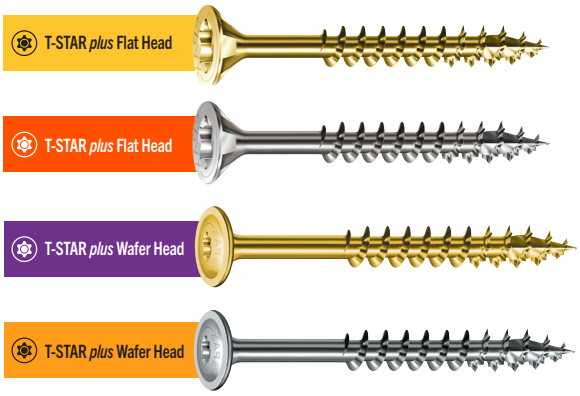
PRODUCT SUBMITTAL

MULTI-MATERIAL

JOB NAME:	
CONTRACTOR:	DATE:
NOTES:	

ALTENLOH, BRINCK & CO. US, INC. 2105 County Road 12C • Bryan, OH 43506 • 419-630-2490 • info@spax.us • www.spax.us

MULTI-MATERIAL ENGINEERED FASTENERS



SPAX® multi-material engineered fasteners are the versatile fastening solution for multiple materials including wood, concrete, masonry, sheet metal, plastic, and treated lumber. Use our high-performance, professional-grade screws for a wide range of interior and exterior applications.

FEATURES:

- Heat treated for strength and durability
- IRC/IBC Code Compliant
- Patented thread serrations reduce driving torque to prolong power tool battery life
- Unique *4CUT*™ Point prevents splitting and requires no pre-drilling in wood

SCREW HEAD OPTIONS:

- T-STAR *plus* flat head style
- T-STAR *plus* wafer head style

COATING OPTIONS:

- Yellow zinc coating for interior applications
- HCR-X™ coating for exterior applications

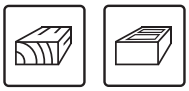
CODE / TECHNICAL REPORTS:

- IRC/IBC Code Compliant DrJ TER No. 2010-02 Properties Report

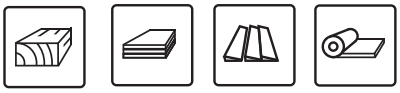
INSTALLATION NOTES:

- Do not install fasteners in locations exposed to saltwater or salt spray.
- For use in concrete/masonry attachment refer to pilot hole charts
- For use in sheet metal attachment – no pre-drill is required for thickness up to 24 gauge

Main Member / Base Material



Side Member / Attached Material



ORIGINS:

- Manufactured in Bryan, Ohio

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MATERIALS & COATINGS:

YELLOW ZINC:

"Yellow zinc" is tested and recognized for use in untreated and above ground contact pressure treated lumber for interior dry/damp general construction applications (e.g. AWPA UC1-UC2).

HCR-X™:

"HCR-X" is tested and recognized for use in ground contact pressure treated lumber for exterior freshwater general construction applications (e.g. AWPA UC1-UC4A, UCFA).

USE CATEGORY	BRIEF DESCRIPTION
UC1	Interior Dry
UC2	Interior Damp
UC3A	Exterior Above Ground, Coated with Rapid Water Runoff
UC3B	Exterior Above Ground, Uncoated or Poor Water Runoff
UC4A	Ground Contact, General Use
UC4B	Ground Contact, Heavy Duty
UC4C	Ground Contact, Extreme Duty
UC5A	Marine Use, Northern Waters (Salt or Brackish Water)
UC5B	Marine Use, Central Waters (Salt or Brackish Water)
UC5C	Marine Use, Southern Waters (Salt or Brackish Water)
UCFA	Interior Above Ground Fire Protection
UCFB	Exterior Above Ground Fire Protection

Information referenced from the AWPA site: https://awpa.com/info/technical/codes

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PRODUCT SUBMITTAL

MULTI-MATERIAL

CHECK ALL THAT APPLY FOR SUBMITTAL

HEAD TYPE:

- ○ Flat Head
- ○ Wafer Head

SIZE:

- ○ #8
- ○ #9
- ○ #10
- ○ #14

COATING TYPE:

- ○ Yellow Zinc (Interior)
- ○ HCR-X™ (Exterior)

LENGTH:

- ○ 1"
- ○ 1-1/4"
- ○ 1-1/2"
- ○ 2"
- ○ 2-1/2"
- ○ 2-3/4"
- ○ 3"
- ○ 3-1/4"
- ○ 3-1/2"
- ○ 4"
- ○ 4-3/4"

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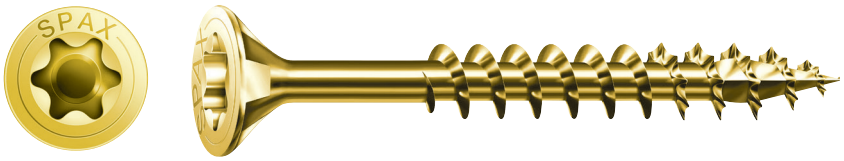
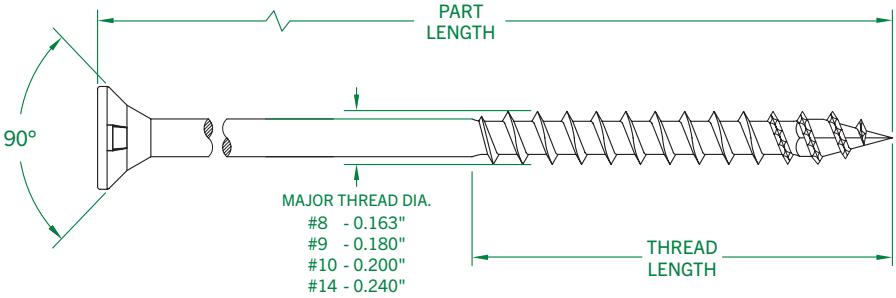
PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD YELLOW ZINC



T-STAR *plus* FLAT HEAD YELLOW ZINC

SPAX® T-STAR *plus* Flat Head fasteners with yellow zinc coating are designed for use in multiple material connections often found inside residential buildings. These "work horse" construction fasteners are designed to countersink in wood for a clean-flush finish and provides a quick and easy installation. In addition, they provide long-lasting, "contractor proven" secure connections. Cold-rolled "carbon steel" wire, heat treated and plated with a yellow zinc finish to prevent red rust. "Yellow zinc" is tested and recognized for use in above ground contact pressure treated lumber for interior dry/damp general construction applications (e.g. AWPA UC1-UC2).



PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD SIZE	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#8 x 1-1/4"	N/A	0.670"	0.320"	T20+	240	1 lb. Box	5	4191020400324
					675	3 lb. Box	3	41910204003245
					2500	Bulk Pail	N/A	3191020400320
#8 x 1-1/2"	N/A	0.870"	0.320"	T20+	197	1 lb. Box	5	4191020400404
					597	3 lb. Box	3	41910204004045
					2500	Bulk Pail	N/A	3191020400400
#8 x 2"	N/A	1.240"	0.320"	T20+	161	1 lb. Box	5	4191020400504
					465	3 lb. Box	3	41910204005045
					1500	Bulk Pail	N/A	3191020400500
#8 x 2-1/2"	N/A	1.340"	0.320"	T20+	133	1 lb. Box	5	4191020400604
					375	3 lb. Box	3	41910204006045
					618	5 lb. Box	3	4191020400607
					1500	Bulk Pail	N/A	3191020400600

NOTE: Only sold in master cartons.
* Bit not included.

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PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD YELLOW ZINC

PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD SIZE	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#9 x 2-1/2"	N/A	1.655"	0.340"	T20+	116	1 lb. Box	5	4191020450604
					1500	Bulk Pail	N/A	3191020450600
#9 x 3-1/4"	N/A	1.810"	0.340"	T20+	89	1 lb. Box	5	4191020450804
					1500	Bulk Pail	N/A	3191020450800
#10 x 1-1/2"	N/A	1.000"	0.390"	T20+	133	1 lb. Box	5	4191020500404
					2500	Bulk Pail	N/A	3191020500400
#10 x 2"	N/A	1.250"	0.390"	T20+	107	1 lb. Box	5	4191020500504
					1500	Bulk Pail	N/A	3191020500500
#10 x 2-1/2"	N/A	1.600"	0.390"	T20+	87	1 lb. Box	5	4191020500604
					230	3 lb. Box	3	41910205006045
					1500	Bulk Pail	N/A	3191020500600
#10 x 2-3/4"	N/A	1.600"	0.390"	T20+	1500	Bulk Pail	N/A	3191020500690
#10 x 3"	N/A	1.600"	0.390"	T20+	16	Retail Pax®*	10	4191020500752
					72	1 lb. Box	5	4191020500754
					200	3 lb. Box	3	41910205007545
					322	5 lb. Box	3	4191020500757
					1500	Bulk Pail	N/A	3191020500750
#10 x 3-1/2"	N/A	2.375"	0.390"	T20+	57	1 lb. Box	5	4191020500904
					170	3 lb. Box	3	41910205009045
					1500	Bulk Pail	N/A	3191020500900
#14 x 3-1/2"	N/A	2.400"	0.450"	T30+	10	Retail Pax®*	10	4191020600902
#14 x 4"	N/A	2.400"	0.450"	T30+	8	Retail Pax®*	10	4191020601002
					1000	Bulk Pail	N/A	3191020601000
#14 x 4-3/4"	N/A	2.650"	0.450"	T30+	8	Retail Pax®*	10	4191020601202

NOTE: Only sold in master cartons.
* Bit not included.

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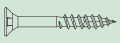
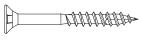
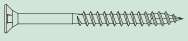
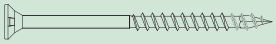
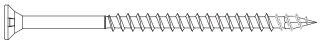
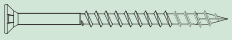
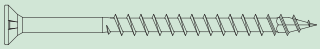
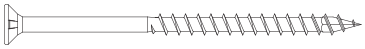
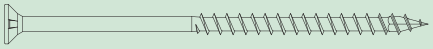
PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD YELLOW ZINC

FASTENER LENGTHS

Not actual size.

PART LENGTH	HEAD	FASTENER	PART LENGTH	HEAD	FASTENER
#8 x 1-1/4"			#10 x 2"		
#8 x 1-1/2"			#10 x 2-1/2"		
#8 x 2"			#10 x 3"		
#8 x 2-1/2"			#10 x 3-1/2"		
#9 x 2-1/2"			#14 x 3-1/2"		
#9 x 3-1/4"			#14 x 4"		
#10 x 1-1/2"			#14 x 4-3/4"		

MASONRY & CONCRETE PRE-DRILL SPECIFICATIONS

SCREW DIAMETER	DRILL BIT	WEIGHT
#8/9	1/8"	Light
#10	5/32"	Medium
#14	3/16"	Medium

NOTE: In masonry/concrete, pre-drill a hole at least 1/4" to 1/2" longer than the length of the screw (refer to chart). No anchor required. In sheet metal, no pre-drilling is required up to 24 gauge.

PERFORMANCE SPECIFICATIONS

DrJ TER No. 2010-02
Construction Screw Properties

DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2,3,4]					
	SOUTHERN PINE (SG=0.55)		DOUGLAS-FIR (SG=0.50)		HEM FIR & SPRUCE-PINE-FIR (SG=0.42)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#8	175	157	133	157	127	123
#9	190	303	146	211	132	177
#10	190	315	176	238	144	177

DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2,3,4]					
	SOUTHERN PINE (SG=0.55)		LAMINATED VENEER LUMBER (SG=0.50)		HEM FIR & SPRUCE-PINE-FIR (SG=0.42)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#14 (Dry)	205	240	180	350	130	190
#14 (Wet)	140	155	-	-	95	135

1. Tabulated withdrawal and head pull-through design values (W) and (W_H) are shown at a C_D = 1.0. Tabulated withdrawal and head pull-through values shall be adjusted by all applicable adjustment factors per *NDS Table 11.3.1.*
2. Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
3. Head pull-through values for #8 diameter and larger in Southern Pine, Douglas-Fir, Hem-Fir and Spruce-Pine-Fir are minimum 1.5" side member thickness.
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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DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2]											
	PLYWOOD 15/32" (0.39)		PLYWOOD 19/32" (0.39)		PLYWOOD 23/32" (0.50)		OSB 15/32" (0.50)		OSB 19/32" (0.50)		OSB 23/32" (0.50)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#8	51	120	83	120	162	212	36	68	48	78	52	110
#9	51	125	92	145	186	258	54	68	54	78	66	110
#10	90	151	92	177	186	293	54	78	54	78	66	110

1. Tabulated withdrawal and head pull-through design values (W) and (W_H) are shown at a C_D = 1.0. Tabulated withdrawal and head pull-through values shall be adjusted by all applicable adjustment factors per *NDS Table 11.3.1*.
2. Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
3. Head pull-through values for #8 diameter and larger in Southern Pine, Douglas-Fir, Hem-Fir and Spruce-Pine-Fir are minimum 1.5" side member thickness.
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.

DIAMETER	BENDING YIELD STRENGTH[1] , f_{yb} (psi)	ALLOWABLE STEEL STRENGTH (lbs)	
		TENSILE	SHEAR[2]
#8	187,000	460	345
#9	201,000	540	435
#10	187,000	690	545

1. Bending yield strength, f_{yb}, is determined in accordance with *ASTM F1575* using minor thread diameter when fastener is tested in thread section.
2. Shear strength is determined in accordance withh *AISI S904* using minor thread diameter when fastener is tested in threaded section.

DIAMETER	REFERENCE LATERAL SHEAR VALUE[4,5,6], Z (lbf)				
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	WOOD SPECIES (SPECIFIC GRAVITY[2,3])		
			SP (0.55)	DF-L (0.50)	SPF/HF (0.42)
#8 x 1-1/2"	3/4"	3/4"	70	59	43
#8 x 1-3/4"	1"	3/4"	80	69	50
#8 x 2"	1-1/4"	3/4"	80	70	55
#8 x 2-1/2"	1"	1-1/2"	84	75	58
#9 x 2-1/2"	1"	1-1/2"	105	92	73
#9 x 3-1/4"	1-3/4"	1-1/2"	116	106	90
#10 x 1-1/2"	3/4"	3/4"	86	72	53
#10 x 2"	1-1/4"	3/4"	112	99	73
#10 x 2-1/2"	1"	1-1/2"	115	101	81
#10 x 2-3/4"	1-1/4"	1-1/2"	132	117	91
#10 x 3"	1-1/2"	1-1/2"	132	121	103
#10 x 3-1/2"	1-1/2"	1-1/2"	132	121	103
#14 x 2"	1-1/4"	3/4"	145	121	88

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 the 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 orientation shall be perpendicular to the 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 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 11.3.1*.

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PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD YELLOW ZINC

DIAMETER	REFERENCE LATERAL SHEAR VALUE[4,5,6], Z (lbf)				
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	WOOD SPECIES (SPECIFIC GRAVITY[2,3])		
			SP (0.55)	DF-L (0.50)	SPF/HF (0.42)
#14 x 2-1/2"	1"	1-1/2"	151	134	109
#14 x 3"	1-1/2"	1-1/2"	187	171	133
#14 x 3-1/2"	2"	1-1/2"	187	172	146
#14 x 4"	3"	1-1/3"	187	172	146
#14 x 4-1/2"	4"	1-1/4"	187	172	146

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 the 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 orientation shall be perpendicular to the 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 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 11.3.1.*

DIAMETER	REFERENCE LATERAL SHEAR VALUE, Z (lbf)			
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	REFERENCE LATERAL SHEAR VALUE[1,3,4], Z (lbf)	
			OSB[5] (0.50)	PLYWOOD[5] (0.39)
#8 x 1-1/4"	13/16"	7/16"	40	-
#8 x 1-1/4"	25/32"	15/32"	40	33
#8 x 1-1/4"	21/32"	19/32"	42	32
#8 x 1-1/2"	1-1/16"	7/16"	51	-
#8 x 1-1/2"	1-1/32"	15/32"	50	44
#8 x 1-1/2"	29/32"	19/32"	49	41
#8 x 1-1/2"	25/32"	23/32"	51	39
#8 x 1-3/4"	1-5/16"	7/16"	53	-
#8 x 1-3/4"	1-9/32"	15/32"	54	46
#8 x 1-3/4"	1-5/32"	19/32"	59	48
#8 x 1-3/4"	1-1/32"	23/32"	58	48
#8 x 2"	1-9/16"	7/16"	53	-
#8 x 2"	1-17/32"	15/32"	54	46
#8 x 2"	1-13/32"	19/32"	59	48
#8 x 2"	1-9/32"	23/32"	64	51
#8 x 2-1/2"	1-9/16"	7/16	53	-
#8 x 2-1/2"	1-17/32"	15/32	54	46
#8 x 2-1/2"	1-13/32"	19/32	59	48
#8 x 2-1/2"	1-9/32"	23/32	64	51
#9 x 2-1/2"	2-1/16"	7/16"	71	-

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 (SG = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to the 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 the 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 appplicable 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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PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD YELLOW ZINC

DIAMETER	REFERENCE LATERAL SHEAR VALUE, Z (lbf)			
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	REFERENCE LATERAL SHEAR VALUE[1,3,4], Z (lbf)	
			OSB[5] (0.50)	PLYWOOD[5] (0.39)
#9 x 2-1/2"	2-1/32"	15/32"	71	62
#9 x 2-1/2"	1-29/32"	19/32"	76	63
#9 x 2-1/2"	1-25/32"	23/32"	81	66
#10 x 1-1/4"	13/16"	7/16"	48	-
#10 x 1-1/4"	25/32"	15/32"	48	40
#10 x 1-1/2"	1-1/16"	7/16"	61	-
#10 x 1-1/2"	1-1/32"	15/32"	60	53
#10 x 1-1/2"	29/32"	19/32"	60	49
#10 x 1-1/2"	25/32"	23/32"	63	48
#10 x 2"	1-9/16"	7/16"	80	-
#10 x 2"	1-17/32"	15/32"	81	70
#10 x 2"	1-13/32"	19/32"	85	72
#10 x 2"	1-9/32"	23/32"	83	71
#10 x 2-1/2"	2-1/16"	7/16"	80	-
#10 x 2-1/2"	1-17/32"	15/32"	81	70
#10 x 2-1/2"	1-29/32"	19/32"	85	72
#10 x 2-1/2"	1-25/32"	23/32"	90	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 (SG = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to the 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 the 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 appplicable 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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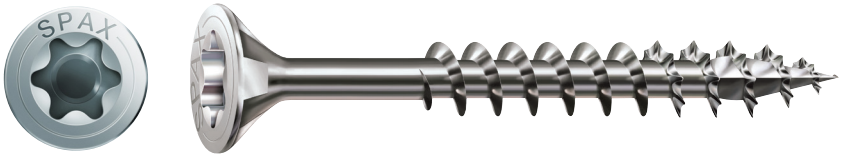
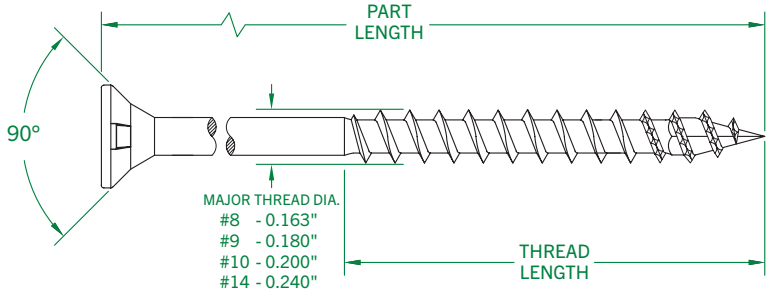
PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD HCR-X™



T-STAR *plus* FLAT HEAD HCR-X™

SPAX® T-STAR *plus* Flat Head fasteners with HCR-X™ coating are designed for use in multiple material connections often found outside residential domains. These "work horse" construction fasteners are designed to countersink in treated lumber for a clean-flush finish and provides a quick and easy installation. In addition, they provide long-lasting, "contractor proven" secure connections. Cold-rolled "carbon steel" wire, heat treated and plated with a HCR-X™ finish to prevent red rust. "HCR-X™" is tested and recognized for use in ground contact pressure treated lumber for exterior, freshwater general construction applications (e.g. AWPA UC1-UC4A, UCFA). SPAX® recommends stainless steel for cedar and redwood attachment applications.



PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD SIZE	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#8 x 1-1/4"	N/A	0.670"	0.320"	T20+	230	1 lb. Box	5	4191670400324
					1150	5 lb. Box	3	4191670400327
					2500	Bulk Pail	N/A	3191670400320
#8 x 1-1/2"	N/A	0.870"	0.320"	T20+	25	Retail Pax®*	10	4191670400402
					195	1 lb. Box	5	4191670400404
					550	3 lb. Box	3	41916704004045
					975	5 lb. Box	3	4191670400407
					2500	Bulk Pail	N/A	3191670400400
#8 x 2"	N/A	1.240"	0.320"	T20+	154	1 lb. Box	5	4191670400504
					465	3 lb. Box	3	41916704005045
					770	5 lb. Box	3	4191670400507
					1500	Bulk Pail	N/A	3191670400500

NOTE: Only sold in master cartons.
* Bit not included.

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PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD HCR-X™

PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD SIZE	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#8 x 2-1/2"	N/A	1.340"	0.320"	T20+	124	1 lb. Box	5	4191670400604
					375	3 lb. Box	3	41916704006045
					1500	Bulk Pail	N/A	3191670400600
#9 x 2-1/2"	N/A	1.655"	0.340"	T20+	109	1 lb. Box	5	4191670450604
					310	3 lb. Box	3	41916704506045
					1500	Bulk Pail	N/A	3191670450600
#9 x 3-1/4"	N/A	1.810"	0.340"	T20+	83	1 lb. Box	5	4191670450804
					245	3 lb. Box	3	41916704508045
					1500	Bulk Pail	N/A	3191670450800
#10 x 1-1/2"	N/A	1.000"	0.390"	T20+	125	1 lb. Box	5	4191670500404
					625	5 lb. Box	3	4191670500407
					2500	Bulk Pail	N/A	3191670500400
#10 x 2"	N/A	1.250"	0.390"	T20+	99	1 lb. Box	5	4191670500504
					277	3 lb. Box	3	41916705005045
					474	5 lb. Box	3	4191670500507
					1500	Bulk Pail	N/A	3191670500500
#10 x 2-1/2"	N/A	1.600"	0.390"	T20+	81	1 lb. Box	5	4191670500604
					235	3 lb. Box	3	41916705006045
					388	5 lb. Box	3	4191670500607
					1500	Bulk Pail	N/A	3191670500600
#10 x 3"	N/A	1.600"	0.390"	T20+	16	Retail Pax®*	10	4191670500752
					67	1 lb. Box	5	4191670500754
					200	3 lb. Box	3	41916705007545
					335	5 lb. Box	3	4191670500757
					225	Mini Pail	3	4191670500758
					1500	Bulk Pail	N/A	3191670500750
#10 x 3-1/2"	N/A	2.375"	0.390"	T20+	59	1 lb. Box	5	4191670500904
					177	3 lb. Box	3	41916705009045
					1500	Bulk Pail	N/A	3191670500900
#14 x 1"	Full	N/A	0.450"	T30+	115	1 lb. Box	5	4191670600254
					1500	Bulk Pail	N/A	3191670600250
#14 x 1-1/4"	Full	N/A	0.450"	T30+	97	1 lb. Box	5	4191670600324
					1500	Bulk Pail	N/A	3191670600320
#14 x 1-1/2"	Full	N/A	0.450"	T30+	90	1 lb. Box	5	4191670600404
					1500	Bulk Pail	N/A	3191670600400

NOTE: Only sold in master cartons.
* Bit not included.

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PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD HCR-X™

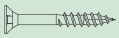
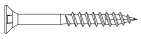
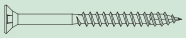
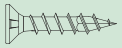
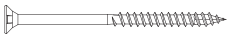
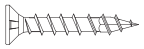
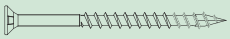
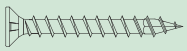
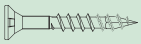
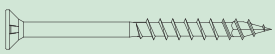
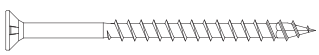
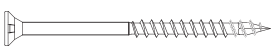
PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD SIZE	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#14 x 2"	Full	N/A	0.450"	T30+	65	1 lb. Box	5	4191670600504
					1500	Bulk Pail	N/A	3191670600500
#14 x 2-1/2"	N/A	1.600"	0.450"	T30+	55	1 lb. Box	5	4191670600604
					1000	Bulk Pail	N/A	3191670600600
#14 x 3"	N/A	1.600"	0.450"	T30+	10	Retail Pax®*	10	4191670600752
					1000	Bulk Pail	N/A	3191670600750
#14 x 3-1/2"	N/A	2.400"	0.450"	T30+	10	Retail Pax®*	10	4191670600902
					1000	Bulk Pail	N/A	3191670600900
#14 x 4"	N/A	2.400"	0.450"	T30+	8	Retail Pax®*	10	4191670601002
					1000	Bulk Pail	N/A	3191670601000
#14 x 4-3/4"	N/A	2.650"	0.450"	T30+	8	Retail Pax®*	10	4191670601202
					750	Bulk Pail	N/A	3191670601200

NOTE: Only sold in master cartons.
* Bit not included.

FASTENER LENGTHS

Not actual size.

PART LENGTH	HEAD	FASTENER	PART LENGTH	HEAD	FASTENER
#8 x 1-1/4"			#10 x 3-1/2"		
#8 x 1-1/2"			#14 x 1"		
#8 x 2"			#14 x 1-1/4"		
#8 x 2-1/2"			#14 x 1-1/2"		
#9 x 2-1/2"			#14 x 2"		
#9 x 3-1/4"			#14 x 2-1/2"		
#10 x 1-1/2"			#14 x 3"		
#10 x 2"			#14 x 3-1/2"		
#10 x 2-1/2"			#14 x 4"		
#10 x 3"			#14 x 4-3/4"		

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PRODUCT SUBMITTAL

T-STAR *plus* FLAT HEAD HCR-X™

MASONRY & CONCRETE PRE-DRILL SPECIFICATIONS

SCREW DIAMETER	DRILL BIT	WEIGHT
#8/9	1/8"	Light
#10	5/32"	Medium
#14	3/16"	Medium

NOTE: In masonry/concrete, pre-drill a hole at least 1/4" to 1/2" longer than the length of the screw (refer to chart). No anchor required. In sheet metal, no pre-drilling is required up to 24 gauge.

PERFORMANCE SPECIFICATIONS

Dr J TER No. 2010-02
Construction Screw Properties

DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2,3,4]					
	SOUTHERN PINE (SG=0.55)		DOUGLAS-FIR (SG=0.50)		HEM FIR & SPRUCE-PINE-FIR (SG=0.42)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#8	175	157	133	157	127	123
#9	190	303	146	211	132	177
#10	190	315	176	238	144	177

DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2,3,4]					
	SOUTHERN PINE (SG=0.55)		LAMINATED VENEER LUMBER (SG=0.50)		HEM FIR & SPRUCE-PINE-FIR (SG=0.42)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#14 (Dry)	205	240	180	350	130	190
#14 (Wet)	140	155	-	-	95	135

DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2]											
	PLYWOOD 15/32" (0.39)		PLYWOOD 19/32" (0.39)		PLYWOOD 23/32" (0.50)		OSB 15/32" (0.50)		OSB 19/32" (0.50)		OSB 23/32" (0.50)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#8	51	120	83	120	162	212	36	68	48	78	52	110
#9	51	125	92	145	186	258	54	68	54	78	66	110
#10	90	151	92	177	186	293	54	78	54	78	66	110

1. Tabulated withdrawal and head pull-through design values (W) and (W_H) are shown at a C_D = 1.0. Tabulated withdrawal and head pull-through values shall be adjusted by all applicable adjustment factors per *NDS Table 11.3.1.*
2. Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
3. Head pull-through values for #8 diameter and larger in Southern Pine, Douglas-Fir, Hem-Fir and Spruce-Pine-Fir are minimum 1.5" side member thickness.
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.

DIAMETER	BENDING YIELD STRENGTH[1] , f_{yb} (psi)	ALLOWABLE STEEL STRENGTH (lbs)	
		TENSILE	SHEAR[2]
#8	187,000	460	345
#9	201,000	540	435
#10	187,000	690	545

1. Bending yield strength, f_{yb}, is determined in accordance with *ASTM F1575* using minor thread diameter when fastener is tested in thread section.
2. Shear strength is determined in accordance with *AISI S904* using minor thread diameter when fastener is tested in threaded section.

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DIAMETER	REFERENCE LATERAL SHEAR VALUE[4,5,6], Z (lbf)				
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	WOOD SPECIES (SPECIFIC GRAVITY[2,3])		
			SP (0.55)	DF-L (0.50)	SPF/HF (0.42)
#8 x 1-1/2"	3/4"	3/4"	70	59	43
#8 x 1-3/4"	1"	3/4"	80	69	50
#8 x 2"	1-1/4"	3/4"	80	70	55
#8 x 2-1/2"	1"	1-1/2"	84	75	58
#9 x 2-1/2"	1"	1-1/2"	105	92	73
#9 x 3-1/4"	1-3/4"	1-1/2"	116	106	90
#10 x 1-1/2"	3/4"	3/4"	86	72	53
#10 x 2"	1-1/4"	3/4"	112	99	73
#10 x 2-1/2"	1"	1-1/2"	115	101	81
#10 x 2-3/4"	1-1/4"	1-1/2"	132	117	91
#10 x 3"	1-1/2"	1-1/2"	132	121	103
#10 x 3-1/2"	1-1/2"	1-1/2"	132	121	103
#14 x 2"	1-1/4"	3/4"	145	121	88
#14 x 2-1/2"	1"	1-1/2"	151	134	109
#14 x 3"	1-1/2"	1-1/2"	187	171	133
#14 x 3-1/2"	2"	1-1/2"	187	172	146
#14 x 4"	3"	1-1/3"	187	172	146
#14 x 4-1/2"	4"	1-1/4"	187	172	146

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 the 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 orientation shall be perpendicular to the 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 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 11.3.1*.

DIAMETER	REFERENCE LATERAL SHEAR VALUE, Z (lbf)			
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	REFERENCE LATERAL SHEAR VALUE[1,3,4], Z (lbf)	
			OSB[5] (0.50)	PLYWOOD[5] (0.39)
#8 x 1-1/4"	13/16"	7/16"	40	-
#8 x 1-1/4"	25/32"	15/32"	40	33
#8 x 1-1/4"	21/32"	19/32"	42	32
#8 x 1-1/2"	1-1/16"	7/16"	51	-
#8 x 1-1/2"	1-1/32"	15/32"	50	44
#8 x 1-1/2"	29/32"	19/32"	49	41
#8 x 1-1/2"	25/32"	23/32"	51	39
#8 x 1-3/4"	1-5/16"	7/16"	53	-
#8 x 1-3/4"	1-9/32"	15/32"	54	46
#8 x 1-3/4"	1-5/32"	19/32"	59	48
#8 x 1-3/4"	1-1/32"	23/32"	58	48
#8 x 2"	1-9/16"	7/16"	53	-

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DIAMETER	REFERENCE LATERAL SHEAR VALUE, Z (lbf)			
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	REFERENCE LATERAL SHEAR VALUE[1,3,4], Z (lbf)	
			OSB[5] (0.50)	PLYWOOD[5] (0.39)
#8 x 2"	1-17/32"	15/32"	54	46
#8 x 2"	1-13/32"	19/32"	59	48
#8 x 2"	1-9/32"	23/32"	64	51
#8 x 2-1/2"	1-5/16"	7/16"	51	46
#8 x 2-1/2"	1-9/32"	15/32"	52	48
#8 x 2-1/2"	1-5/32"	19/32"	57	51
#9 x 2-1/2"	2-1/16"	7/16"	71	-
#9 x 2-1/2"	2-1/32"	15/32"	71	62
#9 x 2-1/2"	1-29/32"	19/32"	76	63
#9 x 2-1/2"	1-25/32"	23/32"	81	66
#10 x 1-1/4"	13/16"	7/16"	48	-
#10 x 1-1/4"	25/32"	15/32"	48	40
#10 x 1-1/2"	1-1/16"	7/16"	61	-
#10 x 1-1/2"	1-1/32"	15/32"	60	53
#10 x 1-1/2"	29/32"	19/32"	60	49
#10 x 1-1/2"	25/32"	23/32"	63	48
#10 x 2"	1-9/16"	7/16"	80	-
#10 x 2"	1-17/32"	15/32"	81	70
#10 x 2"	1-13/32"	19/32"	85	72
#10 x 2"	1-9/32"	23/32"	83	71
#10 x 2-1/2"	2-1/16"	7/16"	80	-
#10 x 2-1/2"	1-17/32"	15/32"	81	70
#10 x 2-1/2"	1-29/32"	19/32"	85	72
#10 x 2-1/2"	1-25/32"	23/32"	90	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 (SG = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to the 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 the 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 appplicable 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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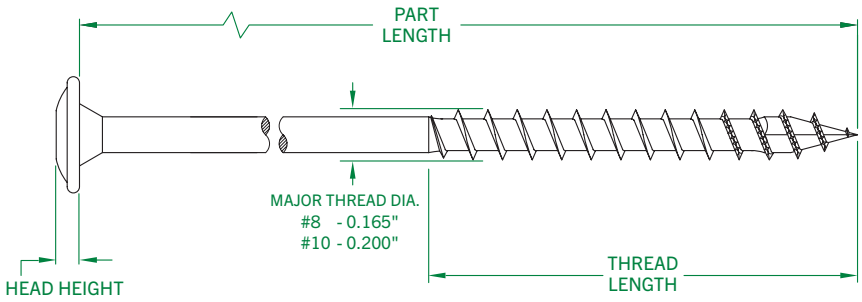
PRODUCT SUBMITTAL

T-STAR *plus* WAFER HEAD YELLOW ZINC

T-STAR *plus* WAFER HEAD YELLOW ZINC

SPAX® T-STAR *plus* Wafer Head fasteners with yellow zinc coating are designed for use in multiple material connections often found inside residential buildings. These fasteners are designed with a low profile large diameter wafer head for applications requiring additional surface area under the head for superior pull-down force. Ideal for the installation of cabinetry where a flush or countersunk installation is not possible or desired. Cold-rolled "carbon steel" wire, heat treated and plated with a yellow zinc finish to prevent red rust. "Yellow zinc" is tested and recognized for use in above ground contact pressure treated lumber for interior dry/damp general construction applications (e.g. AWPA UC1-UC2).



PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD DIA. HEAD HT.	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#8 x 1-1/4"	N/A	0.670"	0.375" 0.080"	T20+	195	1 lb. Box	5	4281020400324
					951	5 lb. Box	3	4281020400327
					2500	Bulk Pail	N/A	3281020400320
#8 x 1-1/2"	N/A	0.875"	0.375" 0.080"	T20+	175	1 lb. Box	5	4281020400404
					2500	Bulk Pail	N/A	3281020400400
#8 x 2"	N/A	1.250"	0.375" 0.080"	T20+	140	1 lb. Box	5	4281020400504
					1500	Bulk Pail	N/A	3281020400500
#8 x 2-1/2"	N/A	1.375"	0.375" 0.080"	T20+	120	1 lb. Box	5	4281020400604
					550	5 lb. Box	3	4281020400607
					1500	Bulk Pail	N/A	3281020400600

NOTE: Only sold in master cartons.

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PRODUCT SUBMITTAL

T-STAR *plus* WAFER HEAD YELLOW ZINC

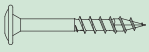
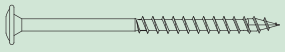
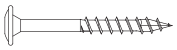
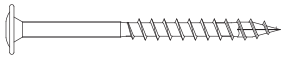
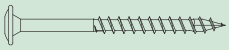
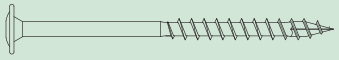
PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD DIA. HEAD HT.	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#10 x 2-1/2"	N/A	1.500"	0.470" 0.085"	T20+	75	1 lb. Box	5	4281020500604
					220	3 lb. Box	3	42810205006045
					375	5 lb. Box	3	4281020500607
					1500	Bulk Pail	N/A	3281020500600
#10 x 3"	N/A	1.625"	0.470" 0.085"	T20+	65	1 lb. Box	5	4281020500754
					185	3 lb. Box	3	42810205007545
					311	5 lb. Box	3	4281020500757
					1000	Bulk Pail	N/A	3281020500750

NOTE: Only sold in master cartons.

FASTENER LENGTHS

Not actual size.

PART LENGTH	HEAD	FASTENER	PART LENGTH	HEAD	FASTENER
#8 x 1-1/4"			#8 x 2-1/2"		
#8 x 1-1/2"			#10 x 2-1/2"		
#8 x 2"			#10 x 3"		

MASONRY & CONCRETE PRE-DRILL SPECIFICATIONS

SCREW DIAMETER	DRILL BIT	WEIGHT
#8	1/8"	Light
#10	5/32"	Medium

NOTE: In masonry/concrete, pre-drill a hole at least 1/4" to 1/2" longer than the length of the screw (refer to chart). No anchor required. In sheet metal, no pre-drilling is required up to 24 gauge.

PERFORMANCE SPECIFICATIONS

DrJ TER No. 2010-02
Construction Screw Properties

DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2,3,4]					
	SOUTHERN PINE (SG=0.55)		DOUGLAS-FIR (SG=0.50)		HEM FIR & SPRUCE-PINE-FIR (SG=0.42)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#8	175	335	133	297	127	268
#10	190	461	176	387	144	338

1. Tabulated withdrawal and head pull-through design values (W) and (W_H) are shown at a C_D = 1.0. Tabulated withdrawal and head pull-through values shall be adjusted by all applicable adjustment factors per *NDS Table 11.3.1.*
2. Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
3. Head pull-through values for #8 diameter and larger in Southern Pine, Douglas-Fir, Hem-Fir and Spruce-Pine-Fir are minimum 1.5" side member thickness.
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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PRODUCT SUBMITTAL

T-STAR *plus* WAFER HEAD YELLOW ZINC

DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2]											
	PLYWOOD 15/32" (0.39)		PLYWOOD 19/32" (0.39)		PLYWOOD 23/32" (0.50)		OSB 15/32" (0.50)		OSB 19/32" (0.50)		OSB 23/32" (0.50)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#8	51	146	83	190	162	319	36	86	48	110	52	131
#10	90	183	92	246	186	322	54	87	54	126	66	131

1. Tabulated withdrawal and head pull-through design values (W) and (W_H) are shown at a C_D = 1.0. Tabulated withdrawal and head pull-through values shall be adjusted by all applicable adjustment factors per *NDS Table 11.3.1.*
2. Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
3. Head pull-through values for #8 diameter and larger in Southern Pine, Douglas-Fir, Hem-Fir and Spruce-Pine-Fir are minimum 1.5" side member thickness.
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.

DIAMETER	BENDING YIELD STRENGTH[1], f_{yb} (psi)	ALLOWABLE STEEL STRENGTH (lbs)	
		TENSILE	SHEAR[2]
#8	187,000	460	345
#10	187,000	690	545

1. Bending yield strength, f_{yb}, is determined in accordance with *ASTM F1575* using minor thread diameter when fastener is tested in thread section.
2. Shear strength is determined in accordance withh *AISI S904* using minor thread diameter when fastener is tested in threaded section.

DIAMETER	REFERENCE LATERAL SHEAR VALUE[4,5,6], Z (lbf)				
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	WOOD SPECIES (SPECIFIC GRAVITY[2,3])		
			SP (0.55)	DF-L (0.50)	SPF/HF (0.42)
#8 x 1-1/2"	3/4"	3/4"	70	59	43
#8 x 2"	1-1/4"	3/4"	80	70	55
#8 x 2-1/2"	1"	1-1/2"	84	75	58
#10 x 1-1/2"	3/4"	3/4"	86	72	53
#10 x 2"	1-1/4"	3/4"	112	99	73
#10 x 2-1/2"	1"	1-1/2"	115	101	81
#10 x 3"	1-1/2"	1-1/2"	132	121	103

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 the 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 orientation shall be perpendicular to the 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 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 11.3.1.*

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DIAMETER	REFERENCE LATERAL SHEAR VALUE, Z (lbf)			
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	REFERENCE LATERAL SHEAR VALUE[1,3,4], Z (lbf)	
			OSB[5] (0.50)	PLYWOOD[5] (0.39)
#8 x 1-1/4"	13/16"	7/16"	40	-
#8 x 1-1/4"	25/32"	15/32"	40	33
#8 x 1-1/4"	21/32"	19/32"	42	32
#8 x 1-1/2"	1-1/16"	7/16"	51	-
#8 x 1-1/2"	1-1/32"	15/32"	50	44
#8 x 1-1/2"	29/32"	19/32"	49	41
#8 x 1-1/2"	25/32"	23/32"	51	39
#8 x 2"	1-9/16"	7/16"	53	-
#8 x 2"	1-17/32"	15/32"	54	46
#8 x 2"	1-13/32"	19/32"	59	48
#8 x 2"	1-9/32"	23/32"	64	51
#8 x 2-1/2"	1-5/16"	7/16"	51	46
#8 x 2-1/2"	1-9/32"	15/32"	52	48
#8 x 2-1/2"	1-5/32"	19/32"	57	51
#10 x 2-1/2"	2-1/16"	7/16"	80	-
#10 x 2-1/2"	1-17/32"	15/32"	81	70
#10 x 2-1/2"	1-29/32"	19/32"	85	72
#10 x 2-1/2"	1-25/32"	23/32"	90	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 (SG = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to the 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 the 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 appplicable 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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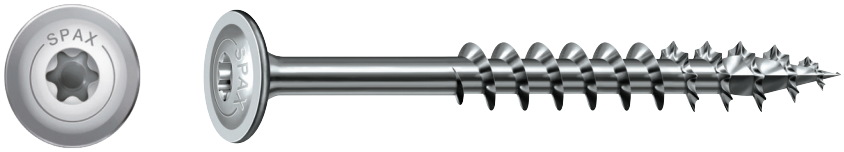
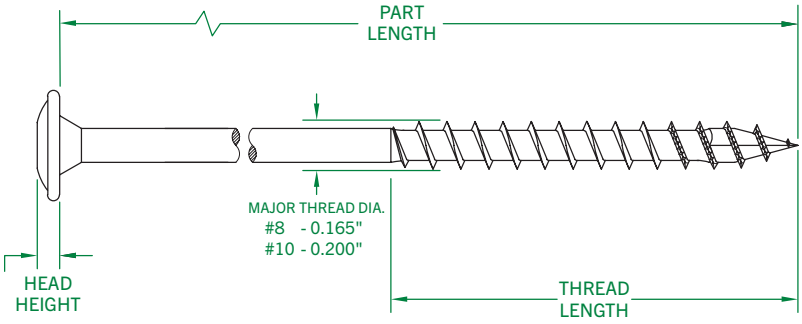
PRODUCT SUBMITTAL

T-STAR *plus* WAFER HEAD HCR-X™



T-STAR *plus* WAFER HEAD HCR-X™

SPAX® T-STAR *plus* Wafer Head fasteners with HCR-X™ coating are designed for use in multiple material connections often found outside residential dwellings. These fasteners are designed with a low profile large diameter wafer head for applications requiring additional surface area under the head for superior pull-down force. Ideal for attaching rail, fencing and out building hardware where a flush or countersunk installation is not possible or desired. Cold-rolled "carbon steel" wire heat treated and plated with a HCR-X™ finish to prevent red rust. "HCR-X™" is tested and recognized for use in ground contact pressure treated lumber for exterior, freshwater general construction applications (e.g. AWPA UC1-UC4A, UCFA). SPAX® recommends stainless steel fasteners for applications with cedar and redwoods.



PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD DIA. HEAD HT.	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#8 x 1-1/4"	N/A	0.670"	0.375" 0.080"	T20+	195	1 lb. Box	5	4281670400324
					2500	Bulk Pail	N/A	3281670400320
#8 x 1-1/2"	N/A	0.875"	0.375" 0.080"	T20+	165	1 lb. Box	5	4281670400404
					495	3 lb. Box	3	42816704004045
					2500	Bulk Pail	N/A	3281670400400
#8 x 2"	N/A	1.250"	0.375" 0.080"	T20+	140	1 lb. Box	5	4281670400504
					1500	Bulk Pail	N/A	3281670400500
#8 x 2-1/2"	N/A	1.375"	0.375" 0.080"	T20+	120	1 lb. Box	5	4281670400604
					1500	Bulk Pail	N/A	3281670400600

NOTE: Only sold in master cartons.

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PRODUCT SUBMITTAL

T-STAR *plus* WAFER HEAD HCR-X™

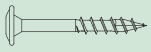
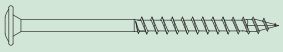
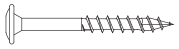
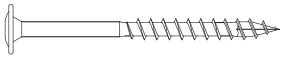
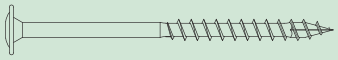
PRODUCT SELECTION

PART LENGTH	THREAD LENGTH		HEAD DIA. HEAD HT.	DRIVE/BIT SIZE	APPROX. QTY.	PKG. TYPE	MASTER QTY.	PART NO.
	FULL	PARTIAL						
#10 x 2-1/2"	N/A	1.500"	0.470" 0.085"	T20+	77	1 lb. Box	5	4281670500604
					1200	Bulk Pail	N/A	3281670500600
#10 x 3"	N/A	1.625"	0.470" 0.085"	T20+	63	1 lb. Box	5	4281670500754
					185	3 lb. Box	3	42816705007545
					1000	Bulk Pail	N/A	3281670500750

NOTE: Only sold in master cartons.

FASTENER LENGTHS

Not actual size.

PART LENGTH	HEAD	FASTENER	PART LENGTH	HEAD	FASTENER
#8 x 1-1/4"			#8 x 2-1/2"		
#8 x 1-1/2"			#10 x 2-1/2"		
#8 x 2"			#10 x 3"		

MASONRY & CONCRETE PRE-DRILL SPECIFICATIONS

SCREW DIAMETER	DRILL BIT	WEIGHT
#8	1/8"	Light
#10	5/32"	Medium

NOTE: In masonry/concrete, pre-drill a hole at least 1/4" to 1/2" longer than the length of the screw (refer to chart). No anchor required. In sheet metal, no pre-drilling is required up to 24 gauge.

PERFORMANCE SPECIFICATIONS

DrJ TER No. 2010-02
Construction Screw Properties

DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2,3,4]					
	SOUTHERN PINE (SG=0.55)		DOUGLAS-FIR (SG=0.50)		HEM FIR & SPRUCE-PINE-FIR (SG=0.42)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#8	175	335	133	297	127	268
#10	190	461	176	387	144	338

1. Tabulated withdrawal and head pull-through design values (W) and (W_H) are shown at a C_D = 1.0. Tabulated withdrawal and head pull-through values shall be adjusted by all applicable adjustment factors per *NDS Table 11.3.1.*
2. Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
3. Head pull-through values for #8 diameter and larger in Southern Pine, Douglas-Fir, Hem-Fir and Spruce-Pine-Fir are minimum 1.5" side member thickness.
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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DIAMETER	ALLOWABLE WITHDRAWAL (W) AND HEAD PULL-THROUGH (W_H)[1,2]											
	PLYWOOD 15/32" (0.39)		PLYWOOD 19/32" (0.39)		PLYWOOD 23/32" (0.50)		OSB 15/32" (0.50)		OSB 19/32" (0.50)		OSB 23/32" (0.50)	
	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)	WITHDRAWAL W (lbs./inch)	HEAD PULL-THROUGH W_H (lbs.)
#8	51	146	83	190	162	319	36	86	48	110	52	131
#10	90	183	92	246	186	322	54	87	54	126	66	131

1. Tabulated withdrawal and head pull-through design values (W) and (W_H) are shown at a C_D = 1.0. Tabulated withdrawal and head pull-through values shall be adjusted by all applicable adjustment factors per *NDS Table 11.3.1.*
2. Full withdrawal strength is calculated by multiplying the length of thread embedded in the main member by the tabulated reference withdrawal values.
3. Head pull-through values for #8 diameter and larger in Southern Pine, Douglas-Fir, Hem-Fir and Spruce-Pine-Fir are minimum 1.5" side member thickness.
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.

DIAMETER	BENDING YIELD STRENGTH[1] , f_{yb} (psi)	ALLOWABLE STEEL STRENGTH (lbs)	
		TENSILE	SHEAR[2]
#8	187,000	460	345
#10	187,000	690	545

1. Bending yield strength, f_{yb}, is determined in accordance with *ASTM F1575* using minor thread diameter when fastener is tested in thread section.
2. Shear strength is determined in accordance with *AISI S904* using minor thread diameter when fastener is tested in threaded section.

DIAMETER	REFERENCE LATERAL SHEAR VALUE[4,5,6], Z (lbf)				
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	WOOD SPECIES (SPECIFIC GRAVITY[2,3])		
			SP (0.55)	DF-L (0.50)	SPF/HF (0.42)
#8 x 1-1/2"	3/4"	3/4"	70	59	43
#8 x 2"	1-1/4"	3/4"	80	70	55
#8 x 2-1/2"	1"	1-1/2"	84	75	58
#10 x 2-1/2"	1"	1-1/2"	115	101	81
#10 x 3"	1-1/2"	1-1/2"	132	121	103

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 the 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 orientation shall be perpendicular to the 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 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 11.3.1.*

DIAMETER	REFERENCE LATERAL SHEAR VALUE, Z (lbf)			
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	REFERENCE LATERAL SHEAR VALUE[1,3,4], Z (lbf)	
			OSB[5] (0.50)	PLYWOOD[5] (0.39)
#8 x 1-1/4"	13/16"	7/16"	40	-
#8 x 1-1/4"	25/32"	15/32"	40	33
#8 x 1-1/4"	21/32"	19/32"	42	32

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 (SG = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to the 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 the 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 appplicable 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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DIAMETER	REFERENCE LATERAL SHEAR VALUE, Z (lbf)			
	MINIMUM MAIN MEMBER PENETRATION[1] (in)	MINIMUM SIDE MEMBER THICKNESS (in)	REFERENCE LATERAL SHEAR VALUE[1,3,4], Z (lbf)	
			OSB[5] (0.50)	PLYWOOD[5] (0.39)
#8 x 1-1/2"	1-1/16"	7/16"	51	-
#8 x 1-1/2"	1-1/32"	15/32"	50	44
#8 x 1-1/2"	29/32"	19/32"	49	41
#8 x 1-1/2"	25/32"	23/32"	51	39
#8 x 2"	1-9/16"	7/16"	53	-
#8 x 2"	1-17/32"	15/32"	54	46
#8 x 2"	1-13/32"	19/32"	59	48
#8 x 2"	1-9/32"	23/32"	64	51
#8 x 2-1/2"	1-5/16"	7/16"	51	46
#8 x 2-1/2"	1-9/32"	15/32"	52	48
#8 x 2-1/2"	1-5/32"	19/32"	57	51
#10 x 2-1/2"	2-1/16"	7/16"	80	-
#10 x 2-1/2"	1-17/32"	15/32"	81	70
#10 x 2-1/2"	1-29/32"	19/32"	85	72
#10 x 2-1/2"	1-25/32"	23/32"	90	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 (SG = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to the 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 the 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 appplicable 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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