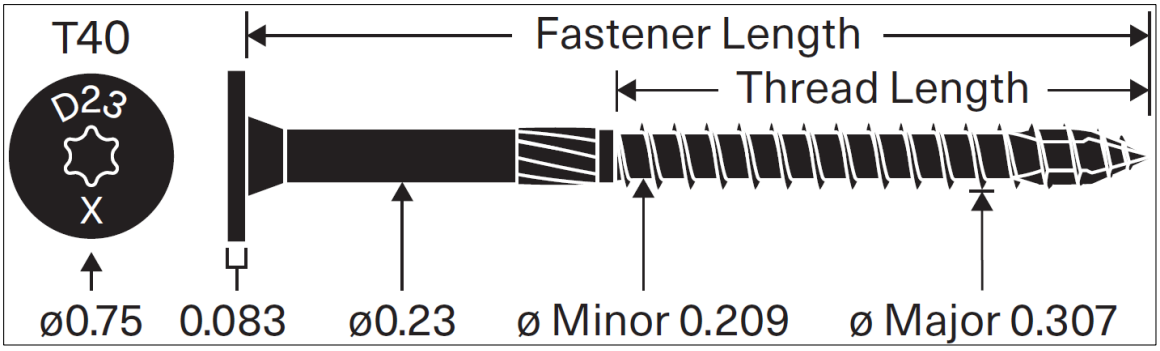

Figure 2. Starborn Structural F23 Screw

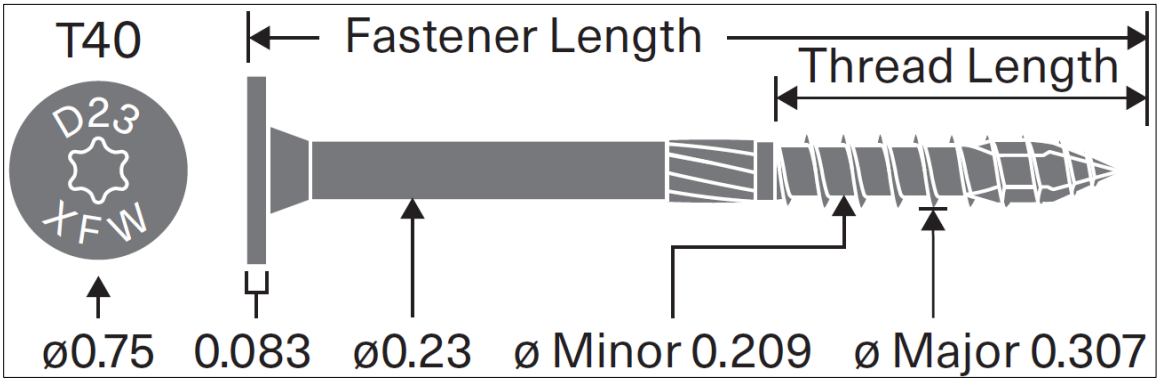

Figure 3. Starborn Structural F23-W Screw

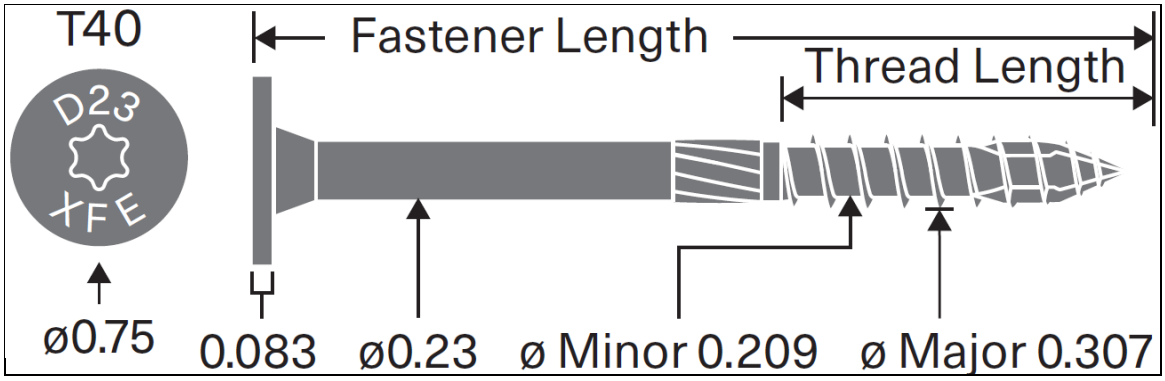

Figure 4. Starborn Structural F23-E Screw

Table 1. Starborn Structural Fastener Descriptions

Product Name	Unthreaded Shank Diameter[1] (in)	Head Type	Coating Type (Application)
Structural F19	0.19	Flat (T-30)	Exterior/Interior Use
Structural F23	0.23	Flat (T-40)	
Structural F23-W			Interior Use
Structural F23-E			Exterior/Interior Use[2]

SI: 1 in = 25.4 mm

1. Unthreaded shank diameter is measured on uncoated parts. Finished part dimensions are larger due to the thickness of the proprietary coating.
2. The Starborn Structural F23-E screw is protected with a *"Gray 2X BL300 + 2X P260 + POST-LUBE"* coating system, which has demonstrated corrosion resistance equivalent to or better than hot-dip galvanization.

2.2 *General*

2.2.1 Starborn Structural Screws are partially threaded, self-drilling, dowel-type fasteners designed for use in wood to-wood and multi-ply connections.

2.2.1.1 Starborn Structural Screws are Torx-driven flat head screws.

2.3 *Fastener Material*

2.3.1 Starborn Structural Screws are manufactured with heat-treated carbon steel grade 10B21 wire using a standard cold-forming process.

2.3.2 Starborn Structural Screws are produced in accordance with the approved quality control procedures referred to in **Section 12**.

2.4 *Corrosion Resistance*

2.4.1 Starborn Structural F19 and F23 screws are zinc-plated and are overcoated with a proprietary epoxy coating.

2.4.1.1 Starborn Structural F19 and F23 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 subject to the limitations of **Section 12**.

2.4.1.1.1 Starborn Structural F19 and F23 screws were evaluated for use in wood chemically treated with waterborne alkaline copper quaternary, type D (ACQ-D).

2.4.1.1.2 These fasteners are alternates to hot-dip zinc galvanized fasteners.

2.4.1.1.3 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 R304.3.[2]

2.4.1.2 Starborn F23-W screws are designated for interior, dry use only.

2.4.1.3 Starborn F19, F23, and F23-E screws are approved for exterior use and for use with preservative-treated wood.

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

2.5.1 Starborn Structural F19 and F23 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 F19 and F23 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 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, LSL, PSL, etc.) connected with Starborn Structural 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 3** and **Table 4**.

2.8 *Fastener Specifications*

2.8.1 **Table 2** lists the dimensions and mechanical properties of Starborn Structural Screws.

Table 2. Starborn Structural Screws 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
Structural F19	D19 2.9	$2^{7}/_{8}$	2	0.189	0.169	0.260	192,880	1,495	1,016
	D19 4	$4^{1}/_{2}$							
	D19 6	6							
	D19 8	8							
	D19 10	10							
	D19 12	12							
	D19 14	14							
	D19 16	16							
Structural F23	D23 2.9	$2^{7}/_{8}$	1.4	0.229	0.209	0.307	183,155	1,980	1,490
	D23 4	4	$2^{3}/_{8}$						
	D23 5	5	3						
	D23 6	6	$2^{3}/_{4}$						
Structural F23-W	D23 2.9 XFW	$2^{7}/_{8}$	1.4						
	D23 4.4 XFW	$4^{3}/_{8}$							
	D23 5.9 XFW	$5^{7}/_{8}$							
Structural F23-E	D23 3.4 XFE	$3^{3}/_{8}$	$1^{1}/_{2}$						
	D23 5 XFE	5							
	D23 6.8 XFE	$6^{3}/_{4}$							

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 In-plant quality control procedures, under which the Starborn Structural Screws are manufactured, are audited through an inspection process performed by an approved agency.

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

3 Definitions[3]

3.1 New Materials[4] 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.[5] The design strength and permissible stresses shall be established by tests[6] and/or engineering analysis.[7]

3.2 Duly authenticated reports[8] and research reports[9] are test reports and related engineering evaluations that are written by an approved agency[10] and/or an approved source.[11]

3.2.1 These reports utilize intellectual property and/or trade secrets to create public domain material properties for commercial end-use.

3.2.1.1 This report protects confidential Intellectual Property and trade secretes under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[12]

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

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional, hereinafter RDP) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[13]

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 RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[14] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[15] 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[16] 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.[17]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory. Therefore, recognition of certificates and validation statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope shall be approved.[18] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[19] and can be used in any country that is an MLA signatory found at this link: https://iaf.nu/en/recognised-abs/

3.9 Approval equity is a fundamental commercial and legal principle.[20]

4 Applicable Local, State, and Federal Approvals; Standards; Regulations[21]

4.1 *Local, State, and Federal*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured local jurisdictions: Austin, Baltimore, Broward County, Chicago, Clark County, Dade County, Dallas, Detroit, Denver, DuPage County, Fort Worth, Houston, Kansas City, King County, Knoxville, Las Vegas, Los Angeles City, Los Angeles County, Miami, Nashville, New York City, Omaha, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Jose, San Francisco, Seattle, Sioux Falls, South Holland, St. Louis County, Texas Department of Insurance, and Wichita.[22]

4.1.2 Approved in all state jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured states: California, Florida, New Jersey, Oregon, New York, Texas, Washington, and Wisconsin.[23]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[24] and Part 3280[25] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.1.4 Approved means complying with the requirements of local, state, or federal legislation.

4.2 *Regulations*

4.2.1 *IBC – 18, 21, 24: International Building Code®*

4.2.2 *IRC – 18, 21, 24: International Residential Code®*

4.2.3 *IECC – 18, 21, 24: International Energy Conservation Code®*

4.3 *Standards*

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

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

5 Listed[26]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), an approved agency (i.e., CBI and DrJ), and/or and approved source (i.e., DrJ), or other organization(s) 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 Screws are self-tapping screws used for attaching multi-ply wood members including trusses, sawn lumber, and engineered wood products.

6.1.2 Starborn Structural Screws are installed without lead holes as prescribed in the NDS.

6.1.3 *Design:*

6.1.3.1 The design of Starborn Structural Screws is governed by the applicable code and the provisions for dowel type fasteners in the NDS.

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

6.2 *Multi-Ply Connection Design Values*

6.2.1 *Starborn Structural F19 Screws:*

6.2.1.1 Design values are set forth in **Table 3**. Assembly conditions are detailed in **Figure 5**.

Table 3. Starborn Structural F19 Screw Allowable Lateral Design Values (plf)[2,3,4]

Multiple Members		Product Fastener Length[1] (in)	Loaded Side	SPF/HF (SG=0.42)						DF/SP (SG=0.50)					
				12" o.c.		16" o.c.		24" o.c.		12" o.c.		16" o.c.		24" o.c.	
Assembly	Components			2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows
A	2-ply 1½"	2⅞	Either	1,160	1,740	870	1,305	580	870	1,520	2,280	1,145	1,720	760	1,140
B	3-ply 1½"	4½	Either	870	1,305	655	985	435	655	1,140	1,710	855	1,285	570	855
C	4-ply 1½"	6	Either	840	1,260	630	945	420	630	1,135	1,705	855	1,285	570	855

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. Fastener length is measured from the underside of the head to the tip.
2. Wood framing shall be any species with specific gravity of 0.42 or greater.
3. Allowable design values are based on a load duration factor C_D = 1.0 and shall be multiplied by all applicable adjustment factors per the NDS.
4. For top-loaded members with even loading across the width of the entire assembly, fasteners shall be installed in two (2) rows with a maximum distance of 32" o.c. between fasteners in the same row.

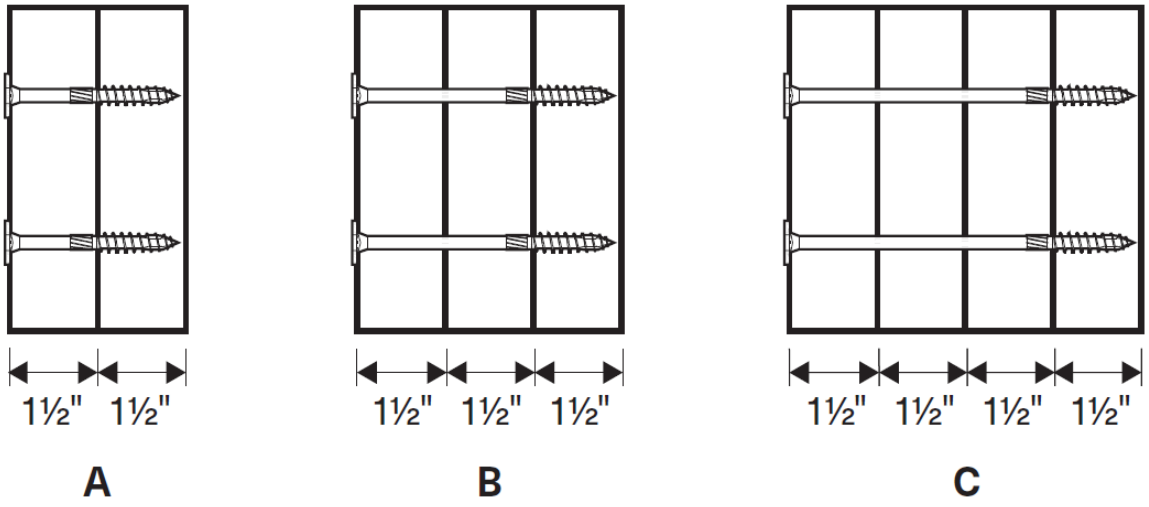

Figure 5. Starborn Structural F19 Screw Assemblies

6.2.2 *Starborn Structural F23-W Screws:*

6.2.2.1 Design values are set forth in **Table 4**. Assembly conditions are detailed in **Figure 6**.

Table 4. Starborn Structural F23 and F23-W Screw Allowable Lateral Design Values (plf)[2,3,4]

Multiple Members		Product Fastener Length[1] (in)	Loaded Side	SPF/HF (SG=0.42)						DF/SP (SG=0.50)					
				12" o.c.		16" o.c.		24" o.c.		12" o.c.		16" o.c.		24" o.c.	
Assembly	Components			2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows
A	2-ply 1½"	F23-W: 2⅞ F23: 2⅞	Either	1,460	2,190	1,100	1,650	730	1,095	1,660	2,490	1,250	1,875	830	1,245
B	3-ply 1½"	F23-W: 4⅜ F23: 4	Either	1,260	1,890	945	1,420	630	945	1,680	2,520	1,265	1,900	840	1,260
C	4-ply 1½"	F23-W: 5⅞ F23: 6	Either	1,120	1,680	840	1,260	560	840	1,495	2,245	1,125	1,690	750	1,125

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. Fastener length is measured from the underside of the head to the tip.
2. Wood framing shall be any species with specific gravity of 0.42 or greater.
3. Allowable design values are based on a load duration factor C_D = 1.0 and shall be multiplied by all applicable adjustment factors per the NDS.
4. For top-loaded members with even loading across the width of the entire assembly, fasteners shall be installed in two (2) rows with a maximum distance of 32" o.c. between fasteners in the same row.

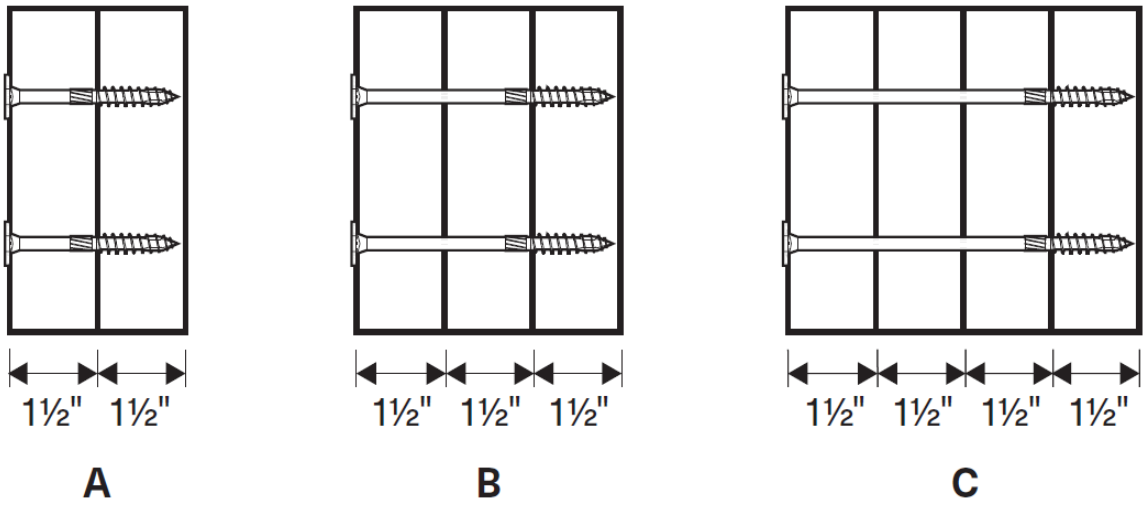

Figure 6. Starborn Structural F23 and F23-W Screw Assemblies

6.2.3 *Starborn Structural F23-E Screws:*

6.2.3.1 Design values are set forth in **Table 5**. Assembly conditions are detailed in **Figure 7**.

Table 5. Starborn Structural F23-E Screw Allowable Lateral Design Values (plf)[2,3,4]

Multiple Members		Fastener Length[1] (in)	Loaded Side	12" o.c.		16" o.c.		24" o.c.	
Assembly	Components			2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows
A	2-ply 1¾"	3⅜	Either	1,620	2,430	1,215	1,825	810	1,215
B	3-ply 1¾"	5	Head	1,680	2,520	1,260	1,890	840	1,260
			Point	1,265	1,900	950	1,425	635	950
C	4-ply 1¾"	6¾	Either	1,495	2,245	1,120	1,685	750	1,125
D	2-ply 1¾" & 3½"	5	Either	1,495	2,245	1,125	1,690	750	1,125
E	3-ply 1¾" & 3½"	6¾	Either	1,660	2,490	1,250	1,875	830	1,245
F	2-ply 3½"	6¾	Either	1,660	2,490	1,250	1,875	830	1,245

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. Fastener length is measured from the underside of the head to the tip.
2. Wood framing shall be any species with specific gravity of 0.50 or greater.
3. Allowable design values are based on a load duration factor of C_D = 1.0 and shall be multiplied by all applicable adjustment factors per the NDS.
4. For top-loaded members with even loading across the width of the entire assembly, and a depth of 18" or less, fasteners shall be installed in two (2) rows with a maximum distance of 24" o.c. between fasteners in the same row. Use three (3) rows for members deeper than 18".

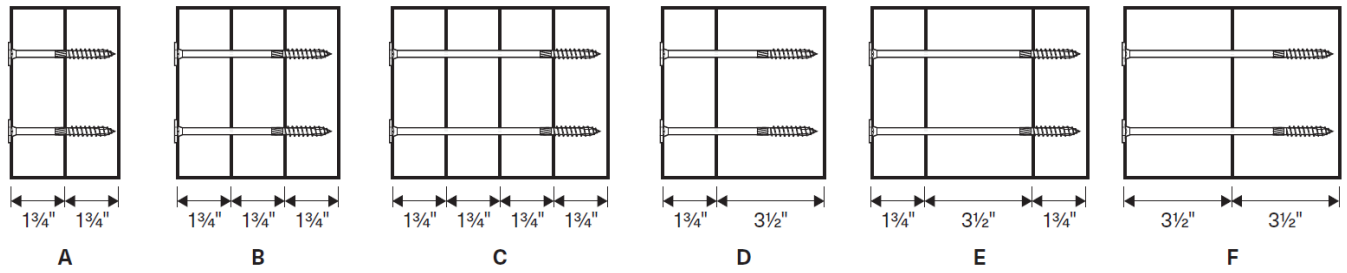

Figure 7. Starborn Structural F23-E Screw Assemblies

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[27]

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.[28]

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.[29]

8 Regulatory Evaluation and Accepted Engineering Practice

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

8.1.1 Starborn Structural Screws were evaluated to determine their ability to provide multi-ply attachment in trusses, sawn lumber, and engineered wood applications using the methodology and provisions in the NDS.

8.2 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, which is an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP or approved sources. DrJ is qualified[30] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[31] respectively.

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

8.4 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, contact the manufacturer for counsel on the proper installation method.

9.3 *Installation Procedure*

9.3.1 Starborn Structural 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, the NDS, and standard framing practice as applied to wood fasteners. Use of an impact driver is also permitted.

9.3.2 The fasteners must be installed using a Torx® T-30 star driver bit for the F19 screws and a T-40 star driver bit for the F23 screws. Pre-drilling of pilot holes is not required, but may be used where lumber is prone to splitting.

9.3.3 Minimum penetration into main member (final member in multi-ply assembly) is 1", unless otherwise stated in this report.

9.3.4 Starborn Structural Screws edge and end distances shall be as specified in **Table 6** and **Figure 8**.

9.3.5 For applications outside the scope of this report, an engineered design is required.

Table 6. Starborn Structural Screws Edge and End Distance Requirements

Number	Installed Condition	Minimum Distance or Spacing[1] (in)		
		Face	Edge	End
1	Minimum End Distance	6	3	1 3/4
2	Minimum Edge Distance	1 3/4	3/4	3/4
3	Minimum Spacing Between Fasteners in a Row	3 1/2	3 1/2	3 1/2
4	Minimum Spacing Between Non-Staggered Rows	3 1/2	NA	NA
5	Minimum Spacing Between Staggered Rows	5/8	NA	NA
6	Minimum Stagger Between Fasteners in Adjacent Rows	5/8	NA	NA

SI: 1 in = 25.4 mm

1. Edge distances, end distances, and spacing of fasteners shall be sufficient to prevent splitting of the wood or as shown in this table, whichever is more restrictive.

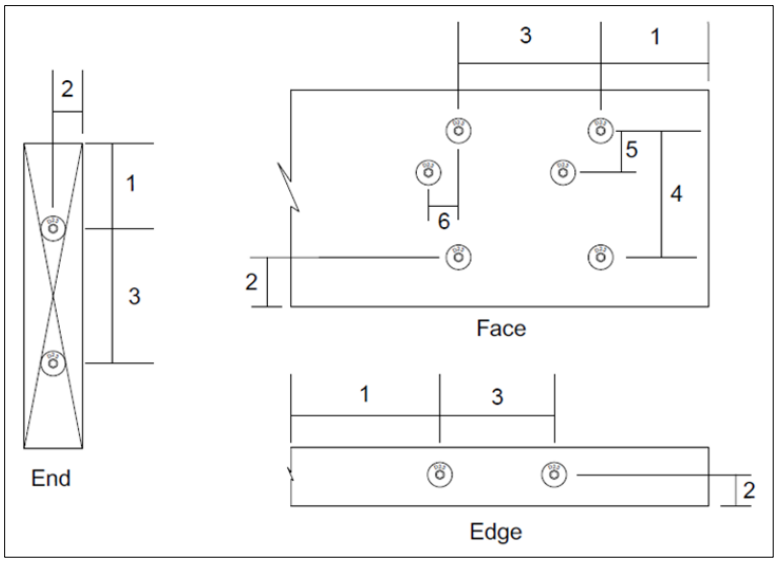

Figure 8. Starborn Structural Screw Spacing Diagram

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

10.1.2 Material properties and design values in accordance with Report Number 1703-05

10.1.3 Multi-ply design value calculations by DrJ Engineering, LLC, 2019

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 an RDP. 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*

10.5.1 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.[32]

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

11 Findings

11.1 As outlined in **Section 6**, Starborn Structural Screws have performance characteristics that were tested and/or meet applicable regulations. In addition, they 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 Screws shall be approved for the following applications:

11.2.1 Starborn Structural Screws are suitable to provide multi-ply attachment in trusses, sawn lumber, and engineered wood applications.

11.2.2 Starborn Structural Screws have been evaluated in the context of the codes listed in **Section 4** and are compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this report, they are listed here:

11.2.2.1 No known variations

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 104.2.3[33] (IRC Section R104.2.2[34] and IFC Section 104.2.3[35] are similar) in pertinent part state:

> **104.2.3 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, provided that any such alternative is not specifically prohibited by this code and has been approved.

11.5 **Approved:**[36] Building regulations require that the building official shall accept duly authenticated reports.[37]

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 Arrangement (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.[38]

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 Screws shall be installed in accordance with this report and the manufacturer installation instructions.

12.4 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.

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

12.6 Starborn Structural 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.

12.7 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:

12.7.1 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.

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

12.7.3 These innovative products have an internal quality control program and a third-party quality assurance program.

12.7.4 At a minimum, these innovative products shall be installed per **Section 9**.

12.7.5 The review of this report by the AHJ shall comply with IBC Section 104.2.3.2 and IBC Section 105.3.1.

12.7.6 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.7.2, IBC Section 110.4, IBC Section 1703, IRC Section R104.7.2, and IRC Section R109.2.

12.7.7 The application of these innovative products 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.

12.8 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *"the building official shall make, or cause to be made, the necessary tests and investigations; or 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 Section 104.2.3"*, all of IBC Section 104, and IBC Section 105.3.

12.9 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).

12.10 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 Starborn Structural Screws (Starborn Structural F19 Screws, Starborn Structural F23-W Screws, Starborn Structural F23-E Screws, and Starborn Structural F23 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.

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

14 Review Schedule

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

14.2 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 2021 IRC Section R317.3

3 Capitalized terms and responsibilities are defined pursuant to the applicable building code, applicable reference standards, the latest edition of TPI 1, the NDS, AISI S202, US professional engineering law, Canadian building code, Canada professional engineering law, Qualtim External Appendix A: Definitions/Commentary, Qualtim External Appendix B: Project/Deliverables, Qualtim External Appendix C: Intellectual Property and Trade Secrets, definitions created within Design Drawings and/or definitions within Reference Sheets. Beyond this, terms not defined shall have ordinarily accepted meanings as the context implies. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

4 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1702

5 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/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3

6 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.2:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests

7 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/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.1:~:text=Conformance%20to%20Standards-,The%20design%20strengths%20and%20permissible%20stresses,-of%20any%20structural

8 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20make%2C%20or%20cause%20to%20be%20made%2C%20the%20necessary%20tests%20and%20investigations%3B%20or%20the%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%20104.2.3.

9 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4.2

10 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_agency

11 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_source

12 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.

13 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/

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

15 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.1:~:text=directed%20to%20enforce%20the%20provisions%20of%20this%20code

16 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3 AND https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#105.3.1

17 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

18 https://iaf.nu/en/about-iaf-mla/#:~:text=Once%20an%20accreditation%20body%20is%20a%20signatory%20of%20the%20IAF%20MLA%2C%20it%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

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

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

21 Unless otherwise noted, the links referenced herein use un-amended versions of the 2024 International Code Council (ICC) 2024 International Code Council (ICC) model codes as foundation references. Mississippi versions of the IBC 2024 and the IRC 2024 are un-amended. This material, product, design, service and/or method of construction also complies with the 2000-2012 versions of the referenced codes and the standards referenced therein. As pertinent to this technical and code compliance evaluation, CBI and/or DrJ staff have reviewed any state or local regulatory amendments to assure this report is in compliance.

22 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by the local jurisdiction. https://up.codes/codes/general

23 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by state. https://up.codes/codes/general

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

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

26 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#listed AND https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#labeled

27 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4

28 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

29 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

[30] 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.

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

[32] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

[33] 2021 IBC Section 104.11

[34] 2021 IRC Section R104.11

[35] 2018: https://up.codes/viewer/wyoming/ifc-2018/chapter/1/scope-and-administration#104.9 AND 2021: https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11

[36] 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 (https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[37] https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

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