Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

Report No: 2010-02

Issue Date: December 16, 2021

Revision Date: March 4, 2026

Subject to Renewal: January 1, 2027

SPAX® Construction Screw Properties

Trade Secret Report Holder:

Altenloh, Brinck & Company US, Inc.

Phone: 419-636-6715 Website: spax.us

CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 00 90 - Wood and Plastic Fastenings

Section: 06 05 23 - Wood, Plastic, and Composite Fastenings

1 Innovative Products Evaluated[1]

1.1 #6, #8, #9, #10, and #14 SPAX Construction Screws

2 Product Description and Materials

2.1 SPAX Construction Screws are made of hardened carbon steel conforming to ASTM A510 or DIN 1654. Select Construction Screws are made of 304 or 316 stainless steel conforming to ASTM A493 or DIN 17440.

2.2 The fasteners are available with a variety of coatings, including proprietary coating systems designated as zinc, yellow zinc, HCR®, HCR-X™, and WIROX®.

2.3 SPAX Construction Screws are available in a variety of sizes with different diameters, head types, and lengths.

2.3.1 #6 SPAX Construction Screws are shown in **Figure 1** and are defined in **Table 1**.

2.3.2 #8 SPAX Construction Screws are shown in **Figure 2** and are defined in **Table 2**.

2.3.3 #9 SPAX Construction Screws are shown in **Figure 3** and are defined in **Table 3**.

2.3.4 #10 SPAX Construction Screws are shown in **Figure 4** and are defined in **Table 4**.

2.3.5 #14 SPAX Construction Screws are shown in **Figure 5** and are defined in **Table 5**.

RYAN JOSEPH DEXTER LICENSE No. 69484 STATE OF FLORIDA PROFESSIONAL ENGINEER

DrJ Engineering, LLC

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Certificate of Authorization #29766

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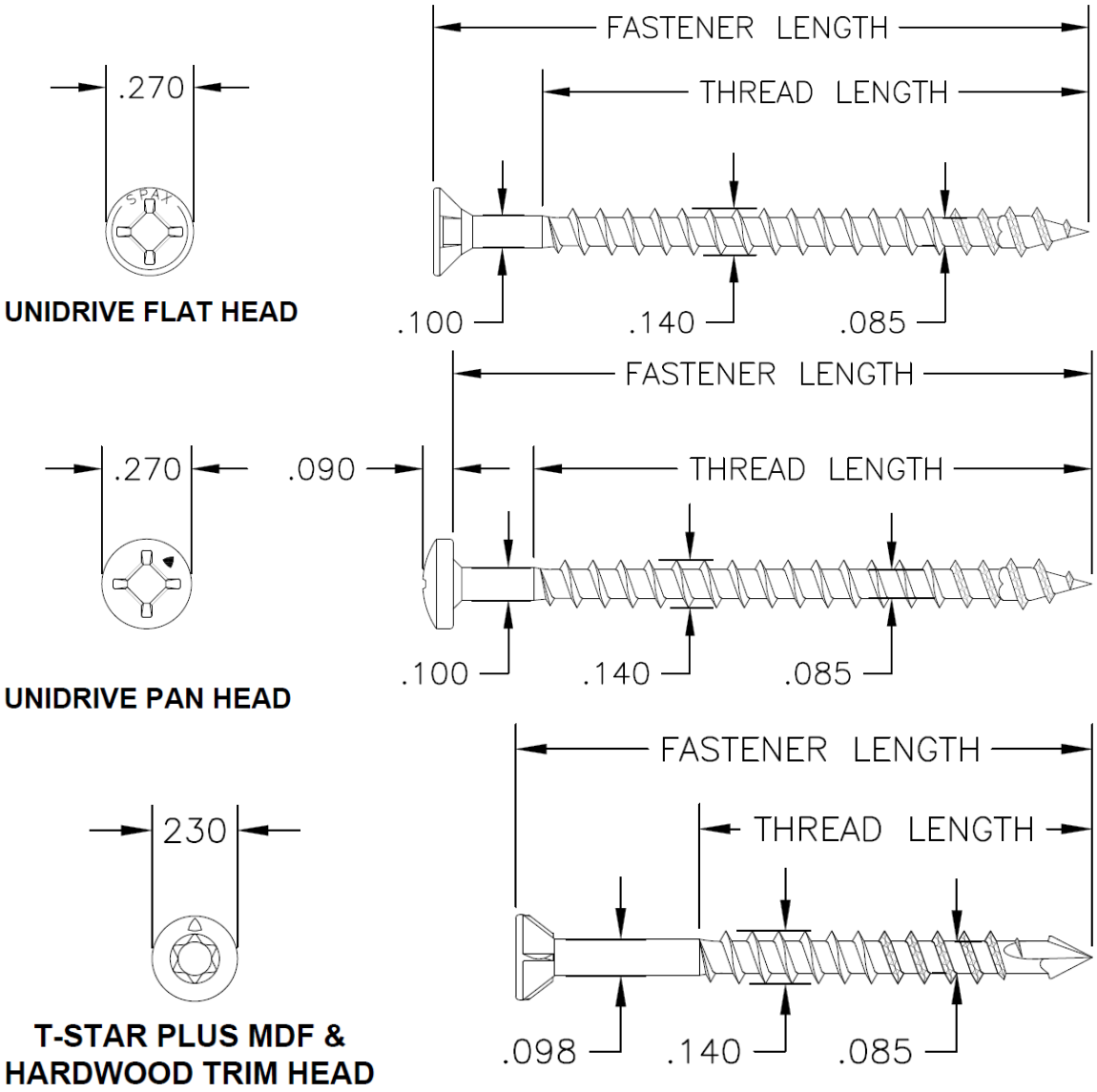

Figure 1. #6 SPAX Construction Screws

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Table 1. #6 SPAX Construction Screws Specifications[5]

Fastener Desig-nation	Part No.	Head				Length (in)		Diameter (in)			TPI	Bending Yield Strength,[3] F_{yb} (psi)	Allowable Steel Strength (lbs)	
		Style	Drive System	Diameter (in)	Height (in)	Fastener[1]	Thread[2]	Shank	Minor	Major			Tensile	Shear[4]
Carbon Steel														
#6 x 3/4"	XFU06-0750	Flat	Unidrive (#2 Cross and #1 Square)	0.270	N/A	0.750	Full	0.100	0.085	0.140	12	198,000	310	265
#6 x 1"	XFU06-1000					1.000								
#6 x 1 1/4"	XFU06-1250					1.250								
#6 x 1 1/2"	XFU06-1500					1.500								
#6 x 1 3/4"	XFU06-1750					1.750	1.575	0.100	0.085	0.140	12	198,000	310	265
#6 x 2"	XFU06-2000					2.000								
#6 x 3/4"	XPU06-0750	Pan	Unidrive (#2 Cross and #1 Square)	0.270	0.090	0.750	Full	0.100	0.085	0.140	12	198,000	310	265
#6 x 1 1/2"	XMT06-1500	MDF/ Hard-wood Trim	T15 T-Star Plus	0.230	N/A	1.5	1.06	0.098	0.085	0.140	14	196,000	270	270

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

1. Fastener length is measured from the topside of the head to the tip for flat and MDF/hardwood trim screws and from the underside of the head to the tip for the pan screws.
2. Thread length includes tapered tip (**Figure 1**).
3. Bending yield strength, F_{yb}, is determined in accordance with ASTM F1575 using minor thread diameter when fastener is tested in the threaded section.
4. Shear strength is determined in accordance with AISI S904 using minor thread diameter when fastener is tested in the threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

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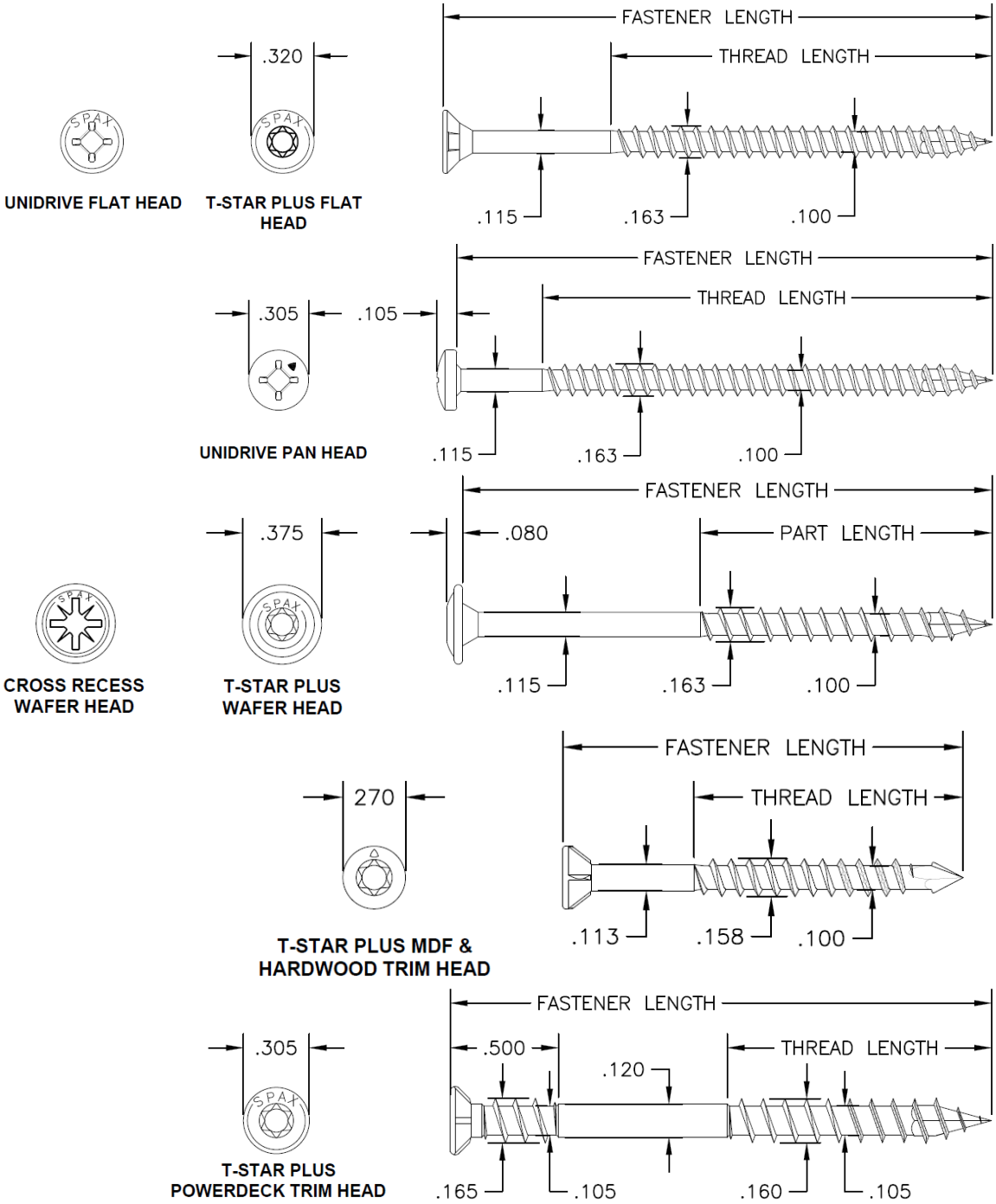

Figure 2. #8 SPAX Construction Screws

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Table 2. #8 SPAX Construction Screws Specifications5

Fastener Designation	Part No.	Head				Length (in)		Diameter (in)			TPI	Bending Yield Strength,[3] F_{yb} (psi)	Allowable Steel Strength (lbs)	
		Style	Drive System	Diameter (in)	Height (in)	Fastener[1]	Thread[2]	Shank	Minor	Major			Tensile	Shear[4]
Carbon Steel														
#8 x 1 1/4"	XFT08P-1250	Flat	T20 T-Star Plus	0.320	N/A	1.250	0.670	0.115	0.100	0.163	11	187,000	460	345
#8 x 1 1/2"	XFT08P-1500					1.500	0.865							
#8 x 2"	XFT08P-2000					2.000	1.240							
#8 x 2 1/2"	XFT08P-2500					2.500	1.340							
#8 x 1"	XFU08-1000		#2 Unidrive			1.000	Full	0.115	0.100	0.163	11	187,000	460	345
#8 x 1 1/4"	XFU08-1250					1.250								
#8 x 1 1/2"	XFU08-1500					1.500								
#8 x 1 3/4"	XFU08-1750					1.750								
#8 x 2"	XFU08-2000					2.000								
#8 x 2 1/2"	XFU08-2500					2.500	1.970							
#8 x 1"	XPU08-1000	Pan	#2 Unidrive	0.305	0.102	1.000	Full	0.115	0.100	0.163	11	187,000	460	345
#8 x 1 1/4"	XPU08-1250					1.250								
#8 x 1 1/2"	XPU08-1500					1.500								
#8 x 2"	XPU08-2000					2.000								
#8 x 1 1/4"	XWP08-1250	Wafer	#2 Cross	0.375	0.080	1.250	Full	0.115	0.100	0.163	11	187,000	460	345
#8 x 1 1/4"	XWT08P-1250		T20 T-Star Plus			1.250	0.670							
#8 x 1 1/2"	XWT08P-1500					1.500	0.875							
#8 x 2"	XWT08P-2000					2.000	1.250							
#8 x 2 1/2"	XWT08P-2500					2.500	1.375							
#8 x 1 3/4"	XMT08-1750	MDF/ Hard-wood Trim	T20 T-Star Plus	0.270	N/A	1.750	1.160	0.113	0.100	0.158	12.5	171,000	340	305
#8 x 2 1/2"	XMT08-2500					2.500	1.495							
Stainless Steel														
#8 x 1 5/8"	XDT08-SS	Power Deck Trim	T20 T-Star Plus	0.305	N/A	1.625	0.700	0.120	0.105	0.160	11	110,000	355	340

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

1. Fastener length is measured from the topside of the head to the tip for flat, MDF/hardwood trim, and PowerDeck® screws and from the underside of the head to the tip for the pan and wafer screws.
2. Thread length includes tapered tip (**Figure 2**).
3. Bending yield strength, F_{yb}, is determined in accordance with ASTM F1575 using minor thread diameter when fastener is tested in the threaded section.
4. Shear strength is determined in accordance with AISI S904 using minor thread diameter when fastener is tested in the threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

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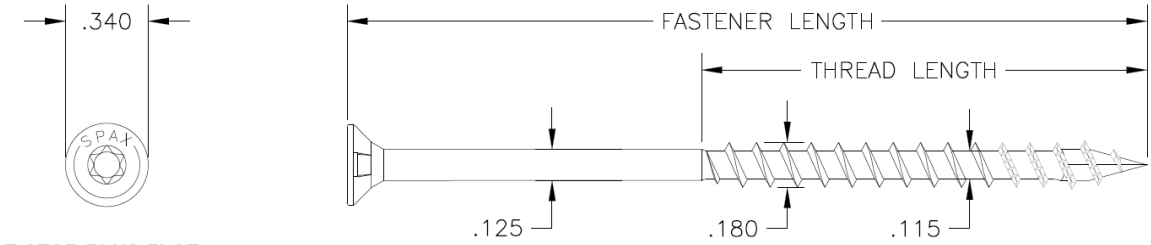

T-STAR PLUS FLAT HEAD

Figure 3. #9 SPAX Construction Screw

Table 3. #9 SPAX Construction Screws Specifications[5]

Fastener Designation	Part No.	Head				Length (in)		Diameter (in)			TPI	Bending Yield Strength,[3] F_{yb}	Allowable Steel Strength (lbs)	
		Style	Drive System	Diameter (in)	Height (in)	Fastener[1]	Thread[2]	Shank	Minor	Major			Tensile	Shear[4]
Carbon Steel														
#9 x 2 1/2"	XFT09P-2500	Flat	T20 T-Star Plus	0.340	N/A	2.500	1.655	0.125	0.115	0.180	9.5	201,000	540	435
#9 x 3 1/4"	XFT09P-3250					3.250	1.810							
Stainless Steel														
#9 x 1 1/2"	XFT09-1500	Flat	T20 T-Star Plus	0.340	N/A	1.500	1.000	0.125	0.115	0.180	9.5	129,000	395	380
#9 x 2"	XFT09-2000					2.000	1.280							

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

1. Fastener length is measured from the topside of the head to the tip.
2. Thread length includes tapered tip (**Figure 3**).
3. Bending yield strength, F_{yb}, is determined in accordance with ASTM F1575 using minor thread diameter when fastener is tested in the threaded section.
4. Shear strength is determined in accordance with AISI S904 using minor thread diameter when fastener is tested in the threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

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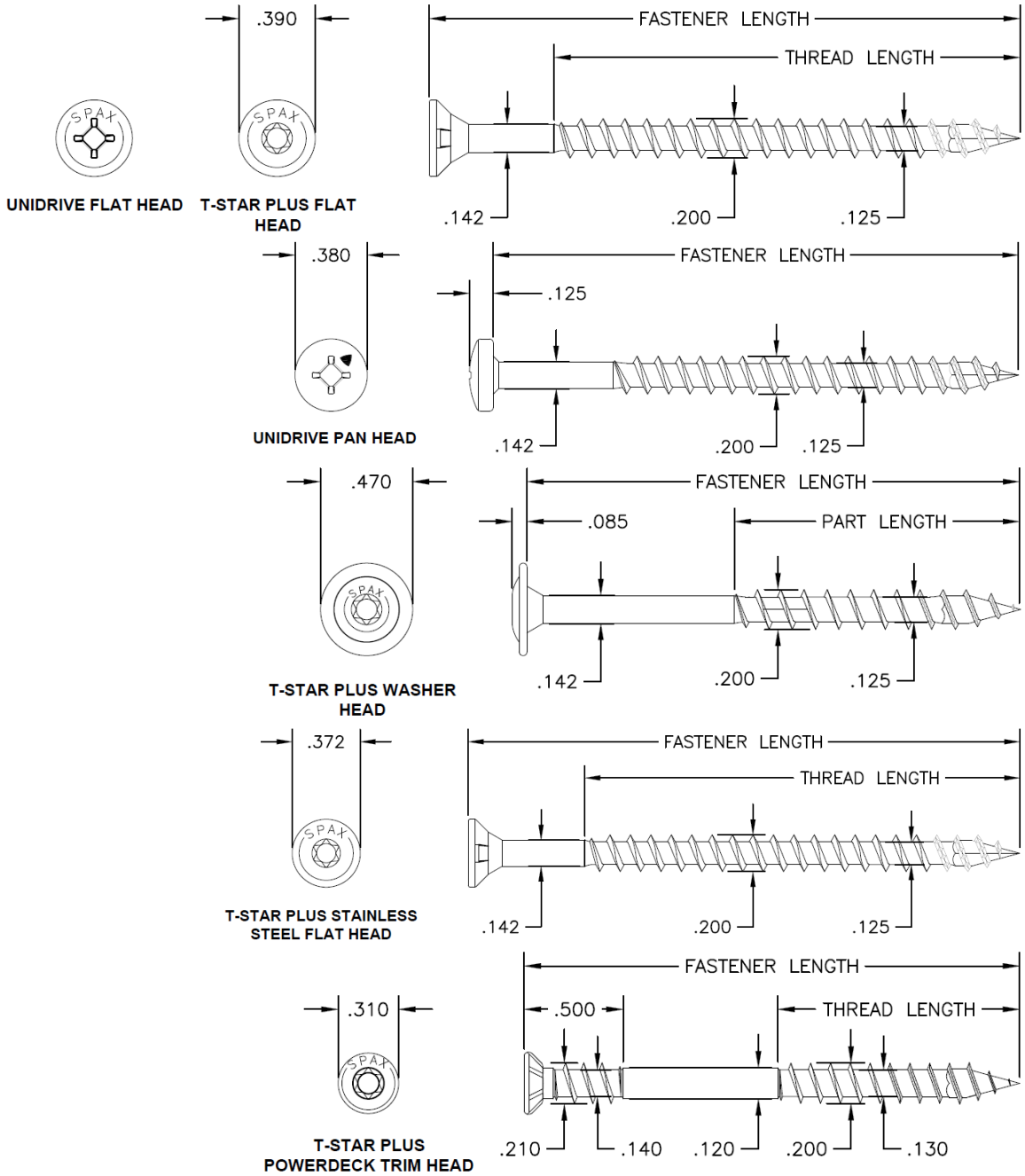

Figure 4. #10 SPAX Construction Screws

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Table 4. #10 SPAX Construction Screws Specifications[5]

Fastener Designation	Part No.	Head				Length (in)		Diameter (in)			TPI	Bending Yield Strength,[3] F_{yb} (psi)	Allowable Steel Strength (lbs)	
		Style	Drive System	Diameter (in)	Height (in)	Fastener[1]	Thread[2]	Shank	Minor	Major			Tensile	Shear[4]
Carbon Steel														
#10 x 1 1/2"	XFT10P-1250	Flat	T20 T-Star Plus	0.390	N/A	1.500	1.000	0.142	0.125	0.200	8.5	187,000	690	545
#10 x 2"	XFT10P-2000					2.000	1.250							
#10 x 2 1/2"	XFT10P-2500					2.500	1.600							
#10 x 2 3/4"	XFT10P-2750					2.750								
#10 x 3"	XFT10P-3000					3.000								
#10 x 3 1/2"	XFT10P-3500					2.500	2.375							
#10 x 1"	XFU10-1000		#2 Unidrive	0.390	N/A	1.000	Full	0.142	0.125	0.200	8.5	187,000	690	545
#10 x 1 1/4"	XFU10-1250					1.250								
#10 x 1 1/2"	XFU10-1500					1.500								
#10 x 2"	XFU10-2000					2.000								
#10 x 2 1/2"	XFU10-2500					2.500	2.275							
#10 x 3"	XFU10-3000					3.000	2.375							
#10 x 3 1/2"	XFU10-3500					3.500								
#10 x 5/8"	XPU10-0625	Pan	#2 Unidrive	0.380	0.125	0.625	Full	0.142	0.125	0.200	8.5	187,000	690	545
#10 x 1"	XPU10-1000					1.000								
#10 x 2 1/2"	XWT10-2500	Washer	T20 T-Star Plus	0.470	0.085	2.500	1.500	0.142	0.125	0.200	8.5	187,000	690	545
#10 x 3"	XWT10-3000					3.000	1.625							
Stainless Steel														
#10 x 2 1/2"	XFT10-2500-SS	Flat	T20 T-Star Plus	0.372	N/A	2.375	1.450	0.142	0.125	0.200	8.5	126,000	480	440
#10 x 3"	XFT10-3000-SS					3.000	1.600							
#10 x 2 1/2"	XDT10-2500-SS	Power-Deck Trim	T20 T-Star Plus	0.310	N/A	2.500	1.260	0.155	0.130	0.200	8.5	129,000	485	455
#10 x 3"	XDT10-3000-SS					3.000	1.540							
#10 x 3 1/2"	XDT10-3500-SS					3.500	1.610							

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

1. Fastener length is measured from the topside of the head to the tip for flat and PowerDeck screws and from the underside of the head to the tip for the pan and washer screws.
2. Thread length includes tapered tip (**Figure 4**).
3. Bending yield strength, F_{yb}, is determined in accordance with ASTM F1575 using minor thread diameter when fastener is tested in the threaded section.
4. Shear strength is determined in accordance with AISI S904 using minor thread diameter when fastener is tested in the threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

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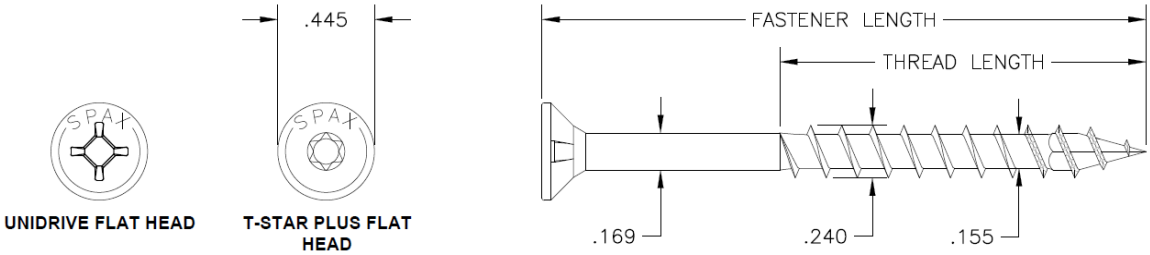

Figure 5. #14 SPAX Construction Screw

Table 5. #14 SPAX Construction Screws Specifications[5]

Fastener Designation	Part No.	Head				Length (in)		Diameter (in)			TPI	Bending Yield Strength,[3] F_{yb} (psi)	Allowable Steel Strength (lbs)	
		Style	Drive System	Diameter (in)	Height (in)	Fastener[1]	Thread[2]	Shank	Minor	Major			Tensile	Shear[4]
Carbon Steel														
#14 x 1¼"	XFT14-1000	Flat	T30 T-Star Plus or Unidrive	0.445	N/A	1.250	0.925	0.169	0.155	0.240	7	160,000	990	750
#14 x 1½"	XFT14-1500					1.500	1.240							
#14 x 2"	XFT14-2000					2.000	1.675							
#14 x 2½"	XFT14P-2500					2.500	1.595							
#14 x 3"	XFT14P-3000					3.000								
#14 x 3½"	XFT14P-3500					3.500	2.385							
#14 x 4"	XFT14P-4000					4.000								
#14 x 4¾"	XFT14P-4750					4.750	2.660							

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

1. Fastener length is measured from the topside of the head to the tip.
2. Thread length includes tapered tip (**Figure 5**).
3. Bending yield strength, F_{yb}, is determined in accordance with ASTM F1575 using minor thread diameter when fastener is tested in the threaded section.
4. Shear strength is determined in accordance with AISI S904 using minor thread diameter when fastener is tested in the threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

2.4 *Fastener Material*

2.4.1 SPAX Construction Screws are made of hardened carbon steel grade 10B18 wire conforming to ASTM A510 or stainless steel Grade 316 wire.

2.5 *Corrosion Resistance*

2.5.1 *Interior Wood Applications:*

2.5.1.1 SPAX Construction Screws, having the proprietary coatings, are equivalent to the protection provided by code-approved hot-dipped galvanized coatings meeting ASTM A153, Class D (IBC Section 2304.10.6 and IRC Section R304.3[2]), when recognized for use by the American Wood Protection Association in untreated wood and above ground contact pressure-treated wood for interior, dry/damp general construction applications (e.g., ABOVE GROUND AWPA UC1-UC2).

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2.5.2 *Exterior Wood Applications:*

2.5.2.1 SPAX Construction Screws, having the proprietary coatings, are equivalent to the protection provided by code-approved hot-dipped galvanized coatings meeting ASTM A153, Class D (IBC Section 2304.10.6 and IRC Section R304.3[3]), when recognized for use by the American Wood Protection Association in untreated wood and above ground contact pressure-treated wood for exterior, freshwater, general construction applications (e.g., GROUND CONTACT AWPA UC1 UC4A).

2.5.3 *Stainless Steel Wood Applications:*

2.5.3.1 Stainless Steel SPAX Construction Screws meet the material requirements in ASTM F1667 per IBC Section 2304.10.6 and IRC Section R304.3,[4] and are recognized for use in untreated, preservative treated and fire-retardant treated wood in interior and exterior applications.

2.5.4 *Fire-Retardant Treated (FRT) Wood Applications:*

2.5.4.1 SPAX Construction Screws proprietary coating systems designated as zinc, yellow zinc, HCR, HCR-X, and WIROX are recognized for use in FRT lumber provided the conditions set forth by the FRT lumber manufacturer be met, including appropriate strength reductions.

2.6 *Wood Material*

2.6.1 Wood main and side members must be solid-sawn lumber or OSB or plywood boards having an assigned specific gravity as given in the respective tables of this report. Assigned specific gravity must be determined in accordance with NDS Table 12.3.3A.

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

3 Definitions[5]

3.1 New Materials[6] 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.[7] The design strength and permissible stresses shall be established by tests[8] and/or engineering analysis.[9]

3.2 Duly authenticated reports[10] and research reports[11] are test reports and related engineering evaluations that are written by an approved agency[12] and/or an approved source.[13]

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).[14]

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.[15]

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[16] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[17] 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[18] 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.[19]

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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.[20] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[21] 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.[22]

4 Applicable Local, State, and Federal Approvals; Standards; Regulations[23]

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, Texas Department of Insurance, and Wichita.[24]

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.[25]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[26] and Part 3280[27] 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 *Standards*

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

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

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

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

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

4.2.6 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*

4.2.7 *ASTM F1575-21: Standard Test Method for Determining Bending Yield Moment of Nails*

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

4.2.9 *DIN (Deutsches Institut fur Normung E.V.) 1654: Cold Heading & Cold Extruding Steels; Technical Delivery Conditions for Stainless Steels*

4.2.10 *DIN 17440: Technical Delivery Conditions for Stainless Steel Plate, Hot Rolled Strip and bars for Pressure Purposes, Drawn Wire and Forgings*

4.3 *Regulations*

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

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

4.3.3 *FBC-B—20, 23: Florida Building Code[28] – Building (FL 40711)*

4.3.4 *FBC-R—20, 23: Florida Building Code[28] – Residential (FL 40711)*

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5 Listed[29]

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 SPAX Construction Screws are used to attach wood framing members in conventional light-frame construction and provide resistance against head pull-through, withdrawal, and shear loads.

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

6.3 *Design*

6.3.1 Design of SPAX Construction Screws is governed by the applicable code and the provisions for dowel type fasteners in the NDS.

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

6.4 *Head Pull-Through Design Values*

6.4.1 Reference design values for head pull-through for SPAX Construction Screws are specified in **Table 6** for OSB and plywood, and **Table 7** for sawn lumber.

6.4.2 Reference design values for head pull-through for XFT14P-4000 fasteners are specified in **Table 8**.

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Table 6. Reference Pull-Through Design Values (P) for SPAX Construction Screws – OSB and Plywood

Fastener Series	Head Style	Reference Pull-Through Design Value,[1,2,3] P (lbf)									
		Plywood Thickness (Specific Gravity)						OSB Thickness (Specific Gravity)			
		1/8" (0.33)	1/4" (0.39)	11/32" (0.39)	15/32" (0.39)	19/32" (0.39)	23/32" (0.50)	7/16" (0.50)	15/32" (0.50)	19/32" (0.50)	23/32" (0.50)
Carbon Steel											
#6	MDF/Hardwood Trim	17	52	52	57	63	114	34	40	45	45
#8	Flat	21	59	74	120	120	212	65	68	78	110
	Wafer	28	76	88	146	190	319	62	86	110	131
	MDF/Hardwood Trim	17	58	58	77	80	139	39	53	53	56
#9	Flat	22	59	78	125	145	258	65	68	78	110
#10	Flat	23	79	89	151	177	293	73	78	78	110
	Washer	28	95	103	183	246	322	73	87	126	131
Stainless Steel											
#8	PowerDeck Trim	-	-	69	78	130	145	44	77	91	103
#9	Flat	-	-	69	78	130	145	44	77	91	103
#10	Flat	-	-	69	78	130	145	44	77	91	103
	PowerDeck Trim	-	-	67	78	126	145	44	68	81	88

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

1. Minimum wood member thickness as specified
2. Tabulated pull-through values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
3. For wood species with an assigned specific gravity between 0.33 and 0.39, use the tabulated values for specific gravity of 0.33. For wood species with an assigned specific gravity between 0.39 and 0.50, use the tabulated values for specific gravity of 0.39. For wood species with an assigned specific gravity greater than or equal to 0.50, use the tabulated values for specific gravity of 0.50.

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Table 7. Reference Pull-Through Design Values (P) for SPAX Construction Screws – Sawn Lumber

Fastener Series	Head Style	Reference Pull-Through Design Value,[1,2,3] P (lbf)												
		SPF (G = 0.42)					DF-L (G = 0.50)				SP (G = 0.55)			
		1/4"	3/8"	3/4"	1"	1 1/2"	3/8"	3/4"	1"	1 1/2"	3/8"	3/4"	1"	1 1/2"
Carbon Steel														
#6	Flat	-	-	-	125	-	-	-	150	-	-	-	179	
	MDF/Hardwood Trim	33	48	48	-	-	51	48	-	-	58	82	-	
#8	Flat	54	79	79	-	123	95	104	-	157	95	138	-	157
	Wafer	59	85	201	-	268	118	201	-	297	118	250	-	335
	MDF/Hardwood Trim	39	48	64	-	149	77	79	-	161	77	83	-	240
#9	Flat	59	79	95	-	177	114	188	-	211	114	188	-	303
#10	Flat	63	90	130	-	177	121	188	-	238	121	228	-	315
	Washer	59	112	249	-	338	133	251	-	387	133	265	-	461
Stainless Steel														
#8	PowerDeck Trim	-	-	118	-	118	-	143	-	143	-	168	-	168
#9	Flat	-	-	118	-	118	-	143	-	143	-	168	-	168
#10	Flat	-	-	118	-	118	-	143	-	143	-	168	-	168
	PowerDeck Trim	-	-	129	145	153	-	144	165	165	-	185	190	231

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

1. Minimum wood member thickness as specified
2. Tabulated pull-through values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
3. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity between 0.50 and 0.55, use the tabulated values for specific gravity of 0.50. For wood species with an assigned specific gravity greater than or equal to 0.55, use the tabulated values for specific gravity of 0.55.

Table 8. Head Pull-Through Design Values for XFT14P-4000 Fastener

Member Type (Specific Gravity)[1,2]	Member Description[3]	Head Pull-Through Value[5] (lbs)
SPF[2] (0.42)	Dry	190
	Wet	135
SP[2] (0.55)	Dry	240
	Wet	155
LVL (0.50)[4]	Dry	350

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

1. For wood species with an assigned specific gravity between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than or equal to 0.55, use the tabulated values for specific gravity of 0.55.
2. Minimum thickness is 1.5".
3. The dry service condition is defined as lumber with an in-service moisture content of less than or equal to nineteen percent (19%). The wet service condition is defined as lumber with an in-service moisture content of greater than nineteen percent (19%).
4. LVL member minimum thickness is 1.5". Listed specific gravity is an equivalent specific gravity.
5. Tabulated withdrawal values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.

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6.5 *Reference Withdrawal Design Values in Face Grain Applications*

6.5.1 Reference withdrawal design values for SPAX Construction Screws are specified in **Table 9** for OSB and plywood, and **Table 10** for sawn lumber.

6.5.2 Reference withdrawal design values for XFT14P-4000 fasteners are specified in **Table 11**.

Table 9. Reference Withdrawal Design Values (W) for SPAX Construction Screws – OSB and Plywood

Fastener Series	Head Style	Reference Withdrawal Design Values,[1,2] W (lbf)						
		Plywood Thickness (Specific Gravity)			OSB Thickness (Specific Gravity)			
		15/32" (0.39)	19/32" (0.39)	23/32" (0.50)	7/16" (0.50)	15/32" (0.50)	19/32" (0.50)	23/32" (0.50)
Carbon Steel								
#6	Flat	51	83	134	26	29	36	52
	Pan							
	MDF/Hardwood Trim	46	73	144	29	36	41	41
#8	Flat	51	83	162	26	36	48	52
	Pan							
	Wafer							
	MDF/Hardwood Trim	68	75	179	29	37	41	64
#9	Flat	51	92	186	39	54	54	66
#10	Flat	90	92	186	39	54	54	66
	Pan							
	Washer							
Stainless Steel								
#8	PowerDeck Trim	68	75	179	29	37	41	64
#9	Flat	51	92	186	39	54	54	66
#10	Flat	90	92	186	39	54	54	66
	PowerDeck Trim							

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

1. Applies to withdrawal from face grain only where the screw has full thread penetration in the board.
2. Tabulated withdrawal values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1
3. For wood species with an assigned specific gravity between 0.39 and 0.50, use the tabulated values for specific gravity of 0.39. For wood species with an assigned specific gravity greater than or equal to 0.50, use the tabulated values for specific gravity of 0.50.

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Table 10. Reference Withdrawal Design Values (W) for SPAX Construction Screws – Sawn Lumber

Fastener Series	Head Style	Reference Withdrawal Design Values,[1,2] W (lbf/in)		
		Wood Species (Specific Gravity)[3]		
		SPF (0.42)	DF-L (0.50)	SP (0.55)
Carbon Steel				
#6	Flat	105	133	140
	Pan			
	MDF/Hardwood Trim	64	108	124
#8	Flat	127	133	175
	Pan			
	Wafer			
	MDF/Hardwood Trim	106	114	124
#9	Flat	132	146	190
#10	Flat	144	176	190
	Pan			
	Washer			
Stainless Steel				
#8	PowerDeck Trim	106	114	124
#9	Flat	132	146	190
#10	Flat	144	176	190
	PowerDeck Trim			

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

1. Applies to withdrawal from face grain only.
2. Tabulated withdrawal values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1. A minimum thread penetration of 1" (including the tip) is required to achieve the tabulated loads.
3. Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
4. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity between 0.50 and 0.55, use the tabulated values for specific gravity of 0.50. For wood species with an assigned specific gravity greater than or equal to 0.55, use the tabulated values for specific gravity of 0.55.

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Table 11. Reference Withdrawal Value for XFT14P-4000 Fastener in Face Grain

Member Type (Specific Gravity)[1,2]	Member Service Condition	Penetration[4] into Member (in)	Reference Withdrawal Value (lbs/in)[5,6]
SPF (0.42)	Dry	1	130
	Wet	1	95
SP (0.55)	Dry	1	205
		2	240
	Wet	1	140
		2	170
LVL (0.50)[3]	Dry	1	180
		2	225

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

1. For wood species with an assigned specific gravity between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than or equal to 0.55, use the tabulated values for specific gravity of 0.55.
2. The dry service condition is defined as lumber with an in-service moisture content of less than or equal to nineteen percent (19%). The wet service condition is defined as lumber with an in-service moisture content of greater than nineteen percent (19%).
3. Listed specific gravity is an equivalent specific gravity.
4. Fastener penetration is the threaded length embedded in the wood member, including the tip.
5. The full design withdrawal value (W) in pounds is equal to: $W = w^1 + [w^2 + (w^2 - w^1)] \cdot (L_T - 1)$; where w^1 = reference withdrawal corresponding to 1" penetration, L_T = embedded thread length (minimum 1"), and w^2 = reference withdrawal corresponding to 2" penetration.
6. Tabulated withdrawal values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.

6.6 *Lateral Design Values*

6.6.1 Reference lateral design values for shear load parallel and perpendicular to grain for SPAX Construction Screws are specified in the following tables:

6.6.1.1 *Solid Sawn Main Member with OSB or Plywood Side Member:*

6.6.1.1.1 #6 SPAX Construction Screws: **Table 12**

6.6.1.1.2 #8 SPAX Construction Screws: **Table 13**

6.6.1.1.3 #9 SPAX Construction Screws: **Table 14**

6.6.1.1.4 #10 SPAX Construction Screws: **Table 15**

6.6.1.1.5 #14 SPAX Construction Screws: **Table 16**

6.6.1.2 *Sawn Lumber Main and Side Members:*

6.6.1.2.1 See **Table 17**

6.6.2 See **Section 6.6.3** for lateral reference design values for the XFT14P-4000 fastener.

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Table 12. #6 SPAX Construction Screws Lateral Design Values – OSB and Plywood Side Member

Fastener Designation	Head Style	Minimum Main Member Penetration[2] (in)	Minimum Side Member Thickness (in)	Reference Lateral Shear Value,[1,3,4] Z (lbf)	
				OSB[5] (0.50)	Plywood[5] (0.39)
Carbon Steel					
#6 x 1"	Flat or Pan	9/16	7/16	28	-
		17/32	15/32	28	22
#6 x 1 1/4"		13/16	7/16	35	-
		25/32	15/32	35	29
		21/32	19/32	36	28
		17/32	23/32	38	29
#6 x 1 1/2"		1 1/16	7/16	41	-
		1 1/32	15/32	42	35
		29/32	19/32	42	35
		25/32	23/32	43	34
#6 x 1 3/4"		1 5/16	7/16	41	-
		1 9/32	15/32	42	35
		1 5/32	19/32	46	37
		1 1/32	23/32	50	40
#6 x 2"		1 9/16	7/16	41	-
		1 17/32	15/32	42	35
		1 13/32	19/32	46	37
		1 9/32	23/32	51	40
#6 x 1 1/2"	MDF/Hardwood Trim	1 1/16	7/16	41	-
		1 1/32	15/32	42	35
		29/32	19/32	42	35
		25/32	23/32	43	34

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

1. Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (Specific Gravity = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to grain. The underside of the fastener head shall be installed flush with the surface of the side member.
2. Penetration depth includes the length of tapered tip.
3. Lateral design values apply to both perpendicular to grain ($Z_{\perp}$) and parallel to grain ($Z_{\parallel}$) orientations.
4. Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
5. OSB shall comply with DOC PS 2 and have a minimum specific gravity of 0.50. Plywood shall comply with DOC PS 1 and have a minimum specific gravity of 0.39.

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Table 13. #8 SPAX Construction Screws Lateral Design Values – OSB and Plywood Side Member

Fastener Designation	Head Style	Minimum Main Member Penetration[2] (in)	Minimum Side Member Thickness (in)	Reference Lateral Shear Value,[1,3,4] Z (lbf)	
				OSB[5] (0.50)	Plywood[5] (0.39)
Carbon Steel					
#8 x 1 1/4"	Flat, Pan or Wafer	13/16	7/16	40	-
		25/32	15/32	40	33
		21/32	19/32	42	32
#8 x 1 1/2"		1 1/16	7/16	51	-
		1 1/32	15/32	50	44
		29/32	19/32	49	41
		25/32	23/32	51	39
#8 x 1 3/4"		1 5/16	7/16	53	-
		1 9/32	15/32	54	46
		1 5/32	19/32	59	48
		1 1/32	23/32	58	48
#8 x 2" #8 x 2 1/2"		1 9/16	7/16	53	-
		1 17/32	15/32	54	46
		1 13/32	19/32	59	48
		1 9/32	23/32	64	51
#8 x 1 3/4"	MDF/Hardwood Trim	1 5/16	7/16	51	-
		1 9/32	15/32	52	44
		1 5/32	19/32	57	46
		1 1/32	23/32	59	48
#8 x 2 1/2"		2 1/16	7/16	51	-
		2 1/32	15/32	52	44
		1 29/32	19/32	57	46
		1 25/32	23/32	63	49
Stainless Steel					
#8 x 1 5/8"	PowerDeck Trim	1 3/16	7/16	48	-
		1 5/32	15/32	49	40
		1 1/32	19/32	55	43
		29/32	23/32	55	46

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Table 13. #8 SPAX Construction Screws Lateral Design Values – OSB and Plywood Side Member

Fastener Designation	Head Style	Minimum Main Member Penetration[2] (in)	Minimum Side Member Thickness (in)	Reference Lateral Shear Value,[1,3,4] Z (lbf)	
				OSB[5] (0.50)	Plywood[5] (0.39)

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

1. Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (specific gravity = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to grain. The underside of the fastener head shall be installed flush with the surface of the side member.
2. Penetration depth includes the length of tapered tip.
3. Lateral design values apply to both perpendicular to grain ($Z_{\perp}$) and parallel to grain ($Z_{\parallel}$) orientations.
4. Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
5. OSB shall comply with DOC PS 2 and have a minimum specific gravity of 0.50. Plywood shall comply with DOC PS 1 and have a minimum specific gravity of 0.39.

Table 14. #9 SPAX Construction Screws Lateral Design Values – OSB and Plywood Side Member

Fastener Designation	Head Style	Minimum Main Member Penetration[2] (in)	Minimum Side Member Thickness (in)	Reference Lateral Shear Value,[1,3,4] Z (lbf)	
				OSB[5] (0.50)	Plywood[5] (0.39)
Carbon Steel					
#9 x 2 1/2" #9 x 3 1/4"	Flat	2 1/16	7/16	71	-
		2 1/32	15/32	71	62
		1 29/32	19/32	76	63
		1 25/32	23/32	81	66
Stainless Steel					
#9 x 1 1/2"	Flat	1 1/16	7/16	57	-
		1 1/32	15/32	57	50
		29/32	19/32	56	46
		25/32	23/32	59	45
#9 x 2"		1 9/16	7/16	59	-
		1 17/32	15/32	60	51
		1 13/32	19/32	66	53
		1 9/32	23/32	72	57

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

1. Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (specific gravity = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to grain. The underside of the fastener head shall be installed flush with the surface of the side member.
2. Penetration depth includes the length of tapered tip.
3. Lateral design values apply to both perpendicular to grain ($Z_{\perp}$) and parallel to grain ($Z_{\parallel}$) orientations.
4. Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
5. OSB shall comply with DOC PS 2 and have a minimum specific gravity of 0.50. Plywood shall comply with DOC PS 1 and have a minimum specific gravity of 0.39.

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Table 15. #10 SPAX Construction Screws Lateral Design Values – OSB and Plywood Side Member

Fastener Designation	Head Style	Minimum Main Member Penetration[2] (in)	Minimum Side Member Thickness (in)	Reference Lateral Shear Value,[1,3,4] Z (lbf)	
				OSB[5] (0.50)	Plywood[5] (0.39)
Carbon Steel					
#10 x 1 1/4"	Flat, Pan or Washer	13/16	7/16	48	-
		25/32	15/32	48	40
#10 x 1 1/2"		1 1/16	7/16	61	-
		1 1/32	15/32	60	53
		29/32	19/32	60	49
		25/32	23/32	63	48
#10 x 2"		1 9/16	7/16	80	-
		1 17/32	15/32	81	70
		1 13/32	19/32	85	72
		1 9/32	23/32	83	71
#10 x 2 1/2" #10 x 2 3/4" #10 x 3" #10 x 3 1/2"		2 1/16	7/16	80	-
		1 17/32	15/32	81	70
		1 29/32	19/32	85	72
		1 25/32	23/32	90	74
Stainless Steel					
#10 x 2 1/2" #10 x 3"	Flat	2 1/16	7/16	68	-
		2 1/32	15/32	69	59
		1 29/32	19/32	74	61
		1 25/32	23/32	81	64
#10 x 2 1/2" #10 x 3" #10 x 3 1/2"	PowerDeck Trim	2 1/16	7/16	79	-
		2 1/32	15/32	80	69
		1 29/32	19/32	85	71
		1 25/32	23/32	92	74

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

1. Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (specific gravity = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to grain. The underside of the fastener head shall be installed flush with the surface of the side member.
2. Penetration depth includes the length of tapered tip.
3. Lateral design values apply to both perpendicular to grain ($Z_{\perp}$) and parallel to grain ($Z_{\parallel}$) orientations.
4. Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
5. OSB shall comply with DOC PS 2 and have a minimum specific gravity of 0.50. Plywood shall comply with DOC PS 1 and have a minimum specific gravity of 0.39.

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Table 16. #14 SPAX Construction Screws Lateral Design Values – OSB and Plywood Side Member

Fastener Designation	Head Style	Minimum Main Member Penetration[2] (in)	Minimum Side Member Thickness (in)	Reference Lateral Shear Value,[1,3,4] Z (lbf)	
				OSB[5] (0.50)	Plywood[5] (0.39)
Carbon Steel					
#14 x 1 1/2"	Flat	1 1/16	7/16	73	-
		1 1/32	15/32	72	63
#14 x 2"		1 9/16	7/16	110	-
		1 17/32	15/32	108	97
		1 13/32	19/32	103	91
		1 9/32	23/32	100	85
#14 x 2 1/2" #14 x 3" #14 x 3 1/2" #14 x 4" #14 x 4 1/2"		2 1/16	7/16	112	-
		2 1/32	15/32	113	97
		1 29/32	19/32	117	101
		1 25/32	23/32	123	103

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

1. Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (specific gravity = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to grain. The underside of the fastener head shall be installed flush with the surface of the side member.
2. Penetration depth includes the length of tapered tip.
3. Lateral design values apply to both perpendicular to grain ($Z_{\perp}$) and parallel to grain ($Z_{\parallel}$) orientations.
4. Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
5. OSB shall comply with DOC PS 2 and have a minimum specific gravity of 0.50. Plywood shall comply with DOC PS 1 and have a minimum specific gravity of 0.39.

Table 17. SPAX Construction Screws Lateral Design Values – Sawn Lumber Side Member

Fastener Designation	Head Style	Minimum Main Member Penetration[1] (in)	Minimum Side Member Thickness (in)	Reference Lateral Shear Value,[4,5,6] Z (lbf)		
				Wood Species (Specific Gravity)[2,3]		
				SPF/HF (0.42)	DF-L (0.50)	SP (0.55)
Carbon Steel						
#6 x 1 1/2"	Flat	3/4	3/4	37	50	57
#6 x 1 3/4" #6 x 2"		1	3/4	44	56	63
#6 x 1 1/2"	MDF/Hardwood Trim	3/4	3/4	37	50	57
#8 x 1 1/2"	Flat, Pan, Wafer	3/4	3/4	43	59	70
#8 x 1 3/4"		1	3/4	50	69	80
#8 x 2"		1 1/4	3/4	55	70	80
#8 x 2 1/2"		1	1 1/2	58	75	84

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Table 17. SPAX Construction Screws Lateral Design Values – Sawn Lumber Side Member

Fastener Designation	Head Style	Minimum Main Member Penetration[1] (in)	Minimum Side Member Thickness (in)	Reference Lateral Shear Value,[4,5,6] Z (lbf)		
				Wood Species (Specific Gravity)[2,3]		
				SPF/HF (0.42)	DF-L (0.50)	SP (0.55)
Carbon Steel						
#8 x 1 3/4"	MDF/Hardwood Trim	1	3/4	51	69	79
#8 x 2 1/2"		1	1 1/2	57	74	81
#9 x 2 1/2"	Flat	1	1 1/2	73	92	105
#9 x 3 1/4"		1 3/4	1 1/2	90	106	116
#10 x 1 1/2"	Flat, Washer	3/4	3/4	53	72	86
#10 x 2"		1 1/4	3/4	73	99	112
#10 x 2 1/2"		1	1 1/2	81	101	115
#10 x 2 3/4"		1 1/4	1 1/2	91	117	132
#10 x 3" #10 x 3 1/2"		1 1/2	1 1/2	103	121	132
#14 x 2"	Flat	1 1/4	3/4	88	121	145
#14 x 2 1/2"		1	1 1/2	109	134	151
#14 x 3"		1 1/2	1 1/2	133	171	187
#14 x 3 1/2" #14 x 4" #14 x 4 1/2"		2	1 1/2	146	172	187
Stainless Steel						
#8 x 1 5/8"	PowerDeck Trim	7/8	3/4	49	65	71
#9 x 1 1/2"	Flat	3/4	3/4	49	67	78
#9 x 2"		1 1/4	3/4	62	79	91
#10 x 2 1/2"	Flat	1	1 1/2	72	92	106
#10 x 3"		1 1/2	1 1/2	84	99	108
#10 x 2 1/2"	PowerDeck Trim	1	1 1/2	82	103	118
#10 x 3" #10 x 3 1/2"		1 1/2	1 1/2	100	117	128

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

1. Penetration depth includes the length of tapered tip.
2. The species applies to both the main and side members. Where the members are different specific gravities, use the lower of the two.
3. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity between 0.50 and 0.55, use the tabulated values for specific gravity of 0.50. For wood species with an assigned specific gravity greater than or equal to 0.55, use the tabulated values for specific gravity of 0.55.
4. The fastener shall be oriented perpendicular to grain, and the underside of the fastener head shall be installed flush with the surface of the side member.
5. Lateral design values apply to both perpendicular to grain ($Z_{\perp}$) and parallel to grain ($Z_{\parallel}$) orientations.
6. Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.

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6.6.3 *Reference Lateral Design Values for XFT14P-4000 Fasteners:*

6.6.3.1 Reference lateral design values (lbs) for shear load perpendicular and parallel to the side member grain for XFT14P-4000 fasteners are specified in **Table 18**.

6.6.3.2 Reference lateral design values in **Table 18** apply to two-member single shear connections where:

6.6.3.2.1 The main member has an assigned specific gravity equal to or greater than 0.55

6.6.3.2.2 The main member is loaded parallel to grain

6.6.3.2.3 The fastener is oriented perpendicular to grain

6.6.3.2.4 The fastener penetrates the face of the side member and edge of the main member

6.6.3.2.5 The minimum edge distance in the main member is nominally $^3/_4$". Care shall be taken not to split the wood. See **Table 20** for other spacing, edge, and end distance requirements.

Table 18. Lateral Design Values For XFT14P-4000 Fastener[4,5,6]

Main Member Species (Specific Gravity)[1,3]	Side Member Species (Specific Gravity)[2,3]	Reference Lateral Shear Value, Z (lbf)	
		$Z_\perp$	$Z_\parallel$
SP (0.55)	SPF (0.42)	NT	180
	SP (0.55)	285	205
	LVL (0.50)	410	290

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

1. Main member is loaded parallel to grain.
2. For side member wood species with an assigned specific gravity between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than or equal to 0.55, use the tabulated values for specific gravity of 0.55.
3. Main member and side member minimum thickness is 1.5".
4. $Z_\perp$ = Lateral Design Values Perpendicular to Side Member Grain, $Z_\parallel$ = Lateral Design Values Parallel to Side Member Grain (see **Figure 6**).
5. Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
6. NT = Not Tested

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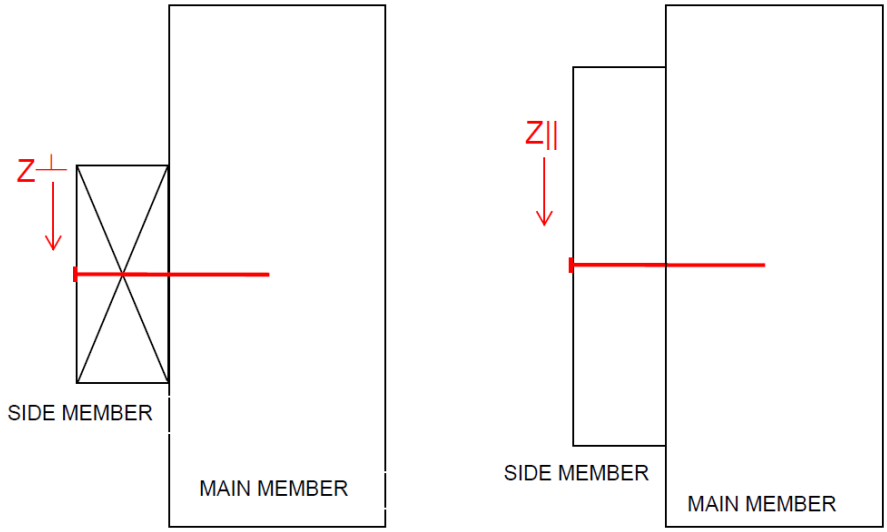

Figure 6. Lateral Load Directions

6.7 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[30]

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.[31]

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.[32]

8 Regulatory Evaluation and Accepted Engineering Practice

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

8.1.1 Bending yield in accordance with ASTM F1575

8.1.2 Tensile strength in accordance with AISI S904

8.1.3 Shear strength in accordance with AISI S904

8.1.4 Head pull-through in accordance with ASTM D1761

8.1.5 Withdrawal strength in accordance with ASTM D1761

8.1.6 Lateral resistance in accordance with NDS and ASTM D1761

8.1.7 Corrosion resistance in accordance with ASTM B117 and ASTM G85

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[33] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[34] respectively.

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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 SPAX Construction Screws shall be installed using the driver bits specified in **Table 1**, **Table 2**, **Table 3**, **Table 4**, and **Table 5**, as applicable.

9.4 Fasteners shall not be struck with a hammer during installation.

9.5 Lead holes are not required for SPAX Construction Screws.

9.6 The fastener head must be installed flush to the surface of the wood side member being connected. The fastener must not be overdriven.

9.7 Minimum main member penetration is $1^1/_2$" unless otherwise stated in this report.

9.8 Minimum requirements for fastener spacing, edge distance, and end distance shall be in accordance with **Table 19**.

9.8.1 Minimum requirements for XFT14P-4000 fastener spacing, edge distance and end distance are found in **Figure 7** and **Table 20**.

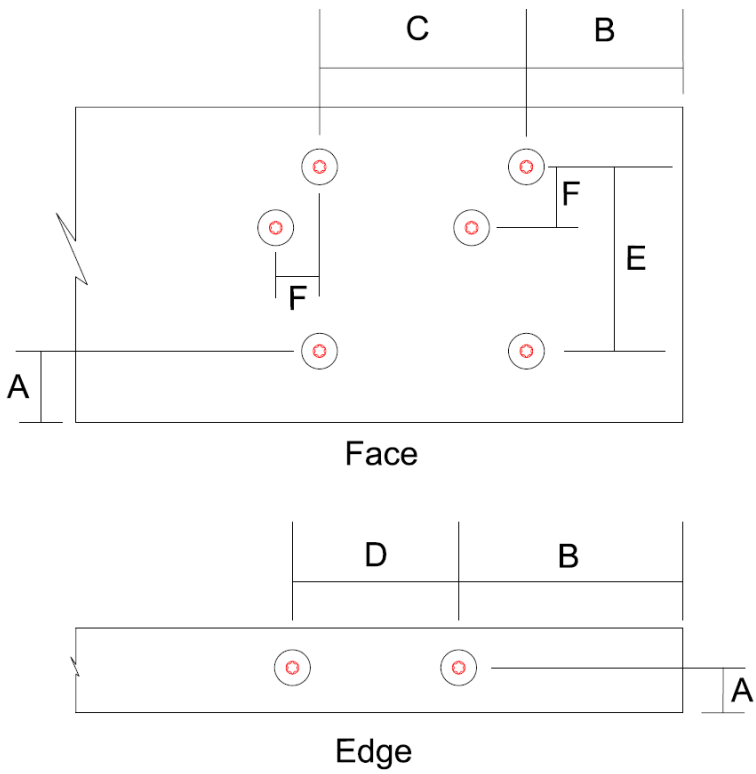

Figure 7. Fastener Spacing in Wood Reference Diagram

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Table 19. Minimum Spacing, Edge Distance, and End Distance Requirements

Reference From Figure 7	Connection Geometry	Minimum Spacing/Distance[1,2] (in)					
		#6 Flat/Pan/ MDF/ Hardwood Trim	#8 Flat/Pan/ Wafer MDF/ Hardwood Trim	#8 PowerDeck Trim, #9 Flat	#10 Flat/Pan/ Washer	#10 PowerDeck Trim	#14 Pan
A	Edge Distance – Load in any direction	1/4	3/8	3/8	3/8	1/2	1/2
B	End Distance – Load parallel to grain, towards end	1 1/2	1 3/4	1 7/8	2 1/4	2 3/8	2 5/8
	End Distance – Load parallel to grain, away from end	1	1 1/4	1 1/4	1 1/2	1 5/8	1 3/4
	End Distance – Load perpendicular to grain	1	1 1/4	1 1/4	1 1/2	1 5/8	1 3/4
C	Spacing between Fasteners in a Row – Parallel to grain	1 1/2	1 3/4	1 7/8	2 1/4	2 3/8	2 5/8
D	Spacing between Fasteners in a Row – Perpendicular to grain	1	1 1/4	1 1/4	1 1/2	1 5/8	1 3/4
E	Spacing between Rows of Fasteners – In-line	1/2	5/8	5/8	3/4	7/8	7/8
F	Spacing between Rows of Fasteners – Staggered	1/4	3/8	3/8	3/8	1/2	1/2

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 the more restrictive.
2. Values for *"Spacing between Rows of Fasteners – Staggered"* apply where the fasteners in adjacent rows are offset by one-half of the *"Spacing between Fasteners in a Row"*.

Table 20. Minimum Spacing, Edge Distance and End Distance Requirements – XFT14P-4000

Reference From Figure 7)	Connection Geometry[1,2]	Minimum Spacing/Distance[1,2] (in)
A	Edge Distance – Load perpendicular to grain	1 1/2
	Edge Distance – Load parallel to grain	3/4
B	End Distance – Load parallel to grain, towards end	1 3/4
	End Distance – Load parallel to grain, away from end	3/4
	End Distance – Load perpendicular to grain	3/4
C	Spacing between Fasteners in a Row – Parallel to grain	1 3/4
D	Spacing between Fasteners in a Row – Perpendicular to grain	7/8
E	Spacing between Rows of Fasteners – In-line	1/2
F	Spacing between Rows of Fasteners – Staggered	1/2

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 the more restrictive.
2. Values for *"Spacing between Rows of Fasteners-Staggered"* apply where the fasteners in adjacent rows are offset by one-half of the *"Spacing between Fasteners in a Row"*.

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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 Head pull-through testing in accordance with ASTM D1761

10.1.5 Withdrawal testing in accordance with ASTM D1761

10.1.6 Lateral resistance testing in accordance with ASTM D1761

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

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.[35]

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

11 Findings

11.1 As outlined in **Section 6**, SPAX Construction 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, SPAX Construction Screws shall be approved for the following applications:

11.2.1 To provide resistance to head pull-through loads as shown in **Table 6**, **Table 7**, and **Table 8**.

11.2.2 To provide resistance to reference withdrawal loads as shown in **Table 9**, **Table 10**, and **Table 11**.

11.2.3 To provide resistance to lateral loads applied to the fastener in a wood connection as shown in **Table 12**, **Table 13**, **Table 14**, **Table 15**, **Table 16**, **Table 17**, and **Table 18**.

11.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Altenloh, Brinck & Company US, Inc.

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11.4 IBC Section 104.2.3[36] (IRC Section R104.2.2[37] and IFC Section 104.2.3[38] 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:**[39] Building regulations require that the building official shall accept duly authenticated reports.[40]

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.[41]

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 Wood main and side members must have a moisture content of less than or equal to nineteen percent (19%). Where fasteners are installed in a wet service condition, the appropriate reduction factors shall be applied per NDS Table 11.3.1.

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

12.5 In cases where fastener metal capacity (instead of the wood member) controls the connection design, the allowable connection strength shall not be multiplied by the adjustment factors specified in the NDS.

12.6 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:

12.6.1 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.

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

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

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

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

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12.6.6 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.

12.6.7 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.

12.7 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.

12.8 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).

12.9 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 #6, #8, #9, #10 and #14 SPAX Construction 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 spax.us.

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.

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Issue Date: December 16, 2021

Subject to Renewal: January 1, 2027

FBC Supplement to Report Number 2010-02

REPORT HOLDER: Altenloh, Brinck & Company US, Inc.

1 Evaluation Subject

1.1 #6, #8, #9, #10 and #14 SPAX Construction Screws

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Report Supplement is to show SPAX Construction Screws, recognized in Report Number 2010-02, 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 40711)*

2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL 40711)*

3 Conclusions

3.1 SPAX Construction Screws, described in Report Number 2010-02, 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 is reserved.

3.2.2 FBC-B Section 110.4 is reserved and replaces IBC Section 110.4.

3.2.3 FBC-B Section 104.6 is reserved and replaces IBC Section 104.4.

3.2.4 FBC-B Section 104.11 replaces IBC Section 104.2.3 and Section 104.2.3.2.

3.2.5 FBC-B Section 105.3 replaces IBC Section 105.3.

3.2.6 FBC-B Section 105.3.1 replaces IBC Section 105.3.1.

3.2.7 FBC-B Section 110.3 replaces IBC Section 110.3.

3.2.8 FBC-B Section 1707.1 replaces IBC Section 1707.1.

3.2.9 FBC-B Section 2304.10.5 replaces IBC Section 2304.10.6.

3.2.10 FBC-B Section 2306.1 replaces IBC Section 2306.1.

3.2.11 FBC-B Section 2306.3 replaces IBC Section 2306.3.

3.2.12 FBC-R Section R104 and Section R109 are reserved.

3.2.13 FBC-R Section R317.3 replaces IRC Section R304.3.

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4 Conditions of Use

4.1 SPAX Construction Screws, described in Report Number 2010-02, must comply with all of the following conditions:

4.1.1 All applicable sections in Report Number 2010-02.

4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.

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Notes

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

2 2021 IRC Section R317.3

3 2021 IRC Section R317.3

4 2021 IRC Section R317.3

5 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.

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

7 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

8 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

9 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

10 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.

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

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

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

14 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.

15 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/

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

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

18 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

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

20 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

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

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

23 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.

24 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

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

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

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

28 All references to the FBC-B and FBC-R are the same as the 2024 IBC and 2024 IRC unless otherwise noted in the Florida Supplement at the end of this report.

29 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

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

31 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

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[32] 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

[33] 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.

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

[35] 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

[36] 2021 IBC Section 104.11

[37] 2021 IRC Section R104.11

[38] 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

[39] 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.

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

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

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