



Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

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Starborn® Structural Screws: Fastener Properties and Design Values

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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 Evaluated¹

1.1 Starborn Structural Screws:

- 1.1.1 Starborn Structural H19 Screws
- 1.1.2 Starborn Structural F19 Screws
- 1.1.3 Starborn Structural H23 Screws
- 1.1.4 Starborn Structural F23 Screws
- 1.1.5 Starborn Structural F23-E Screws
- 1.1.6 Starborn Structural F23-W Screws
- 1.1.7 Starborn Structural F23 Stainless Screws

2 Product Description and Materials

2.1 The innovative products evaluated in this report are shown in **Figure 1** through **Figure 7**, and are listed in **Table 1**.

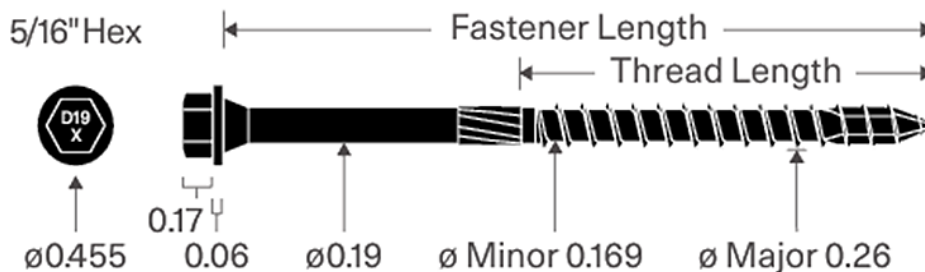


Figure 1. Starborn Structural H19 Screw

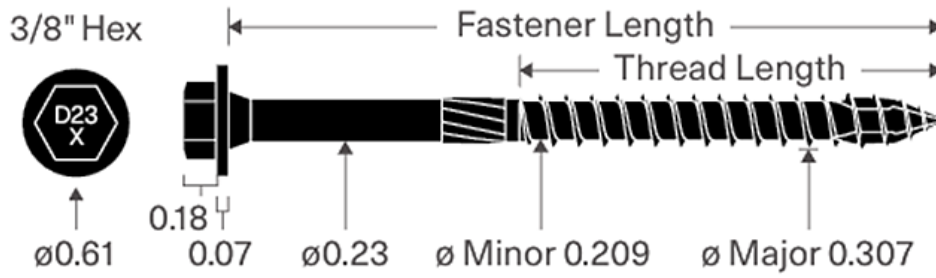


Figure 2. Starborn Structural H23 Screw

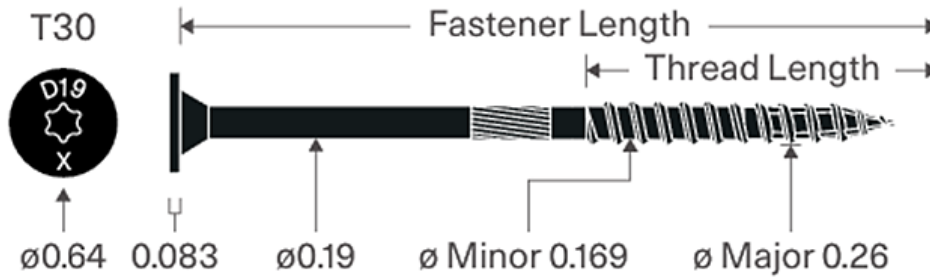


Figure 3. Starborn Structural F19 Screw

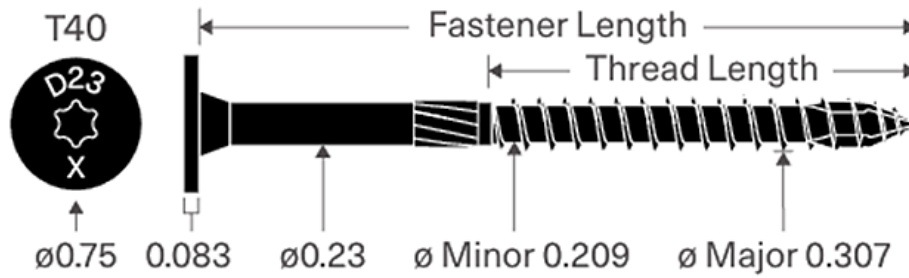


Figure 4. Starborn Structural F23 Screw

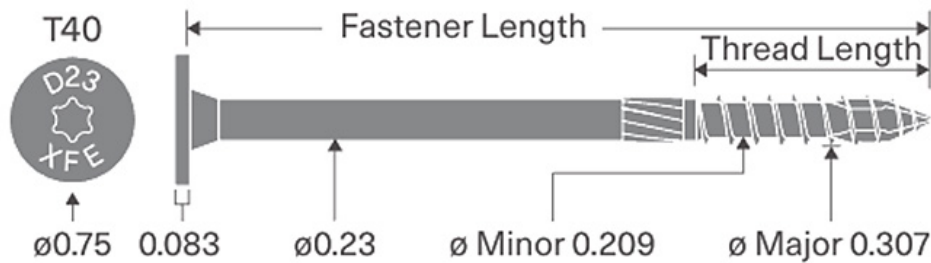


Figure 5. Starborn Structural F23-E Screw

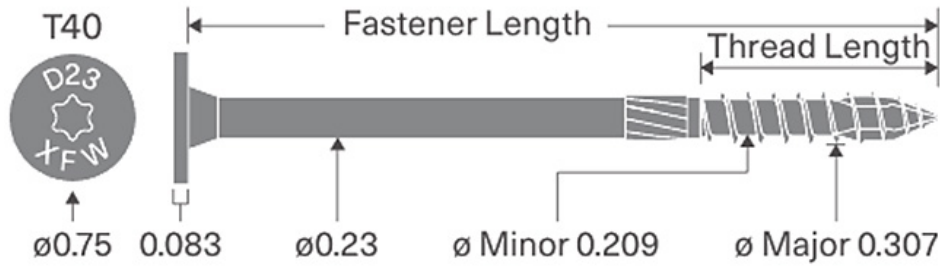


Figure 6. Starborn Structural F23-W Screw

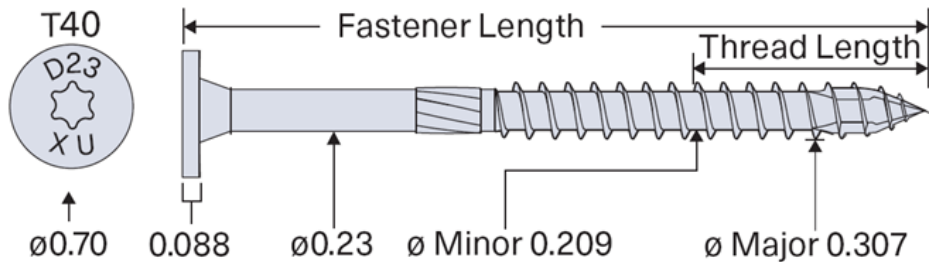


Figure 7. Starborn Structural F23 Stainless Screw

Table 1. Starborn Structural Fastener Designation and Product Name

Product Name	Unthreaded Shank Diameter ¹ (in)	Head Type	Coating Type (Application)
Structural H19	0.19	Hex (⁵ / ₁₆ in)	Exterior Use
Structural F19		Flat (T-30)	
Structural H23	0.23	Hex (³ / ₈ in)	
Structural F23		Flat (T-40)	
Structural F23 Stainless			
Structural F23-E			
Structural F23-W			Interior Use

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.

2.2 General

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

- 2.2.1.1 Starborn Structural H19 Screws are hex-driven (⁵/₁₆") screws with an integrated washer.
- 2.2.1.2 Starborn Structural F19 Screws are Torx-driven flat head screws.
- 2.2.1.3 Starborn Structural H23 Screws are hex-driven (³/₈") screws with an integrated washer.
- 2.2.1.4 Starborn Structural F23 Screws are Torx-driven flat head screws.
- 2.2.1.5 Starborn Structural F23-E Screws are Torx-driven flat head screws.
- 2.2.1.6 Starborn Structural F23-W Screws are Torx-driven flat head screws.
- 2.2.1.7 Starborn Structural F23 Stainless Screws are Torx-driven flat head screws.



2.3 Fastener Material

- 2.3.1 With the exception of Starborn Structural F23 Stainless Screws, Starborn Structural Screws are manufactured with heat-treated carbon steel grade 10B21 wire using a standard cold-forming process.
 - 2.3.1.1 Starborn Structural H19, F19, H23, and F23 Screws are coated with a proprietary black exterior coating.
 - 2.3.1.2 Starborn Structural F23-E and F23-W screws are coated with a proprietary gray epoxy coat finish with lubricated topcoat for interior-use.
- 2.3.2 Starborn Structural F23 Stainless Screws are manufactured with Grade 316 Stainless Steel (SS).
- 2.3.3 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 Screws are zinc plated and overcoated with a proprietary epoxy coating.
 - 2.4.1.1 Starborn H19, F19, H23, F23, and F23 Stainless 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 H19, F19, H23, 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 may be used as alternatives to hot-dipped, 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 R317.3](#).
 - 2.4.1.1.4 Starborn F23 Stainless Screws meets the material requirements in ASTM F1667 per [IBC Section 2304.10.6](#) and [IRC Section R317.3](#), and are recognized for use in untreated, preservative treated, and fire-retardant treated wood in interior and exterior applications.
 - 2.4.1.2 Starborn F23-E and F23-W Screws are designed for interior, dry use only.
 - 2.4.1.2.1 Starborn F23-E Screws are designed for use in Engineered Wood Products (EWP).
 - 2.4.1.2.2 Starborn F23-W Screws are designed for use in solid-sawn lumber.

2.5 Pressure-Preservative Treated (PPT) Wood Applications

- 2.5.1 Starborn Structural Screws, with the proprietary coating or manufactured from stainless steel, 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 Screws, with the proprietary coating or manufactured from stainless steel, 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** through **Table 8**.



2.8 Fastener Specifications

2.8.1 **Table 2** lists the dimensions and mechanical properties of Starborn Structural Screws that are evaluated in this report.

Table 2. Starborn Structural Screw Specifications

Product Name	Head Marking	Fastener Length ¹ (in)	Thread Length ² (in)	Unthreaded Shank Diameter ³ (in)	Thread Diameter (in)		Nominal Bending Yield, ⁵ F _{yb} (psi)	Allowable Fastener Strength (lb)	
					Minor ⁴	Major		Tensile	Shear
Structural H19	D19, 2.9	2 ⁷ / ₈	1.4	0.19	0.169	0.260	196,700	1,280	1,085
	D19, 4	4	2 ¹ / ₄						
	D19, 6	6	2 ¹ / ₂						
	D19, 8	8							
	D19, 10	10							
Structural F19	D19, 2.9	2 ⁷ / ₈	2	0.19	0.169	0.260	192,880	1,495	1,015
	D19, 4	4 ¹ / ₂							
	D19, 6	6							
	D19, 8	8							
	D19, 10	10							
	D19, 12	12							
	D19, 14	14							
	D19, 16	16							
Structural H23	D23, 4	4	2 ³ / ₈	0.23	0.209	0.307	183,155	1,980	1,490
	D23, 5	5	3						
Structural F23	D23, 2.9	2 ⁷ / ₈	1.4	0.23	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						
	D23, 8	8							
	D23, 10	10							
Structural F23-E	D23, 3.4 XFE	3 ³ / ₈	1 ¹ / ₂	0.23	0.209	0.307	183,155	1,980	1,490
	D23, 5 XFE	5							
	D23, 6.8 XFE	6 ³ / ₄							
Structural F23-W	D23, 2.9 XFW	2 ⁷ / ₈	1.4	0.23	0.209	0.307	183,155	1,980	1,490
	D23, 4.4 XFW	4 ³ / ₈							
	D23, 5.9 XFW	5 ⁷ / ₈							



Table 2. Starborn Structural Screw Specifications

Product Name	Head Marking	Fastener Length ¹ (in)	Thread Length ² (in)	Unthreaded Shank Diameter ³ (in)	Thread Diameter (in)		Nominal Bending Yield, ⁵ F _{yb} (psi)	Allowable Fastener Strength (lb)	
					Minor ⁴	Major		Tensile	Shear
Structural F23 Stainless	D23, 2.9 XU	2 ⁷ / ₈	1.4	0.23	0.209	0.307	107,000	695	970
	D23, 4 XU	4	2 ³ / ₈						
	D23, 5 XU	5	3						
	D23, 6 XU	6	2 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.
5. Bending yield strength is determined in accordance with ASTM F1575 and based on the minor diameter.

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

3 Definitions

- 3.1 New Materials² 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 tests⁴ and/or engineering analysis.⁵
- 3.2 Duly authenticated reports⁶ and research reports⁷ are test reports and related engineering evaluations, which are written by an approved agency⁸ 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 ANAB¹² ISO/IEC 17025 and ISO/IEC 17020 accredited.
- 3.6 The regulatory authority shall enforce¹³ 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 writing¹⁴ 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 Evaluation¹⁹

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 A510: Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel*
- 4.1.5 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*
- 4.1.6 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails*

4.2 Regulations

- 4.2.1 *IBC – 15, 18, 21: International Building Code®*
- 4.2.2 *IRC – 15, 18, 21: International Residential Code®*
- 4.2.3 *FBC-B—20, 23: Florida Building Code – Building²⁰ (FL 30525)*
- 4.2.4 *FBC-R—20, 23: Florida Building Code – Residential²⁰ (FL 30525)*
- 4.2.5 *LABC—20, 23: City of Los Angeles Building Code²¹*
- 4.2.6 *LARC—20, 23: City of Los Angeles Residential Code²¹*

5 Listed²²

- 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 Screws are self-tapping fasteners for wood-to-wood connections in conventional light frame construction. They provide resistance against withdrawal, head pull-through, axial, and shear loads. See **Section 9** for installation requirements.
- 6.1.2 Starborn Structural Screws can be used in applications including structural and general timber construction work. Typical uses include deck ledger attachment, interior framing, staircase, and multi-ply beam construction as well as on rafter insulation and façade attachment.
- 6.1.3 Starborn Structural Screws are installed without lead holes, as prescribed in NDS.



6.2 Design

- 6.2.1 Design of Starborn Structural Screws is governed by the applicable code and the provisions for dowel type fasteners in NDS.
- 6.2.2 Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.

6.3 Starborn Structural Screws Reference Lateral Design Values

- 6.3.1 Reference lateral design values for shear load perpendicular and parallel to grain for Starborn Structural Screws are specified in **Table 3**.
- 6.3.1.1 Design loads are applicable for flush installation.

Table 3. Starborn Structural Screws Reference Lateral Design Values^{1,2} (Z) – Flush Installation

Product Name	Fastener Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Main Member Penetration (in)	Lateral Design Values (lb) by Species (Specific Gravity) and Load Orientation					
					HF/SPF (0.42)		DF/SP (0.50)		SCL (0.50)	
					Z _{Perp}	Z _{Para}	Z _{Perp}	Z _{Para}	Z _{Perp}	Z _{Para}
Structural H19	2 ⁷ / ₈	1.4	1 ¹ / ₂	1 ³ / ₈	300	375	375	440	375	440
	4	2 ¹ / ₄		2 ¹ / ₂	305	270	435	415	435	415
	6	2 ¹ / ₂		4 ¹ / ₂						
	8			6 ¹ / ₂						
	10			8 ¹ / ₂						
Structural F19	2 ⁷ / ₈	2	1 ¹ / ₂	1 ³ / ₈	290	315	380	335	380	335
	4 ¹ / ₂			2 ¹ / ₂	290	315	380	335	380	335
	6			4 ¹ / ₂	315	350	425	370	425	370
	8			6 ¹ / ₂	340	305	425	375	425	375
	10			8 ¹ / ₂	370	325	465	365	465	365
	12			10 ¹ / ₂						
	14			12 ¹ / ₂						
	16			14 ¹ / ₂						
Structural H23	4	2 ³ / ₈	1 ¹ / ₂	2 ¹ / ₂	420	420	560	560	560	560
	5	3		3 ¹ / ₂						
Structural F23	2 ⁷ / ₈	1.4	1 ¹ / ₂	1 ³ / ₈	365	415	405	540	405	540
	4	2 ³ / ₈		2 ¹ / ₂	420	420	560	560	560	560
	5	3		3 ¹ / ₂						
	6	2 ³ / ₄		4 ¹ / ₂						
	8			6 ¹ / ₂						
	10			8 ¹ / ₂						



Table 3. Starborn Structural Screws Reference Lateral Design Values^{1,2} (Z) – Flush Installation

Product Name	Fastener Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Main Member Penetration (in)	Lateral Design Values (lb) by Species (Specific Gravity) and Load Orientation					
					HF/SPF (0.42)		DF/SP (0.50)		SCL (0.50)	
					Z _{Perp}	Z _{Para}	Z _{Perp}	Z _{Para}	Z _{Perp}	Z _{Para}
Structural F23-E	3 ³ / ₈	1 ¹ / ₂	1 ³ / ₄	1 ⁵ / ₈	-	-	-	-	405	540
	5			3 ¹ / ₄					560	560
	6 ³ / ₄			5						
Structural F23-W	2 ⁷ / ₈	1.4	1 ¹ / ₂	1 ³ / ₈	365	415	405	540	-	-
	4 ³ / ₈			420	420	560	560	-	-	
	5 ⁷ / ₈			4 ¹ / ₂						
Structural F23 Stainless	2 ⁷ / ₈	1.4	1 ¹ / ₂	1 ³ / ₈	330	370	425	350	425	350
	4	2 ³ / ₈		2 ¹ / ₂	390	450	470	600	470	600
	5	3		3 ¹ / ₂						
	6	2 ³ / ₄		4 ¹ / ₂						

SI: 1 in = 25.4 mm, 1 lb = 4.45 N
 HF = Hemlock-Fir, SPF = Spruce-Pine-Fir, DF = Douglas Fir, SP = Southern Pine, SCL = Structural Composite Lumber, Z_{Perp} = lateral design value for connection with wood members loaded perpendicular to grain, Z_{Para} = lateral design value for connection with wood members loaded parallel to grain.

- Reference lateral design values apply to two-member single shear connections where both members are of the same specific gravity, and the fastener is oriented perpendicular to grain. Where the members are of different specific gravities, use the lower of the two.
- Values shall be adjusted by all applicable adjustment factors per NDS.

6.3.2 Reference lateral design loads for countersunk fasteners are provided in **Table 4**.

6.3.2.1 Countersunk depth shall not exceed 1/2".

Table 4. Starborn Structural Screws Reference Lateral Design Values^{1,2} (Z) – Countersunk Installation

Product Name	Fastener Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Main Member Penetration (in)	Lateral Design Values (lb) by Species (Specific Gravity) and Load Orientation					
					HF/SPF (0.42)		DF/SP (0.50)		SCL (0.50)	
					Z _{Perp}	Z _{Para}	Z _{Perp}	Z _{Para}	Z _{Perp}	Z _{Para}
Structural F23 Stainless	2 ⁷ / ₈	1.4	1 ¹ / ₂	1 ³ / ₈	285	290	395	455	395	455
	4	2 ³ / ₈		2 ¹ / ₂	380	330	490	465	490	465
	5	3		3 ¹ / ₂						
	6	2 ³ / ₄		4 ¹ / ₂						

SI: 1 in = 25.4 mm, 1 lb = 4.45 N
 HF = Hemlock-Fir, SPF = Spruce-Pine-Fir, DF = Douglas Fir, SP = Southern Pine, SCL = Structural Composite Lumber, Z_{Perp} = lateral design value for connection with wood members loaded perpendicular to grain, Z_{Para} = lateral design value for connection with wood members loaded parallel to grain.

- Reference lateral design values apply to two-member single shear connections where both members are of the same specific gravity, and the fastener is oriented perpendicular to grain. Where the members are of different specific gravities, use the lower of the two.
- Values shall be adjusted by all applicable adjustment factors per NDS.



6.4 *Starborn Structural Screws Reference Withdrawal Design Values (W)*

- 6.4.1 Design provisions for withdrawal noted in NDS Table 12.2B apply to Starborn Structural Screws, unless otherwise noted in this report.
- 6.4.2 Reference withdrawal design values for Starborn Structural Screws in select lumber species are specified in **Table 5**.
- 6.4.3 Maximum withdrawal design values for Starborn Structural Screws in select lumber species are specified in **Table 6**.

Table 5. Starborn Structural Screws Reference Withdrawal Design Values (W) in Side Grain Applications^{1,2,3,4}

Product Name	Fastener Length (in)	Thread Length (in)	Allowable Withdrawal Design Values by Species (Specific Gravity), (lb/in)					
			HF/SPF (0.42)		DF/SP (0.50)		SCL (0.50)	
			1" Penetration	2" Penetration	1" Penetration	2" Penetration	1" Penetration	2" Penetration
Structural H19	2 ⁷ / ₈	1.4	255	-	340	-	340	-
	4	2 ¹ / ₄	255	300	340	395	340	395
	6	2 ¹ / ₂						
	8							
	10							
Structural F19	2 ⁷ / ₈	2	255	300	340	395	340	395
	4 ¹ / ₂							
	6							
	8							
	10							
	12							
	14							
	16							
Structural H23	4	2 ³ / ₈	280	380	360	445	360	445
	5	3						
Structural F23	2 ⁷ / ₈	1.4	280	-	360	-	360	-
	4	2 ³ / ₈	280	380	360	445	360	445
	5	3						
	6	2 ³ / ₄						
	8							
	10							



Table 5. Starborn Structural Screws Reference Withdrawal Design Values (*W*) in Side Grain Applications^{1,2,3,4}

Product Name	Fastener Length (in)	Thread Length (in)	Allowable Withdrawal Design Values by Species (Specific Gravity), (lb/in)					
			HF/SPF (0.42)		DF/SP (0.50)		SCL (0.50)	
			1" Penetration	2" Penetration	1" Penetration	2" Penetration	1" Penetration	2" Penetration
Structural F23-E	3 ³ / ₈	1.5	280	-	360	-	360	-
	5							
	6 ³ / ₄							
Structural F23-W	2 ⁷ / ₈	1.4	280	-	360	-	360	-
	4 ³ / ₈							
	5 ⁷ / ₈							
Structural F23 Stainless	2 ⁷ / ₈	1.4	190	-	225	-	225	-
	4	2 ³ / ₈		285		335		
	5	3						
	6	2 ³ / ₄						

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

- Values shall be adjusted by all applicable adjustment factors per NDS Section 11.3 for wood screws.
- Fastener penetration is the threaded length embedded in the main member, including the tip.
- For Maximum Allowable Withdrawal Design Values, see **Table 6**.
- Total Allowable Withdrawal Design Value as a function of penetration is determined as follows:
 For penetration ≤ 1"
 $W_{total} (lb) = W_{1''}(p)$
 For penetration > 1"
 $W_{total} (lb) = W_{1''}(1) + (2W_{2''} - W_{1''})(p - 1)$
 where
 $W_{1''}$ = value for withdrawal resistance at 1" penetration from this table [lb/in]
 $W_{2''}$ = value for withdrawal resistance at 2" penetration from this table [lb/in]
 p = penetration [in], value shall be limited to the threaded length if penetration into substrate exceeds fastener thread length.



Table 6. Starborn Structural Screws Maximum Withdrawal Design Values (W_{max}) in Side Grain Applications

Product Name	Fastener Length (in)	Thread Length (in)	Allowable Maximum Withdrawal Design Values by Species ^{1,2} (Specific Gravity), (lb)		
			HF/SPF (0.42)	DF/SP (0.50)	SCL (0.50)
Structural H19	2 ⁷ / ₈	1.4	395	520	520
	4	2 ¹ / ₄	685	905	905
	6	2 ¹ / ₂	775	1,015	1,015
	8				
	10				
Structural F19	2 ⁷ / ₈	2	395	520	520
	4 ¹ / ₂		685	905	905
	6		775	1,015	1,015
	8				
	10				
	12				
	14				
	16				
Structural H23	4	2 ³ / ₈	940	1,090	1,090
	5	3	1,240	1,420	1,420
Structural F23	2 ⁷ / ₈	1.4	470	570	570
	4	2 ³ / ₈	940	1,090	1,090
	5	3	1,240	1,420	1,420
	6	2 ³ / ₄	1,120	1,290	1,290
	8				
	10				
12					
Structural F23-E	3 ³ / ₈	1 ¹ / ₂	520	625	625
	5				
	6 ³ / ₄				
Structural F23-W	2 ⁷ / ₈	1.4	470	570	570
	4 ³ / ₈				
	5 ⁷ / ₈				



Table 6. Starborn Structural Screws Maximum Withdrawal Design Values (W_{max}) in Side Grain Applications

Product Name	Fastener Length (in)	Thread Length (in)	Allowable Maximum Withdrawal Design Values by Species ^{1,2} (Specific Gravity), (lb)		
			HF/SPF (0.42)	DF/SP (0.50)	SCL (0.50)
Structural F23 Stainless	2 ⁷ / ₈	1.4	265	315	315
	4	2 ³ / ₈	450	535	535
	5	3	570	675	675
	6	2 ³ / ₄	525	620	620

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

- Values shall be adjusted by all applicable adjustment factors per NDS Section 11.3 for wood screws.
- Maximum Withdrawal Design Values are based on full thread engagement, including the tip.

6.5 Starborn Structural Screws Head Pull-Through Design Values

6.5.1 Reference design values for head pull-through for Starborn Structural Screws are specified in **Table 7**.

6.5.1.1 Design loads are applicable for flush installation.

Table 7. Starborn Structural Screws Reference Head Pull-Through Design Values (P) – Flush Installation

Side Member Thickness	Fastener Type									
	Structural H19		Structural H23		Structural F19		Structural F23		Structural F23 Stainless	
	HF/SPF (0.42)	DF/SP (0.50)	HF/SPF (0.42)	DF/SP (0.50)	HF/SPF (0.42)	DF/SP (0.50)	HF/SPF (0.42)	DF/SP (0.50)	HF/SPF (0.42)	DF/SP (0.50)
1 ¹ / ₂ "	405	600	775	1,075	855	975	970	1,210	445	630
1 ¹ / ₈ "	400	595	580	805	640	730	730	905	400	565
1"	355	525	515	715	570	650	645	805	385	545
3 ⁴ / ₄ "	265	395	385	540	430	490	485	605	270	385
2 ³ / ₃₂ "	255	380	370	515	410	465	465	580	255	365
5 ⁸ / ₈ "	225	330	325	450	355	405	405	505	215	300
1 ⁹ / ₃₂ "	210	315	305	425	340	385	385	480	200	280
1 ¹ / ₂ "	180	265	260	360	285	325	325	405	155	220
1 ⁵ / ₃₂ "	165	245	240	335	265	305	305	380	145	200
7 ¹ / ₁₆ "	155	230	225	315	250	285	285	355	130	180
3 ⁸ / ₈ "	135	200	195	270	215	245	245	305	100	140

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

- Tabulated values are for a standard load duration. Values shall be factored by all applicable modification factors per NDS for wood screws.
- For structural composite lumber and wood structural panels, use the assigned specific gravity for the product and use the corresponding lumber design value shown above.



6.5.2 Reference head pull-through design loads for countersunk fasteners are provided in **Table 8**.

6.5.2.1 Countersunk depth shall not exceed 1/2".

Table 8. Starborn Structural Screws Reference Head Pull-Through Design Values (P) – Countersunk Installation

Side Member Thickness	Fastener Type	
	Structural F23 Stainless	
	HF/SPF (0.42)	DF/SP (0.50)
1 1/2"	385	545

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

- Tabulated values are for a standard load duration. Values shall be factored by all applicable modification factors per NDS for wood screws.
- For structural composite lumber and wood structural panels, use the assigned specific gravity for the product and use the corresponding lumber design value shown above.

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

7 Certified Performance²³

- 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.²⁴
- 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.²⁵

8 Regulatory Evaluation and Accepted Engineering Practice

- Starborn Structural Screws comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:
 - Bending yield in accordance with ASTM F1575
 - Tensile strength in accordance with AISI S904
 - Shear strength in accordance with AISI S904
 - Lateral strength in accordance with ASTM D1761
 - Withdrawal strength in accordance with ASTM D1761
 - Head pull-through strength in accordance with ASTM D1761
 - Corrosion resistance of fasteners with the proprietary black exterior coating meeting or exceeding the protection afforded hot dipped galvanized fasteners in accordance with ASTM A153
- Use of fasteners with the proprietary coatings (i.e., black exterior coating and the gray e-coat) in locations exposed to saltwater or saltwater spray is outside the scope of this report.



- 8.3 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 qualified²⁶ to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.
- 8.4 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.
- 8.5 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 Starborn Structural Screws shall be installed using a high-torque, low-speed drill in accordance with the manufacturer installation instructions.
 - 9.3.2 The fasteners must be installed using a ⁵/₁₆" hex, ³/₈" hex, T-30 Torx®, or T-40 Torx® driver bit, depending on the fastener used.
 - 9.3.3 Pre-drilling of pilot holes is not required but may be used where lumber is prone to splitting.
 - 9.3.4 All fastener spacing, edge distance, and end distance shall be per **Table 9** and **Table 10**.
 - 9.3.4.1 Location of the distances are shown in **Figure 8**.

Table 9. Starborn Structural Screws Edge and End Distance Requirements for 0.19" Screw

Figure 8 Number	Installed Condition	Minimum Distance or Spacing ^{1,2} (in)		
		Face	Edge	End
1	Minimum End Distance	6	3	13/4
2	Minimum Edge Distance	13/4	3/4	3/4
3	Minimum Spacing Between Fasteners in a Row	27/8	27/8	27/8
4	Minimum Spacing Between Non-Staggered Rows	27/8	NA	NA
5	Minimum Spacing Between Staggered Rows	1/2	NA	NA
6	Minimum Stagger Between Fasteners in Adjacent Rows	1/2	NA	NA

SI: 1 in = 25.4 mm

- 1. Table values based on 0.19" screw.
- 2. 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 the more restrictive.

Table 10. Starborn Structural Screw Edge and End Distance Requirements for 0.23" Diameter Screw

Figure 8 Number	Installed Condition	Minimum Distance or Spacing ^{1,2} (in)		
		Face	Edge	End
1	Minimum End Distance	6	3	1¾
2	Minimum Edge Distance	13/4	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

- Table values based on 0.23" screw.
- 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 the more restrictive.

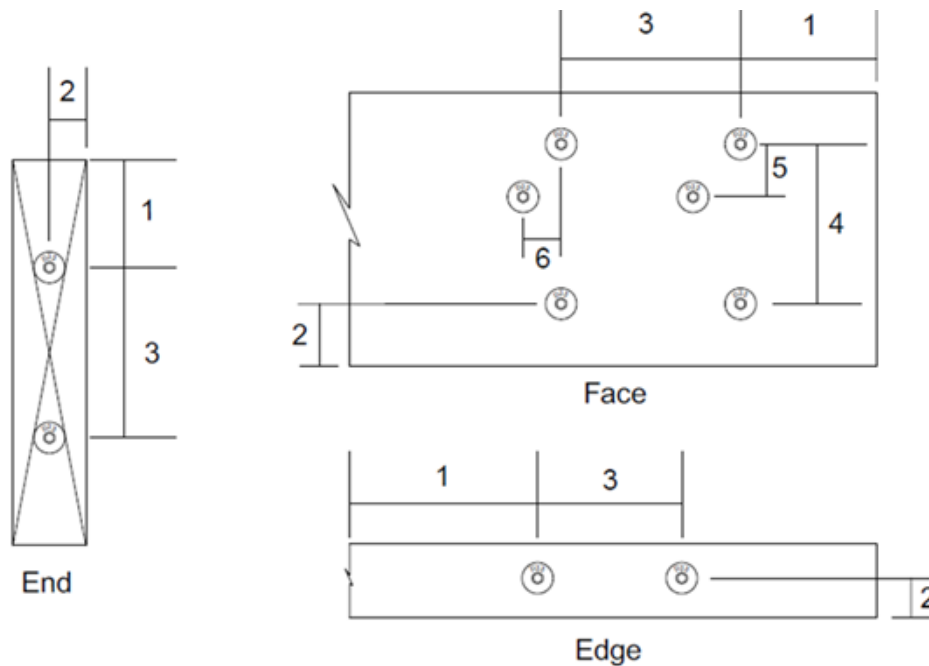


Figure 8. Starborn Structural Screw Spacing Diagram

9.3.5 Minimum penetration is 1", unless otherwise stated in this report. Install fasteners with head flush to the surface of the wood member.



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 Bending yield testing in accordance with ASTM F1575
 - 10.1.2 Tensile strength testing in accordance with AISI S904
 - 10.1.3 Shear strength testing in accordance with AISI S904
 - 10.1.4 Lateral strength testing in accordance with ASTM D1761
 - 10.1.5 Withdrawal strength testing in accordance with ASTM D1761
 - 10.1.6 Head pull-through strength testing in accordance with ASTM D1761
- 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.²⁷
- 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 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 Screws shall be approved for the following applications:
- 11.2.1 Starborn Structural Screws are a suitable alternative to the requirements of IBC Section 1604.8.3 and IRC Section R507.9.²⁸
 - 11.2.2 These products 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 104.11 (IRC Section R104.11 and IFC Section 104.10²⁹ 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:**³⁰ Building regulations require that the building official shall accept duly authenticated reports.³¹
- 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.³²

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:
- 12.3.1 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 With the exception of Starborn F23 Stainless Structural Screws, use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report.
- 12.6 Manufacturer installation instructions shall be followed as provided in **Section 9**.
- 12.7 Starborn Structural Screws are produced by Starborn Industries, Inc. at its facilities located in Edison, New Jersey.
- 12.8 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.
- 12.9 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:
- 12.9.1 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.
- 12.9.2 This report and the installation instructions shall be submitted at the time of permit application.
- 12.9.3 These innovative products have an internal quality control program and a third-party quality assurance program.



- 12.9.4 At a minimum, these innovative products shall be installed per **Section 9** of this report.
- 12.9.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.
- 12.9.6 These innovative products have 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.
- 12.9.7 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.
- 12.10 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.
- 12.11 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).
- 12.12 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 products 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 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 Screws (H19 Screws, F19 Screws, H23 Screws, F23 Screws, F23-E Screws, F23-W Screws, and F23 Stainless 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 these innovative products 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),³³ where providing test reports, engineering analysis, and/or other related IP/TS is subject to prison of not more than ten years³⁴ and/or a \$5,000,000 fine or 3 times the value of³⁵ 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 materials³⁶ 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.³⁷
 - 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 104.11.³⁸



- 1.3 **Approved³⁹ 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.⁴⁰ 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 1707.1.⁴¹
- 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 deemed⁴² 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 agreement⁴³ (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](#),⁴⁴ 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)*”.⁴⁵ 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](#)⁴⁶ and [Part 3280](#),⁴⁷ 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.⁴⁸
 - 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.⁴⁹
 - 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.⁵⁰
 - 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.⁵¹
- 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.⁵²
 - 1.11.4 Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.⁵³
- 1.12 Approval equity is a fundamental commercial and legal principle.⁵⁴



Issue Date: January 11, 2021
Subject to Renewal: January 1, 2026

FBC Supplement to Report Number 1703-05

REPORT HOLDER: Starborn® Industries, Inc.

1 Evaluation Subject

1.1 Starborn Structural Screws:

- 1.1.1 Starborn Structural H19 Screws, Starborn Structural F19 Screws, Starborn Structural H23 Screws, Starborn Structural F23 Screws, Starborn Structural F23-E Screws, Starborn Structural F23-W Screws, and Starborn Structural F23 Stainless Screws

2 Purpose and Scope

2.1 Purpose

- 2.1.1 The purpose of this Report Supplement is to show Starborn Structural Screws, recognized in Report Number 1703-05, have also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

2.2 *Applicable Code Editions*

- 2.2.1 *FBC-B—20, 23: Florida Building Code – Building (FL 30525)*
- 2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL 30525)*

3 Conclusions

- 3.1 Starborn Structural Screws, described in Report Number 1703-05, comply with the FBC-B and FBC-R and are subject to the conditions of use described in this supplement.
- 3.2 Where there are variations between the IBC and IRC and the FBC-B and FBC-R applicable to this report, they are listed here:
 - 3.2.1 FBC-B Section 104.4 and Section 110.4 are reserved.
 - 3.2.2 FBC-R Section R104 and Section R109 are reserved.

4 Conditions of Use

- 4.1 Starborn Structural Screws, described in Report Number 1703-05, must comply with all of the following conditions:
 - 4.1.1 All applicable sections in Report Number 1703-05.
 - 4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.



Issue Date: November 8, 2021
Subject to Renewal: January 1, 2026

LABC and LARC Supplement to Report Number 1703-05

REPORT HOLDER: Starborn® Industries, Inc.

1 Evaluation Subject

1.1 Starborn Structural Screws:

- 1.1.1 Starborn Structural H19 Screws, Starborn Structural F19 Screws, Starborn Structural H23 Screws, Starborn Structural F23 Screws, Starborn Structural F23-E Screws, Starborn Structural F23-W Screws, and Starborn Structural F23 Stainless Screws

2 Purpose and Scope

2.1 Purpose

- 2.1.1 The purpose of this Report Supplement is to show Starborn Structural Screws, recognized in Report Number 1703-05, have also been evaluated for compliance with the codes listed below as adopted by the Los Angeles Department of Building and Safety (LADBS).

2.2 *Applicable Code Editions*

- 2.2.1 *LABC—20, 23: Los Angeles Building Code*
- 2.2.2 *LARC—20, 23: Los Angeles Residential Code*

3 Conclusions

- 3.1 Starborn Structural Screws, described in Report Number 1703-05, comply with the LABC and LARC and is subject to the conditions of use described in this supplement.
- 3.2 Where there are variations between the IBC and IRC and the LABC and LARC applicable to this report, they are listed here:
 - 3.2.1 LABC Section 104.2.6 replaces IBC Section 104.11
 - 3.2.2 LABC Section 104.2.2 replaces IBC Section 104.4
 - 3.2.3 LABC Section 108 replaces IBC Section 110.4
 - 3.2.4 LABC Section 108.5 replaces IBC Section 110.3
 - 3.2.5 LARC Section 104.2.6 replaces IRC Section R104.11
 - 3.2.6 LARC Section 104.2.2 replaces IRC Section R104.4
 - 3.2.7 LARC Section 108 replaces IRC Section R109.2
 - 3.2.8 LARC Section 108.5 replaces IRC Section R109.1

4 Conditions of Use

- 4.1 Starborn Structural Screws, described in Report Number 1703-05, must comply with all of the following conditions:
 - 4.1.1 All applicable sections in Report Number 1703-05.
 - 4.1.2 The design, installation, and inspections are in accordance with additional requirements of LABC Chapter 16 and Chapter 17, as applicable.



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.cbittest.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%20design%20or%20method%20of%20construction%20is%20not%20approved%20the%20building%20official%20shall%20respond%20in%20writing%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%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%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.eu/en/about-iaf>:-: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%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 All references to the FBC-B and FBC-R are the same as the 2021 IBC and 2021 IRC unless otherwise noted in the Florida Supplement at the end of this report.
- 21 All references to the LABC and LARC are the same as the 2021 IBC and 2021 IRC unless otherwise noted in the LABC and LARC Supplement at the end of this report.
- 22 <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#labeled>
- 23 <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4>
- 24 <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%20livable%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades
- 25 <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
- 26 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.
- 27 See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.
- 28 [2015 IRC Section R507.2](#)
- 29 [2018 IFC Section 104.9](#)
- 30 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.



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

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

33 <http://www.drjengineering.org/AppendixC> AND <https://www.drjcertification.org/comell-2016-protection-trade-secrets>

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

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

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

37 IBC 2021, Section 1706.1 Conformance to Standards

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

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

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

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

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

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

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

45 <https://www.nj.gov/dca/divisions/codes/codreg/ucc.html>

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

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

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

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

50 <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/>

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

52 <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>

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

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