



CERTIFICATION



Approved. Sealed. Code Compliant.

Technical Evaluation Report

TER 2010-02

SPAX® Construction Screw Properties

**Altenloh, Brinck & Company
U.S., Inc.**

Products:

**#6, #8, #9, #10, #14 SPAX®
Construction Screws**

Issue Date:

December 16, 2021

Revision Date:

January 21, 2022

Subject to Renewal:

January 1, 2023



COMPANY
INFORMATION:

Altenloh, Brinck & Company U.S., Inc.

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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 PRODUCT EVALUATED¹

- 1.1 #6, #8, #9, #10, #14 SPAX® Construction Screws

2 APPLICABLE CODES AND STANDARDS^{2,3}

2.1 Codes

- 2.1.1 *IBC—15, 18, 21: International Building Code®*
- 2.1.2 *IRC—15, 18, 21: International Residential Code®*
- 2.1.3 *FBC-B—17, 20: Florida Building Code – Building⁴*
- 2.1.4 *FBC-R—17, 20: Florida Building Code – Residential⁴*

2.2 Standards and Referenced Documents

- 2.2.1 *AISI S904: Standard Test Methods for Determining the Tensile and Shear Strengths of Screws*
- 2.2.2 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*
- 2.2.3 *ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*
- 2.2.4 *ASTM A510: Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel*
- 2.2.5 *ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus*
- 2.2.6 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*
- 2.2.7 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails*
- 2.2.8 *ASTM G85: Standard Practice for Modified Salt Spray (Fog) Testing*

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

² Unless otherwise noted, all references in this TER are from the 2018 version of the codes and the standards referenced therein. This material, design, or method of construction also complies with the 2000-2015 versions of the referenced codes and the standards referenced therein.

³ All terms defined in the applicable building codes are italicized.

⁴ All references to the *FBC-B* and *FBC-R* are the same as the 2018 *IBC* and 2018 *IRC*, respectively, unless otherwise noted in the supplement at the end of this TER.

3 PERFORMANCE EVALUATION

- 3.1 SPAX® Construction Screws were tested and evaluated to determine their structural resistance properties, which are used to develop reference design values for allowable stress design (ASD). The following properties were evaluated:
 - 3.1.1 Bending yield in accordance with *ASTM F1575*
 - 3.1.2 Tensile strength in accordance with *AISI S904*
 - 3.1.3 Shear strength in accordance with *AISI S904*
 - 3.1.4 Head pull-through in accordance with *ASTM D1761*
 - 3.1.5 Withdrawal strength in accordance with *ASTM D1761*
 - 3.1.6 Lateral resistance in accordance with *NDS* and *ASTM D1761*
 - 3.1.7 Corrosion resistance in accordance with *ASTM B117* and *ASTM G85*
- 3.2 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this TER.
- 3.3 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.
- 3.4 Any engineering evaluation conducted for this TER was performed within DrJ's ANAB accredited ICS code scope and/or the defined professional engineering scope of work on the dates provided herein.

4 PRODUCT DESCRIPTION AND MATERIALS

- 4.1 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.
- 4.2 The fasteners are available with a variety of coatings, including proprietary coating systems designated as zinc, yellow zinc, HCR™, HCR-X™, and WIROX®.
- 4.3 The SPAX® Construction Screws are available in a variety of sizes with different diameters, head types, and lengths.
 - 4.3.1 #6 SPAX® Construction Screws are shown in Figure 1 and specified in Table 1.
 - 4.3.2 #8 SPAX® Construction Screws are shown in Figure 2 and specified in Table 2.
 - 4.3.3 #9 SPAX® Construction Screws are shown in Figure 3 and specified in Table 3.
 - 4.3.4 #10 SPAX® Construction Screws are shown in Figure 4 and specified in Table 4.
 - 4.3.5 #14 SPAX® Construction Screws are shown in Figure 5 and specified in Table 5.⁵

⁵ The #14 x 4" SPAX® T-Star plus Flat-Head Partial Thread Construction Screw is referred to as the XFT14P-4000 throughout this TER.

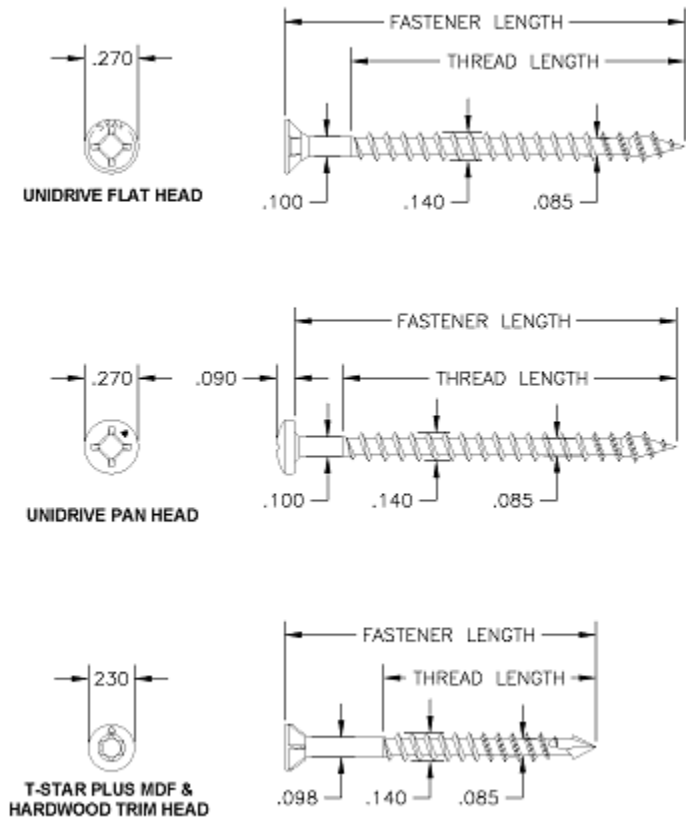


FIGURE 1. #6 SPAX® CONSTRUCTION SCREWS



TABLE 1. #6 SPAX® CONSTRUCTION SCREWSPECIFICATIONS⁵

Fastener Designation	Part Number	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 & #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	1.575	0.100	0.085	0.140	12	198,000	310	265
#6 x 1-3/4"	XFU06-1750					1.750								
#6 x 2"	XFU06-2000					2.000								
#6 x 3/4"	XPU06-0750	Pan	Unidrive (#2 Cross & #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/Hardwood 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 threaded section.
4. Shear strength is determined in accordance with *AISI S904* using minor thread diameter when fastener is tested in threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

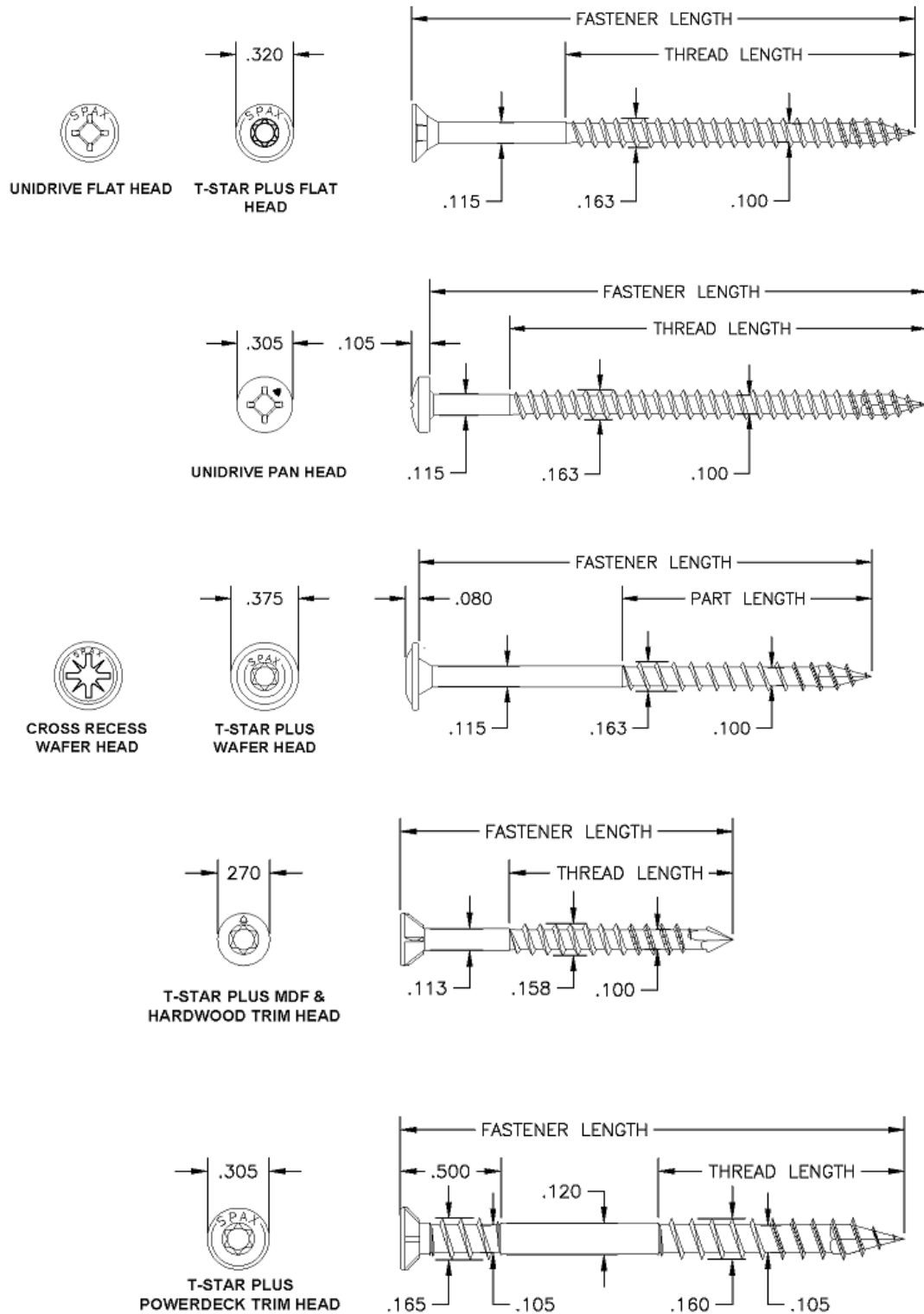


FIGURE 2. #8 SPAX® CONSTRUCTION SCREWS



TABLE 2. #8 SPAX® CONSTRUCTION SCREW SPECIFICATIONS⁵

Fastener Designation	Part Number	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	Flat	#2 Unidrive	0.320	N/A	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								
#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/Hardwood 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 threaded section.
4. Shear strength is determined in accordance with AISI S904 using minor thread diameter when fastener is tested in threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

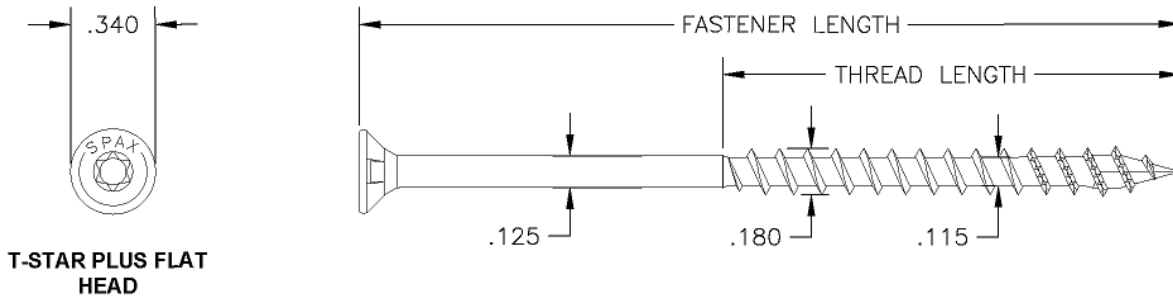


FIGURE 3. #9 SPAX® CONSTRUCTION SCREWS

TABLE 3. #9 SPAX® CONSTRUCTION SCREW SPECIFICATIONS⁵

Fastener Designation	Part Number	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														
#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 top side 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 threaded section.
4. Shear strength is determined in accordance with AISI S904 using minor thread diameter when fastener is tested in threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

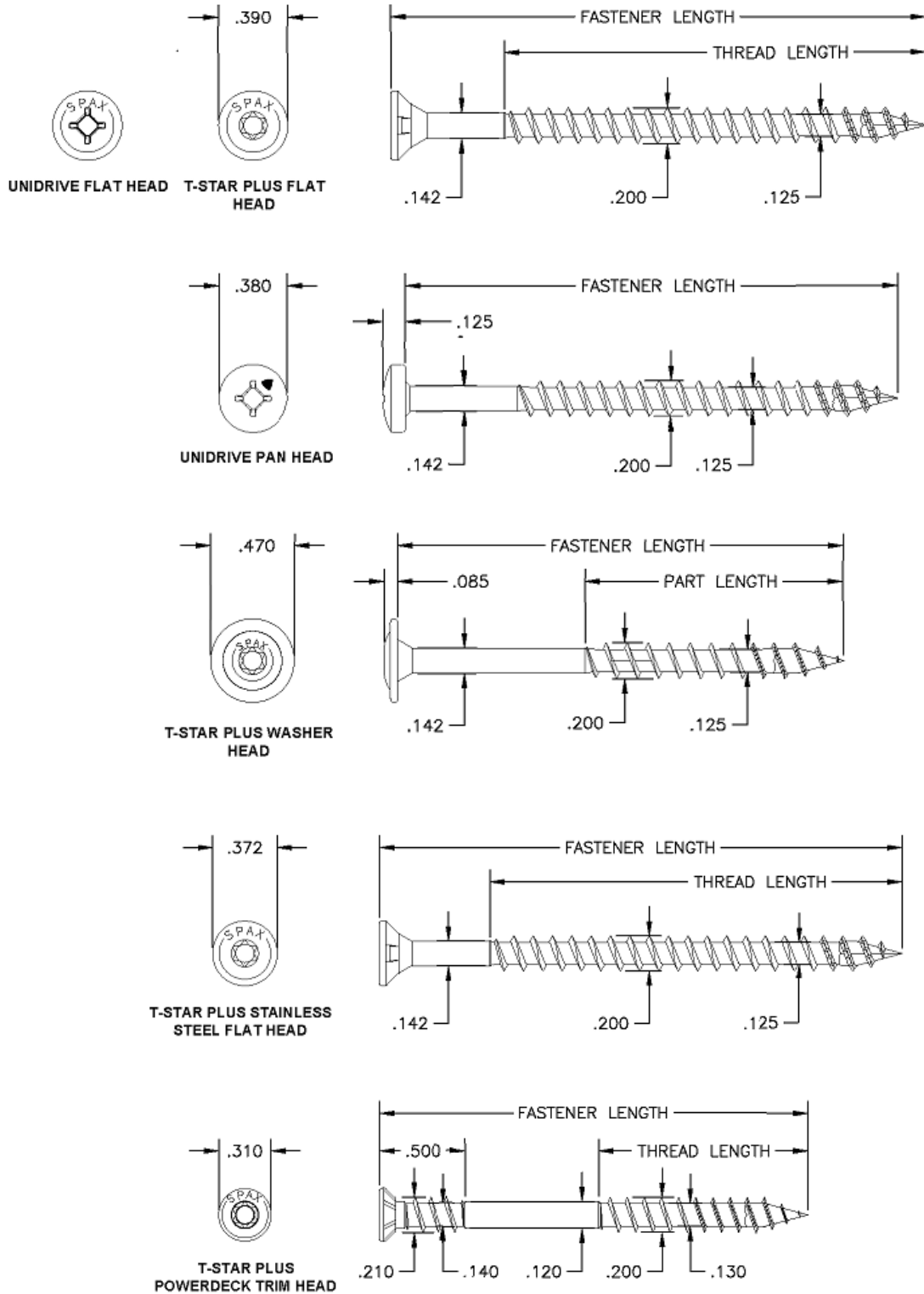


FIGURE 4. #10 SPAX® CONSTRUCTION SCREWS



TABLE 4. #10 SPAX® CONSTRUCTION SCREW SPECIFICATIONS⁵

Fastener Designation	Part Number	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	Flat	#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

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

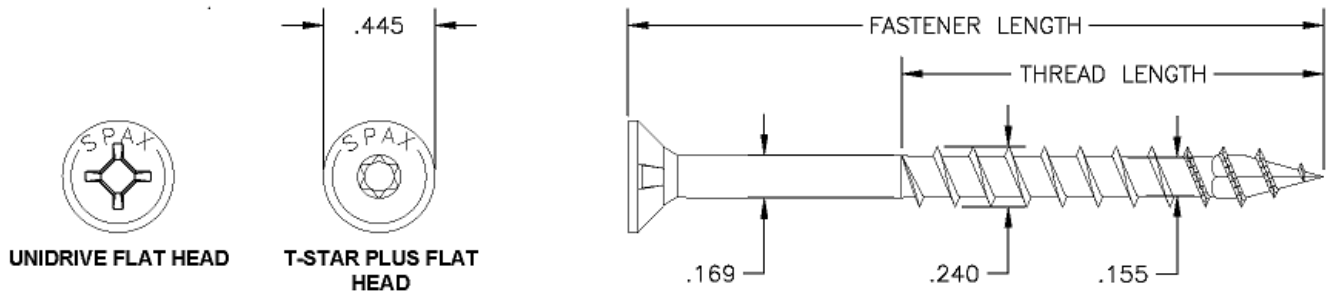


FIGURE 5. #14 SPAX® CONSTRUCTION SCREWS

TABLE 5. #14 SPAX® CONSTRUCTION SCREW SPECIFICATIONS⁵

Fastener Designation	Part Number	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 1-1/4"	XFT14-1000	Flat	T30 T-Star Plus or Unidrive	0.445	N/A	1.25	0.925	0.169	0.155	0.240	7	160,000	990	750
#14 x 1-1/2"	XFT14-1500					1.5	1.240							
#14 x 2"	XFT14-2000					2	1.675							
#14 x 2-1/2"	XFT14P-2500					2.5	1.595							
#14 x 3"	XFT14P-3000					3								
#14 x 3-1/2"	XFT14P-3500					3.5	2.385							
#14 x 4"	XFT14P-4000					4								
#14 x 4-3/4"	XFT14P-4750					4.75	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 threaded section.
4. Shear strength is determined in accordance with *AISI S904* using minor thread diameter when fastener is tested in threaded section.
5. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.

4.4 Fastener Material

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

4.5 Corrosion Resistance

4.5.1 Interior Wood Applications:

- 4.5.1.1 The SPAX® PowerLags® series structural wood fasteners having the proprietary zinc, yellow zinc, ecote and WIROX® coatings are equivalent to the protection provided by code-approved hot-dipped galvanized coatings meeting ASTM A153, Class D (IBC Section 2304.10.5 and IRC Section R317.3) 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).

4.5.2 Exterior Wood Applications:

- 4.5.2.1 The SPAX® PowerLags® series structural wood fasteners having the proprietary HCR coatings are equivalent to the protection provided by code-approved hot-dipped galvanized coatings meeting ASTM A153, Class D (IBC Section 2304.10.5 and IRC Section R317.3) 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).

4.5.3 Stainless Steel Wood Applications:

- 4.5.3.1 The stainless steel SPAX® Construction Screws meet the material requirements in ASTM F1667 per IBC Section 2304.10.5 and IRC Section R317.3 and are recognized for use in untreated, preservative-treated, and fire-retardant-treated wood in interior and exterior applications.

4.5.4 Fire Retardant Treated (FRT) Wood Applications:

- 4.5.4.1 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 are met, including appropriate strength reductions.

4.6 Wood Material

- 4.6.1 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 TER. Assigned specific gravity must be determined in accordance with NDS Table 12.3.3A.

5 APPLICATIONS

- 5.1 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.

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

5.3 Design

- 5.3.1 Design of SPAX® Construction Screws is governed by the applicable code and the provisions for dowel-type fasteners in NDS.
- 5.3.2 Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.



5.4 Head Pull-Through Design Values

5.4.1 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.

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

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 (SG) 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.



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

- Minimum wood member thickness as specified
- Tabulated pull-through values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
- For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity (SG) 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

- 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.
- Minimum thickness is 1.5".
- The dry service condition is defined as lumber with an in-service moisture content of less than or equal to 19%. The wet service condition is defined as lumber with an in-service moisture content of greater than 19%.
- LVL member minimum thickness is 1.5". Listed specific gravity is an equivalent specific gravity.
- Tabulated withdrawal values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.



5.5 Reference Withdrawal Design Values in Face Grain Applications

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

5.5.2 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 (SG) 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.



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

- Applies to withdrawal from face grain only.
- 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.
- Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
- 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 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

- 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.
- The dry service condition is defined as lumber with an in-service moisture content of less than or equal to 19%. The wet service condition is defined as lumber with an in-service moisture content of greater than 19%.
- Listed specific gravity is an equivalent specific gravity.
- Fastener penetration is the threaded length embedded in the wood member, including the tip.
- The full design withdrawal value (W) in pounds is equal to: $W = w_1 + [w_2 + (w_2 - w_1)] * (L_T - 1)$; 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.
- Tabulated withdrawal values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.

5.6 Lateral Design Values

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

5.6.1.1 Solid sawn main member with OSB or Plywood side member:

5.6.1.1.1 #6 SPAX® Construction Screws: Table 12

5.6.1.1.2 #8 SPAX® Construction Screws: Table 13

5.6.1.1.3 #9 SPAX® Construction Screws: Table 14

5.6.1.1.4 #10 SPAX® Construction Screws: Table 15

5.6.1.1.5 #14 SPAX® Construction Screws: Table 16

5.6.1.2 Sawn lumber main and side members: Table 17

5.6.2 See Section 5.6.3 for lateral reference design values for the XFT14P-4000 fastener.



TABLE 12. #6 SPAX® CONSTRUCTION SCREW 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
#6 x 1-1/2"		17/32	23/32	38	29
		1-1/16	7/16	41	-
		1-1/32	15/32	42	35
		29/32	19/32	42	35
#6 x 1-3/4"		25/32	23/32	43	34
		1-5/16	7/16	41	-
		1-9/32	15/32	42	35
		1-5/32	19/32	46	37
#6 x 2"		1-1/32	23/32	50	40
	1-9/16	7/16	41	-	
	1-17/32	15/32	42	35	
	1-13/32	19/32	46	37	
#6 x 1-1/2"	1-9/32	23/32	51	40	
	1-1/16	7/16	41	-	
	1-1/32	15/32	42	35	
	29/32	19/32	42	35	
#6 x 1-1/2"	MDF/Hardwood Trim	25/32	23/32	43	34

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

- Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (SG = 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.
- Penetration depth includes the length of tapered tip.
- Lateral design values apply to both perpendicular to grain (Z_{\perp}) and parallel to grain (Z_{\parallel}) orientations.
- Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
- 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 13. #8 SPAX® CONSTRUCTION SCREW 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
#8 x 1-3/4"		25/32	23/32	51	39
		1-5/16	7/16	53	-
		1-9/32	15/32	54	46
		1-5/32	19/32	59	48
#8 x 2" #8 x 2-1/2"		1-1/32	23/32	58	48
		1-9/16	7/16	53	-
	1-17/32	15/32	54	46	
	1-13/32	19/32	59	48	
#8 x 1-3/4"	1-9/32	23/32	64	51	
	1-5/16	7/16	51	-	
	1-9/32	15/32	52	44	
	1-5/32	19/32	57	46	
#8 x 2-1/2"	1-1/32	23/32	59	48	
	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

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

- Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (SG = 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.
- Penetration depth includes the length of tapered tip.
- Lateral design values apply to both perpendicular to grain (Z_⊥) and parallel to grain (Z_{||}) orientations.
- Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
- 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 SCREW 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"	Flat	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

- Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (SG = 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.
- Penetration depth includes the length of tapered tip.
- Lateral design values apply to both perpendicular to grain (Z_{\perp}) and parallel to grain (Z_{\parallel}) orientations.
- Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
- 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 15. #10 SPAX® CONSTRUCTION SCREW 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
#10 x 2"		25/32	23/32	63	48
		1-9/16	7/16	80	-
		1-17/32	15/32	81	70
		1-13/32	19/32	85	72
#10 x 2-1/2" #10 x 2-3/4" #10 x 3" #10 x 3-1/2"		1-9/32	23/32	83	71
		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
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

- Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (SG = 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.
- Penetration depth includes the length of tapered tip.
- Lateral design values apply to both perpendicular to grain (Z_⊥) and parallel to grain (Z_{||}) orientations.
- Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
- 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 16. #14 SPAX® CONSTRUCTION SCREW 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
#14 x 2-1/2" #14 x 3" #14 x 3-1/2" #14 x 4" #14 x 4-1/2"		1-9/32	23/32	100	85
		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

- Reference lateral design values apply to two-member single shear connections where the side member is OSB or plywood, the main member is SPF (SG = 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.
- Penetration depth includes the length of tapered tip.
- Lateral design values apply to both perpendicular to grain (Z_{\perp}) and parallel to grain (Z_{\parallel}) orientations.
- Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
- 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 SCREW 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
#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"		1-1/4	3/4	88	121	145
#14 x 2-1/2"	1	1-1/2	109	134	151	
#14 x 3"	Flat	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

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)

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

- Penetration depth includes the length of tapered tip.
- The species applies to both the main and side members. Where the members are different specific gravities, use the lower of the two.
- 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.
- 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.
- Lateral design values apply to both perpendicular to grain (Z_{\perp}) and parallel to grain (Z_{\parallel}) orientations.
- Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.

5.6.3 Reference Lateral Design Values for XFT14P-4000 Fasteners:

- 5.6.3.1 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.
- 5.6.3.2 Reference lateral design values in Table 18 apply to two-member single shear connections where:
 - 5.6.3.2.1 The main member has an assigned specific gravity equal to or greater than 0.55.
 - 5.6.3.2.2 The main member is loaded parallel to grain.
 - 5.6.3.2.3 The fastener is oriented perpendicular to grain.
 - 5.6.3.2.4 The fastener penetrates the face of the side member and edge of the main member.
 - 5.6.3.2.5 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
- Main member is loaded parallel to grain.
 - 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.
 - Main member and side member minimum thickness is 1.5".
 - Z_{\perp} = Lateral Design Values Perpendicular to Side Member Grain, Z_{\parallel} = Lateral Design Values Parallel to Side Member Grain (see Figure 6).
 - Tabulated lateral design values shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
 - NT = Not Tested

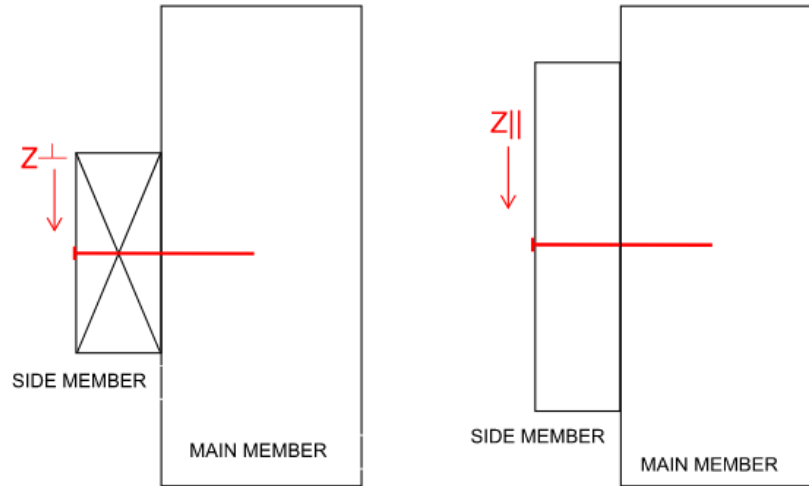


FIGURE 6. LATERAL LOAD DIRECTIONS

6 INSTALLATION

- 6.1 Installation shall comply with the manufacturer's installation instructions and this TER. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.
- 6.2 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.
- 6.3 Fasteners shall not be struck with a hammer during installation.
- 6.4 Lead holes are not required for SPAX® Construction Screws.
- 6.5 The fastener head must be installed flush to the surface of the wood side member being connected. The fastener must not be overdriven.
- 6.6 Minimum main member penetration is 1½" unless otherwise stated in this TER.
- 6.7 Minimum requirements for fastener spacing, edge distance, and end distance shall be in accordance with Table 19.
 - 6.7.1 Minimum requirements for XFT14P-4000 fastener spacing, edge distance, and end distance are found in Figure 7 and Table 20.

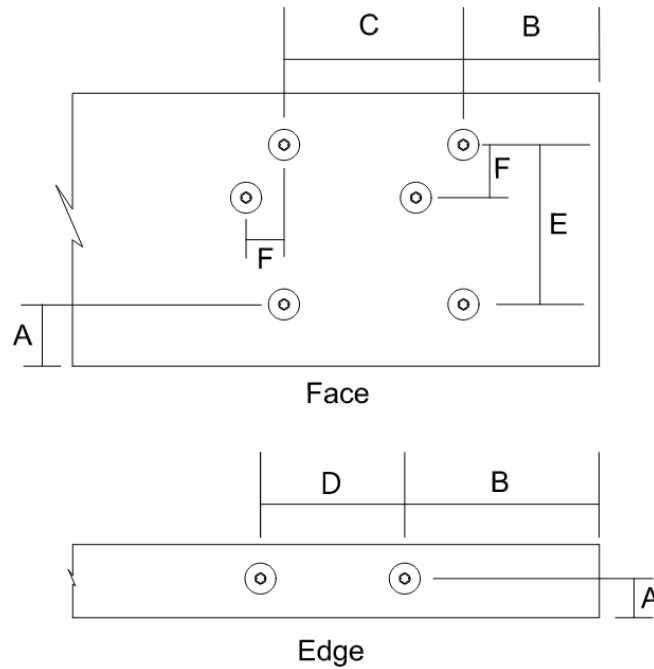


Figure 7 Fastener Spacing in Wood Reference Diagram

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	#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

- 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.
- 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	1½
	Edge Distance – Load parallel to grain	¾
B	End Distance – Load parallel to grain, towards end	1¾
	End Distance – Load parallel to grain, away from end	⅞
	End Distance – Load perpendicular to grain	¾
C	Spacing between Fasteners in a Row – Parallel to grain	1¾
D	Spacing between Fasteners in a Row – Perpendicular to grain	⅞
E	Spacing between Rows of Fasteners – In-line	½
F	Spacing between Rows of Fasteners – Staggered	½

SI: 1 in = 25.4 mm

- 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.
- 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”

7 SUBSTANTIATING DATA

- 7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
 - 7.1.1 Bending yield testing in accordance with *ASTM F1575*
 - 7.1.2 Tensile strength testing in accordance with *AISI S904*
 - 7.1.3 Shear strength testing in accordance with *AISI S904*
 - 7.1.4 Head pull-through testing in accordance with *ASTM D1761*
 - 7.1.5 Withdrawal testing in accordance with *ASTM D1761*
 - 7.1.6 Lateral resistance testing in accordance with *ASTM D1761*
 - 7.1.7 Corrosion resistance testing in accordance with *ASTM B117* and *ASTM G85*
- 7.2 Information contained herein is the result of testing and/or data analysis by sources which conform to IBC Section 1703 and/or professional engineering regulations. DrJ relies upon accurate data to perform its ISO/IEC 17065 evaluations.
- 7.3 Where appropriate, DrJ’s analysis is based on provisions that have been codified into law through state or local adoption of codes and standards. The providers of the codes and standards are legally responsible for their content. DrJ analysis may use code-adopted provisions as a control sample. A control sample versus a test sample establishes a product as being equivalent to that prescribed in this code in quality, strength, effectiveness, fire resistance, durability, and safety. Where the accuracy of the provisions provided herein is reliant upon the published properties of materials, DrJ relies upon the grade mark, grade stamp, mill certificate, and/or test data provided by material suppliers to be minimum properties. DrJ analysis relies upon these properties to be accurate.

8 FINDINGS

- 8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the product listed in Section 1.1 is approved for the following:
- 8.1.1 Provide resistance to head pull-through loads as shown in Table 6, Table 7, and Table 8.
 - 8.1.2 Provide resistance to reference withdrawal loads as shown in Table 9, Table 10, and Table 11.
 - 8.1.3 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.
- 8.2 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this TER, they are listed here.
- 8.2.1 No known variations
- 8.3 Building codes require data from valid research reports be obtained from approved sources (i.e., licensed registered design professionals [RDPs]).
- 8.3.1 Building official approval of a licensed RDP is performed by verifying the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.
- 8.4 Agencies who are accredited through ISO/IEC 17065 have met the code requirements for approval by the building official. DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131 and employs RDPs.
- 8.5 Through ANAB accreditation and the IAF MLA, DrJ certification can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – “certified once, accepted everywhere.”
- 8.6 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10⁶ are similar) 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*.

9 CONDITIONS OF USE

- 9.1 Wood main and side members must have a moisture content of less than or equal to 19 percent. Where fasteners are installed in a wet service condition, the appropriate reduction factors shall be applied per *NDS* Table 11.3.1.
- 9.2 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this TER.
- 9.3 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 *NDS*.
- 9.4 Where required by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.
- 9.5 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.6 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (e.g., owner or RDP).
- 9.7 At a minimum, this product shall be installed per Section 6 of this TER.
- 9.8 This product has an internal quality control program and a third-party quality assurance program in accordance with IBC Section 104.4 and Section 110.4 and IRC Section R104.4 and Section R109.2.

⁶ 2018 *IFC* Section 104.9



- 9.9 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner's authorized agent.
- 9.10 This TER shall be reviewed for code compliance by the AHJ in concert with IBC Section 104.
- 9.11 The implementation of this TER for this product is dependent on the design, quality control, third-party quality assurance, proper implementation of installation instructions, inspections required by IBC Section 110.3, and any other code or regulatory requirements that may apply.

10 IDENTIFICATION

- 10.1 The product listed in Section 1.1 is identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at www.spax.us.

11 REVIEW SCHEDULE

- 11.1 This TER is subject to periodic review and revision. For the most recent version, visit drjcertification.org.
- 11.2 For information on the current status of this TER, contact [DrJ Certification](#).



Issue Date: December 16, 2021
Subject to Renewal: January 1, 2023

FBC Supplement to TER 2010-02

REPORT HOLDER: Altenloh, Brinck & Company U.S., Inc.

1 EVALUATION SUBJECT

- 1.1 #6, #8, #9, #10, #14 SPAX® Construction Screws

2 PURPOSE AND SCOPE

2.1 Purpose

- 2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show #6, #8, #9, #10, #14 SPAX® Construction Screws, recognized in TER 2010-02, has 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—17, 20: Florida Building Code – Building*
- 2.2.2 *FBC-R—17, 20: Florida Building Code – Residential*

3 CONCLUSIONS

- 3.1 #6, #8, #9, #10, #14 SPAX® Construction Screws, described in TER 2010-02, complies with the *FBC-B* and *FBC-R* 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 *FBC-B* and *FBC-R* applicable to this TER, 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 #6, #8, #9, #10, #14 SPAX® Construction Screws, described in TER 2010-02, must comply with all of the following conditions:
 - 4.1.1 All applicable sections in TER 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.