ICC EVALUATION SERVICE

ICC-ES Evaluation Report

ESR-2761

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings

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EVALUATION SUBJECT:

MITEK PRO SERIES WS, WSWH, WSBH, WSTS AND LUMBERLOK SERIES STRUCTURAL WOOD SCREWS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012, 2009 and 2006 *International Building Code®* (IBC)
- 2018, 2015, 2012, 2009 and 2006 *International Residential Code®* (IRC)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see ESR-2761 LABC and LARC Supplement.

Property evaluated:

Structural

2.0 USES

The MiTek Pro Series WS Hex Head (WS), WSWH Washer Head (WSWH) and WSBH Bugle Head (WSBH) Structural Wood Screws and LumberLok Series Structural Wood Screws (LumberLok) described in this report are used for wood-to-wood and steel-to-wood connections that are designed in accordance with the IBC. The MiTek Pro Series WSTS Truss/Stud Structural Wood Screws (WSTS) described in this report are used for connecting wood trusses to wood top plates to resist uplift and lateral loads. For structures regulated under the IRC, the screws may be used where an engineered design is submitted in accordance with Section R301.1.3 of the IRC.

3.0 DESCRIPTION

3.1 General:

3.1.1 MiTek Pro Series WS, WSWH and WSBHStructural Wood Screws: The MiTek Pro Series WS, WSWH and WSBH Structural Wood Screws are manufactured using a cold-forming process and are heat-treated. The screws have a Type 17 self-drilling (fluted) tip. The WS screws have rolled threads, spaced 10 threads per inch (0.393 thread per millimeter), and a plain (unslotted) hex washer head. The WSWH and WSBH screws have rolled threads spaced 7 threads per inch (0.276 thread per millimeter) or 10 threads per inch (0.393 thread per millimeter). WSWH screws have a flat washer head and WSBH screws have a fluted bugle head. The washer and bugle head styles each have a six lobe recess which accepts a #30 Torx® bit. Screws having a nominal length of 2.5 inches or greater have a built-in reamer to facilitate installation. Table 1 provides a description of the screws and the screw bending yield strengths and allowable tension and shear strengths. See Figure 1B for a diagram of the screws.

3.1.2 MiTek Pro Series WSTS Structural Wood Screws: The MiTek Pro Series WSTS Structural Wood Screws are manufactured using a cold-forming process and are heat-treated. The screws have rolled treads, spaced 8 threads per inch (0.315 thread per millimeter), and a Type 17 self-drilling (fluted) tip. The screw head has a six lobe recess which accepts a #30 Torx® bit. The shank has an asymmetric thread along its entire length, with the thread angle reversed on opposite ends of the screw. Table 1 provides a description of the screws, and the screw bending yield strengths and allowable tension and shear strengths. See Figure 1A for a diagram of the WSTS screws and Figures 2 and 3 for installation guidelines.

3.1.3 LumberLok Series Structural Wood Screws: The LumberLok Series Structural Wood Screws are manufactured using a cold-forming process and are heat-treated. The screws have rolled threads spaced 12 threads per inch (0.472 thread per millimeter) in a twin-lead configuration. The fillister style head has a six-lobe recess that accepts a #20 Torx® bit. The tip style is a sharp gimlet point. Table 1 provides a description of the screws and the screw bending yield strengths and allowable tension and shear strengths. See Figure 1B for a diagram of the LumberLok Series wood screws.

3.2 Materials:

3.2.1 MiTek Structural Wood Screws: The MiTek Structural Wood Screws are manufactured from carbon steel complying with the specifications in the manufacturer's quality documentation and are heat-treated. The WS, WSWH and WSBH screws have either a zinc yellow chromate finish or a proprietary EXT finish. WSTS screws have a multi-layered coating consisting of a zinc yellow

chromate finish and a proprietary EXT finish. LumberLok screws have a multi-layered coating consisting of zinc, a clear trivalent finish and a proprietary gold tone finish.

3.2.2 Wood Members: Wood members must be solid-sawn lumber having a minimum assigned specific gravity as indicated in the Tables in this report, as applicable, or one of the following types of engineered wood structural composite lumbers recognized in an ICC-ES evaluation report: LVL grade 1.3E or higher, LSL grade 1.35E or better, or PSL grade 1.8E or higher, where engineered wood structural composite lumber is addressed in the tables in this report. Assigned specific gravity for solid-sawn lumber must be determined in accordance with Table 12.3.3A of the ANSI/AWC *National Design Specification® for Wood Construction* (NDS) (Table 11.3.3A of NDS-12 for the 2012 IBC; Table 11.3.2A of NDS-05 for the 2009 and 2006 IBC). Engineered wood structural composite lumber must be recognized as having the equivalent specific gravities noted in Tables 2, 3, 4 and 5, as applicable. Solid-sawn wood main members must have a moisture content of less than 19 percent both at the time of screw installation, and in service. For engineered wood structural composite lumber, the moisture content at the time of screw installation and in service must be in accordance with the applicable ICC-ES evaluation report on the engineered wood product. The thickness of the wood main member, t_m, must be equal to or greater than the screw length less the thickness of the side member.

3.2.3 Steel Members: Steel side members with design thicknesses of 0.046 inch, 0.058 inch, 0.074 inch, 0.136 inch, and 0.180 inch (1.2 mm, 1.5 mm, 1.9 mm, 3.5 mm, and 4.6 mm) must have a minimum tensile strength, F_u, of 45 ksi (310.1 MPa). Steel side members with a design thickness of 0.250 inch (6.4 mm) must have a minimum tensile strength, F_u, of 58 ksi (400 MPa). The hole in the steel side member for the WS screws must be predrilled or pre-punched and must have a standard round hole diameter no greater than 0.281 inch (7.14 mm). The hole in the steel side member for the LumberLok screws must be predrilled or pre-punched, and must have a standard round hole diameter no greater than 0.180 inch (4.57 mm). Hole sizes may deviate from these limitations when the screws are recognized in a current ICC-ES evaluation report for use with a specific steel connector.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The design information for the WS, WSWH, WSBH and LumberLok screws used in wood-to-wood and/or steel-to-wood connections designed in accordance with the NDS, is given in Sections 4.1.1 through 4.1.8.

The design information for connections of trusses to wood top plates using the WSTS screws is given in Table 7 and shown in Figures 2 and 3, including all notes.

4.1.1 Governing Design Values: The allowable lateral load for a single-screw connection is the lesser of: (a) the reference lateral design value described in Section 4.1.7, adjusted by all applicable adjustment factors noted in Section 4.1.2; and (b) the allowable screw shear strength given in Table 1. The allowable load for a single-screw connection in which the screw is subject to tension is the least of: (a) the reference withdrawal design value described in Section 4.1.8, multiplied by the thread penetration in the main member and adjusted by all applicable adjustment factors noted in Section 4.1.2, (b) the allowable screw tension strength given in Table 1, and (c) the reference pull-through design value for wood-to-wood connections given in Table 5, as applicable.

4.1.2 Adjustments to Reference Design Values: Reference lateral, withdrawal and pull-through design values given in this report are for allowable stress design, and must be adjusted in accordance with the requirements for dowel-type fasteners in Section 11.3 of the NDS (Section 10.3 of the NDS for the 2012, 2009 and 2006 IBC). Reference head pull-through design values must be adjusted in accordance with Section 11.3 of the 2018 NDS. When the capacity of a connection is controlled by fastener or side plate steel strength, rather than wood strength, the allowable connection strength must not be increased by the adjustment factors specified in the NDS.

4.1.3 Connections with Multiple Screws: Connections containing multiple screws must be designed in accordance with Sections 11.2.2 and 12.6 of the NDS (Sections 10.2.2 and 11.6 of the NDS for the 2012, 2009 and 2006 IBC).

4.1.4 Combined Loading: Where the screws are subjected to combined lateral and withdrawal loads, connections must be designed in accordance with Section 12.4.1 of the NDS (Section 11.4.1 of the NDS for the 2012, 2009 and 2006 IBC).

4.1.5 Design of Metal Parts: Design of connections having steel side members shall comply with Section 11.2.3 of the NDS (Section 10.2.3 of the NDS for the 2012, 2009 and 2006 IBC).

4.1.6 Capacity Requirements for Wood Members: When designing a connection, the structural wood members must be checked for load-carrying capacity in accordance with Section 11.1.2 of the NDS (Section 10.1.2 of the NDS for the 2012, 2009 and 2006 IBC), and local stresses within the connection must be checked according to Appendix E in the NDS to ensure the capacity of the connection and fastener group.

4.1.7 Lateral Design Values: Reference lateral (Z) design values for screws for single shear wood-to-wood connections loaded perpendicular and parallel to grain, are as shown in Table 3. Reference lateral (Z) design values for WS and LumberLok screws for single shear steel-to-wood connections loaded perpendicular and parallel to grain, are as shown in Table 4.

4.1.8 Withdrawal and Pull-through Design Values: Reference withdrawal (W) design values and thread lengths for the screws are shown in Table 2. Reference pull-through (W_H) design values for the screws are provided in Table 5.

4.2 Installation:

WS screws must be installed using a low-speed clutch drill with a $^3/_8$-inch hex-head driver. WSWH, WSBH and WSTS screws must be installed using a low-speed clutch drill with a T30 Torx bit. LumberLok screws must be installed using a low-speed clutch drill with a T20 Torx bit. The screws must be installed perpendicular to the plane of the steel or wood side member. For WS, WSWH and LumberLok screws, the underside of the head must be flush to the surface of the steel or wood side member. For WSBH and WSTS screws, the top of head must be flush with the surface of the wood member. Screws must not be overdriven and should be installed using the minimum amount of torque necessary to drive the screw. Installation may be performed without predrilling wood members.

Edge distances, end distances and spacing of the screws must be sufficient to prevent splitting of the wood, or as required by Table 6 of this report (for the WS, WSWH, WSBH and LumberLok screws), whichever is more restrictive.

WSTS screws must be installed in accordance with footnotes in Table 7 and Figures 2 and 3 of this report.

5.0 CONDITIONS OF USE

The wood screws described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Screws must be installed in accordance with this report and the manufacturer's installation instructions. In the event of a conflict between this report and the manufacturer's published installation instructions, the more restrictive requirements govern.

5.2 Corrosion protection of fasteners is outside the scope of this report.

5.3 Screws are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Alternate Dowel-type Threaded Fasteners (AC233), dated October 2018.

7.0 IDENTIFICATION

7.1 The packaging for the MiTek Pro Series WS, WSWH and WSBH screws is labeled with the designations "MiTek Pro Series" "WSx, WSWHx, or WSBHx" where "x" designates the fastener size; the company name (MiTek) and address; and the ICC-ES evaluation report number (ESR-2761). Each screw head is marked with the letters "USP" and a number designating the screw length, as shown in Table 1.

7.2 The packaging for the MiTek Pro Series WSTS screws is labeled with the designations "MiTek Pro Series;" "WSTSx," where "x" designates the fastener size; the company name (MiTek) and address; and the ICC-ES evaluation report number (ESR-2761). Each screw head is marked with the letters "USP" and a number designating the screw length, as shown in Table 1.

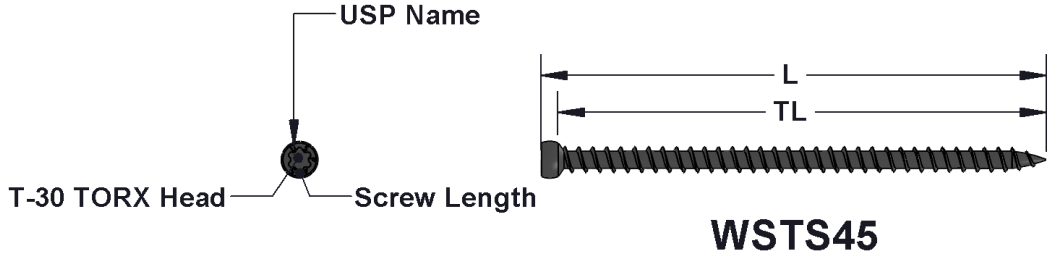
7.3 The packaging for the LumberLok Series screws is labeled with the designation "USP LLx," where "x" designates the fastener size; the company name (MiTek) and address, and the ICC-ES evaluation report number (ESR-2761). Each screw head is marked with the letters "USP" and a number designating the screw length, as shown in Table 1.

TABLE 1—FASTENER SPECIFICATIONS, BENDING YIELD STRENGTH,AND ALLOWABLE SCREW STRENGTH

FASTENER DESIGNATION	HEAD MARKING	SCREW DIMENSIONS[1] (inches)							SPECIFIED BENDING YIELD STRENGTH[2], F_{yb} (psi)	ALLOWABLE SCREW STRENGTH	
		Screw Length (L)	Shank (SH)	Thread Length[1] (T)	Major Diameter	Shank Diameter	Minor (Root) Diameter	Head Diameter		Tension (lbf)	Shear (lbf)
WS Hex Head Screws											
WS15	USP15	1 1/2	1/4	1 1/4	0.254	0.241	0.185	0.540	180,000	1,460	895
WS2	USP 2	2	1/4	1 3/4							
WS25	USP 25	2 1/2	1/4	2 1/4							
WS3	USP 3	3	3/4	2 1/4							
WS35	USP 35	3 1/2	3/4	2 3/4							
WS45	USP 45	4 1/2	1 1/4	3 1/4							
WS5	USP 5	5	1 3/4	3 1/4							
WS6	USP 6	6	1 3/4	4 1/4							
WS8	USP 8	8	4 3/4	3 1/4							
WSWH Washer Head Screws											
WSWH278	USP 278	2 7/8	5/8	2 1/4	0.280	0.241	0.185	0.750	180,000	1,460	895
WSWH338	USP 338	3 3/8	1 1/8	2 1/4							
WSWH358	USP 358	3 5/8	1 3/8	2 1/4							
WSWH45	USP 45	4 1/2	2 1/4	2 1/4							
WSWH5	USP 5	5	2 3/4	2 1/4							
WSWH6	USP 6	6	3 3/4	2 1/4							
WSWH638	USP 638	6 3/8	4 1/8	2 1/4							
WSWH634	USP 634	6 3/4	4 1/2	2 1/4							
WSWH8	USP 8	8	5 3/4	2 1/4							
WSBH Bugle Head Screws											
WSBH25	USP 25	2 1/2	1/4	2 1/4	0.280	0.241	0.185	0.459	180,000	1,460	895
WSBH4	USP 4	4	1 3/4	2 1/4							
WSBH6	USP 6	6	3 3/4	2 1/4							
WSBH8	USP 8	8	5 3/4	2 1/4							
WSBH10	USP 10	10	7 3/4	2 1/4							
LumberLok Series Screws											
LL915	USP1.5	1 3/8	1/4	1 1/8	0.170	See Note 3	0.109	0.365	170,000	450	316
LL930	USP3	2 7/8	1 3/8	1 1/2	0.170	See Note 3	0.109				
WSTS Truss/Stud Screws											
WSTS45	USP45	4.5	—	4.3	0.222	—	0.152	0.330	150,000	876	547
WSTS6	USP6	6	—	5.8		—					

For **SI:** 1 inch = 25.4 mm; 1 lbf = 4.4 N; 1 psi = 6.9 kPa

[1]Refer to Figures 1A and 1B for a depiction of the screw dimensions. The "T" dimension includes the threaded portion of the shank, and the beveled reamer on screws 2 1/2 inches or longer. See Table 2 for thread lengths.
[2]Bending yield strength is determined in accordance with ASTM F1575 using the root diameter. The bending yield strength provided in the table is for informational purposes only, and is not intended for use in calculating reference lateral design values in accordance with NDS. Reference lateral design values for the MiTek Pro Series WS, WSWH and WSBH and LumberLok Series screws are as given in Tables 3 & 4 of this report.
[3]The LL915 screw is almost fully threaded, with an unthreaded shank diameter of 0.170 inch (4.3 mm). The LL930 screw is partially threaded with a stepped smooth shank having diameters of 0.170 inch (4.3 mm) and 0.145 inch (3.7 mm).



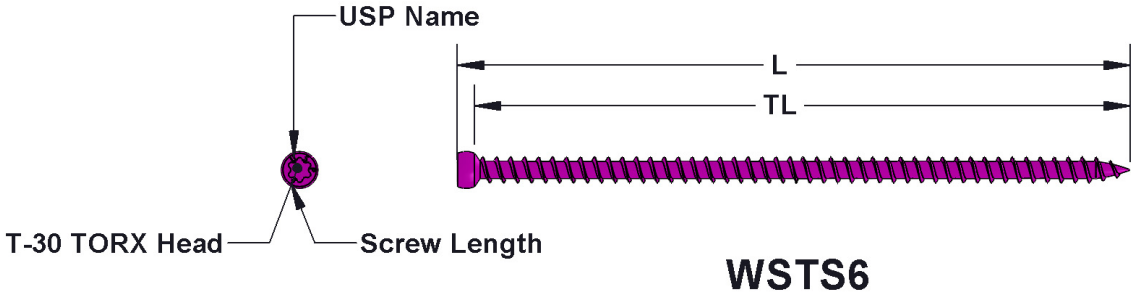


FIGURE 1A—WSTS TRUSS/STUD WOOD SCREWS

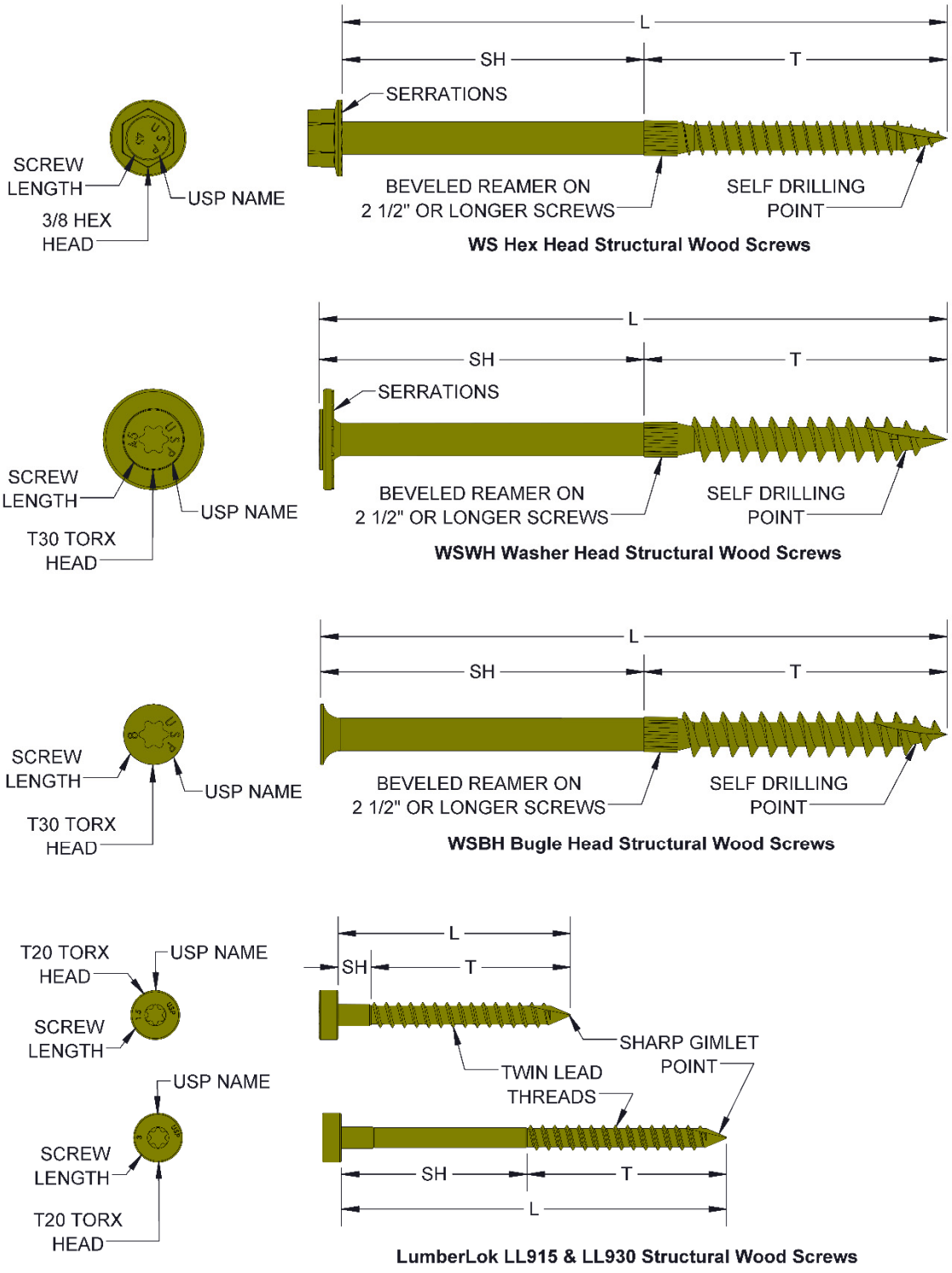


FIGURE 1B—WS, WSWH, WSBH AND LUMBERLOK SCREWS

TABLE 2—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR WS, WSWH, WSBH, AND LUMBERLOK SCREWS [1,2]

FASTENER DESIGNATION	SCREW LENGTH (inches)	THREAD LENGTH (inches)	REFERENCE WITHDRAWAL DESIGN VALUE, *W* (lbs/inch)		
			0.42 ≤ SG < 0.50	SG ≥ 0.50 or PSL & LSL[3]	LVL[3]
WS Hex Head Screws					
WS15	1 1/2	1 1/4	103	164	157
WS2	2	1 3/4	117	160	154
WS25	2 1/2	2	141	199	191
WS3	3	2	141	199	191
WS35	3 1/2	2 1/2	154	208	200
WS45	4 1/2	3	163	214	212
WS5	5	3	163	214	212
WS6	6	4	163	214	212
WS8	8	3	163	214	212
WSWH Washer Head Screws					
WSWH278	2 7/8	2	141	199	191
WSWH338	3 3/8	2	141	199	191
WSWH358	3 5/8	2	141	199	191
WSWH45	4 1/2	2	141	199	191
WSWH5	5	2	141	199	191
WSWH6	6	2	141	199	191
WSWH638	6 3/8	2	141	199	191
WSWH634	6 3/4	2	141	199	191
WSWH8	8	2	141	199	191
WSBH Bugle Head Screws					
WSBH25	2 1/2	2	141	199	191
WSBH4	4	2	141	199	191
WSBH6	6	2	141	199	191
WSBH8	8	2	141	199	191
WSBH10	10	2	141	199	191
LumberLok Series Screws					
LL915	1 1/2	1 1/8	110	120	—
LL930	3	1 1/2	150	150	—

For **SI:** 1 inch = 25.4 mm; 1 lbf = 4.4 N

[1]Tabulated reference withdrawal design values (*W*) must be multiplied by all adjustment factors, as applicable to dowel-type fasteners, in accordance with the NDS.

[2]Tabulated reference withdrawal design values (*W*) are in pounds per inch of thread penetration (including the screw tip) into the side grain of the main member.

[3]Engineered wood must be LVL, LSL, or PSL, as described in Section 3.2.2. The equivalent specific gravity for screws installed in the broad face of the engineered wood member and loaded in withdrawal must be a minimum of 0.50, as recognized in an ICC-ES evaluation report.

TABLE 3—REFERENCE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR WOOD-TO-WOOD CONNECTIONS WITH WS, WSWH, WSBH AND LUMBERLOK SCREWS[1,2,3,4,5]

FASTENER DESIGNATION	SCREW LENGTH (inches)	SIDE MEMBER THICKNESS (inches)	REFERENCE LATERAL DESIGN VALUE (Z) (lbf)		
			0.42 ≤ SG<0.50	SG ≥ 0.50 or PSL & LSL[6]	LVL[6]
WS HEX HEAD SCREWS					
WS3	3	See Note 4	227	268	—
WS35	3 1/2		311	398	319
WS45	4 1/2		364	415	358
WS5	5		364	415	358
WS6	6		364	415	358
WS8	8		364	415	358
WSWH WASHER HEAD SCREWS					
WSWH278	2 7/8	See Note 4	227	268	—
WSWH338	3 3/8		311	398	319
WSWH358	3 5/8		311	398	319
WSWH45	4 1/2		364	415	358
WSWH5	5		364	415	358
WSWH6	6		364	415	358
WSWH638	6 3/8		364	415	358
WSWH634	6 3/4		364	415	358
WSWH8	8		364	415	358
WSBH BUGLE HEAD SCREWS					
WSBH4	4	See Note 4	246	315	252
WSBH6	6		288	328	283
WSBH8	8		288	328	283
WSBH10	10		288	328	283
LUMBERLOK SERIES SCREWS					
LL930	3	1 1/2	100	105[7]	—

For **SI:** 1 inch = 25.4 mm; 1 lbf = 4.4 N

[1]Tabulated reference lateral design values (Z) apply to loading both parallel- and perpendicular-to-grain, and are based on installations in which the screw is driven into the side grain of the wood main members, with the screw axis perpendicular to the wood fibers.
[2]Tabulated values apply to connections where both members are of the same type of wood (sawn lumber, LVL, etc.) and of the same specific gravity.
[3]Tabulated reference lateral design values (Z) must be multiplied by all adjustment factors, as applicable to dowel-type fasteners, in accordance with the NDS.
[4]Side member thickness is 1 1/2" for sawn lumber, PSL and LSL, and 1 3/4" for LVL.
[5]Fastener penetration must be equal to the screw length (in) minus the applicable side member thickness.
[6]Engineered wood must be LVL, LSL, or PSL, as described in Section 3.2.2. The equivalent specific gravity for screws installed in the broad face of the engineered wood member and loaded laterally must be a minimum of 0.50 for LVL and PSL and a minimum of 0.55 for LSL, as recognized in an ICC-ES evaluation report.
[7]Tabulated values apply to sawn lumber installations only.

TABLE 4—REFERENCE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR STEEL-TO-WOOD CONNECTIONS WITH WS AND LUMBERLOK SCREWS (lbf)[1,2,3,4]

FASTENER DESIGNATION	STEEL SIDE MEMBER DESIGN THICKNESS[5,6] t_s (inches)					
	0.046 (No. 18 gage)	0.058 (No. 16 Gage)	0.074 (No. 14 gage)	0.136 (No. 10 gage)	0.180 (No. 7 gage)	0.250 (No. 3 gage)
Installation in a Sawn Lumber Main Member with SG Between 0.42 and 0.50						
WS15	—	—	188	211	190	217
WS2	—	—	215	244	249	248
WS25	—	—	256	292	286	294
WS3	—	—	297	340	322	365
WS35	—	—	338	380	356	370
WS45	—	—	421	460	425	379
WS5	—	—	421	460	425	379
WS6	—	—	421	460	425	379
WS8	—	—	421	460	425	379
LL915	105	105	—	—	—	—
LL930	140	140	—	—	—	—
Installation in a Sawn Lumber Main Member with an SG of 0.50 or Greater or Engineered Wood[7]						
WS15	—	—	230	261	259	266
WS2	—	—	306	307	289	316
WS25	—	—	362	352	338	369
WS3	—	—	418	396	387	457
WS35	—	—	451	460	454	481
WS45	—	—	516	588	589	531
WS5	—	—	516	588	589	531
WS6	—	—	516	588	589	531
WS8	—	—	516	588	589	531
LL915	105[8]	130[8]	—	—	—	—
LL930	165[8]	165[8]	—	—	—	—

For **SI:** 1 inch = 25.4 mm; 1 lbf = 4.4 N

[1]The steel side member must meet the requirements of Section 3.2.3 of this report.
[2]The wood main member must meet the requirements of Section 3.2.2 of this report.
[3]Tabulated reference lateral design values (Z) apply to loading both parallel- and perpendicular-to-grain, and are based on installations in which the screw is driven into the side grain of the wood main member, with the screw axis perpendicular to the wood fibers.
[4]Tabulated reference lateral design values (Z) must be multiplied by all adjustment factors, as applicable to dowel-type fasteners, in accordance with the NDS.
[5]The uncoated minimum steel thickness of the cold-formed steel product delivered to the job site must not be less than 95 percent of tabulated design thickness, t_s.
[6]Minimum fastener penetration must be equal to the screw length less the thickness of the metal side plate.
[7]Engineered wood must be LVL, LSL, or PSL, as described in Section 3.2.2. The recognized equivalent specific gravity for laterally-loaded, dowel-type fasteners, installed in the broad face of the engineered wood member, must be a minimum of 0.50 for LVL and PSL and a minimum of 0.55 for LSL.
[8]Tabulated values apply to sawn lumber installations only.

TABLE 5—REFERENCE PULL-THROUGH DESIGN VALUES (P) FOR WS, WSWH, WSBH AND LUMBERLOK SCREWS[1,2]

FASTENER DESIGNATION	REFERENCE PULL-THROUGH DESIGN VALUE (*P*) (lbf)		
	0.42 ≤ SG < 0.50	SG ≥ 0.50	LVL[3]
WS HEX HEAD SCREWS			
WS3	340	357	—
WS35	340	357	479
WS45	340	357	479
WS5	340	357	479
WS6	340	357	479
WS8	340	357	479
WSWH WASHER HEAD SCREWS			
WSWH278	474	535	—
WSWH338	474	535	619
WSWH358	474	535	619
WSWH45	474	535	619
WSWH5	474	535	619
WSWH6	474	535	619
WSWH638	474	535	619
WSWH634	474	535	619
WSWH8	474	535	619
WSBH BUGLE HEAD SCREWS			
WSBH25	208	282	—
WSBH4	208	282	339
WSBH6	208	282	339
WSBH8	208	282	339
WSBH10	208	282	339
LUMBERLOK SCREWS			
LL930	130	150	—

For **SI:** 1 inch = 25.4 mm; 1 lbf = 4.4 N

[1]Tabulated reference lateral design values (Z) must be multiplied by all adjustment factors, as applicable to reference withdrawal design values, in accordance with the NDS.
[2]Side member thickness is $1^1/_2$" for DF/SPF and $1^3/_4$" for LVL.
[3]Engineered wood must be LVL as described in Section 3.2.2. The equivalent specific gravity must be a minimum of 0.50, as recognized in an ICC-ES evaluation report.

TABLE 6—CONNECTION GEOMETRY REQUIREMENTS FOR WS, WSWH, WSBH AND LUMBERLOK SCREWS[1]

CONDITION			MINIMUM DISTANCE OR SPACING (inches)	
			WS, WSWH and WSBH Wood Screws	LumberLok Series Wood Screws
Edge distance	Perpendicular to grain loading (loaded or unloaded edge)		$1^1/_2$	$^1/_2$
	Parallel to grain load		$^3/_4$	$^1/_2$
End distance	Perpendicular to grain loading		$2^1/_2$	$1^3/_4$
	Parallel to grain loading (loaded toward or away from edge)		$2^1/_2$	$1^3/_4$
Spacing	Between fasteners in a row	Parallel to grain loading	3	$2^1/_2$
		Perpendicular to grain loading	3	$1^3/_4$
	Between rows	Staggered Rows[2]	$1^1/_4$	$^1/_2$

For **SI:** 1 inch = 25.4 mm

[1]Edge distances, end distances and screw spacing must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.
[2]Values for spacing between staggered rows apply where screws in adjacent rows are offset by half of the spacing between screws in a row.

TABLE 7—WSTS TRUSS/STUD SCREW ALLOWABLE LOADS BY INSTALLATION TYPE[1, 2]

FASTENER DESIGNATION	INSTALLATION TYPE	APPLICABLE FIGURE	LOAD DIRECTION[5, 6]	ALLOWABLE LOADS (lbf)					
				DF		SP		SPF	
				100%	160%[3]	100%	160%[3]	100%	160%[3]
WSTS6	Connection of Double Top Plates to Bearing Truss[7]	2	Uplift[8]	447	715	559	876[4]	358	573
			F2[9,10]	339	543	393	547[4]	289	463
WSTS6	Connection of Double Top Plates to End Wall Truss[11]	3	Uplift[8]	530	847	554	876[4]	414	662
			F1[12, 13]	362	547[4]	345	547[4]	324	519
			F2[14, 15]	210	336	233	373	147	235

For **SI:** 1 inch = 25.4 mm; 1 lbf = 4.4 N

[1]Tabulated values are for top plates and truss chords that are of the same assigned specific gravity. For conditions where this is not the case, the design values for the members with the lower specific gravity apply. Wood members must be solid-sawn lumber having a minimum assigned specific gravity of 0.50 for DF, 0.55 for SP and 0.42 for SPF.
[2]Use shall be limited to dry conditions, such that CM = 1.0.
[3]Allowable loads have been increased 60% for wind or seismic loads; no further increase shall be permitted.
[4]Allowable loads are limited by fastener strength.
[5]See Figures 2 and 3 for depictions of each installation type and for load orientations.
[6]Designer must determine the load path needed to transfer these loads to the foundation and must confirm the adequacy of the components and connections along the load path.
[7]Only one fastener is used at each truss. The fastener must be installed perpendicular to the face of the plates and truss chord. The fastener must be installed through the center of the minimum 2-by-4 top plates and through the minimum 2-by-4 truss chord.
[8]Since the trusses do not align with the studs, the top plates must be checked for uplift resistance and the connection of the plates to the studs must also be checked for uplift resistance in accordance with the NDS.
[9]Lateral loads perpendicular to the wall are assumed to be transferred from the wall into the truss. The truss must be designed to transfer this load to the roof diaphragm or other lateral force resisting system.
[10]In bearing truss applications, in-plane loads from the roof diaphragm are to be transferred into the wall by using blocking, bracing or other methods. WSTS screws are not to be used to prevent rolling of the truss bottom chord.
[11]Multiple fasteners may be used for the truss. Minimum required spacing is 2-1/4 inches (57.15 mm). The fasteners must be installed perpendicular to the face of the plates and truss chord. The fastener must be installed through the minimum 2-by-4 top plate and through the center of the minimum 2-by-4 truss chord.
[12]Lateral load is assumed to be transferred from the end wall truss to the wall. The wall must be designed to resist this force .
[13]Truss bottom chords must be blocked, braced or otherwise restrained against lateral movement.
[14]Truss must be designed to resist out of plane load between bracing points.
[15]The minimum spacing of the fasteners must be designed by a registered design professional taking into account the applied loads, the single fastener connection capacities and the capacities of the connected wood members.

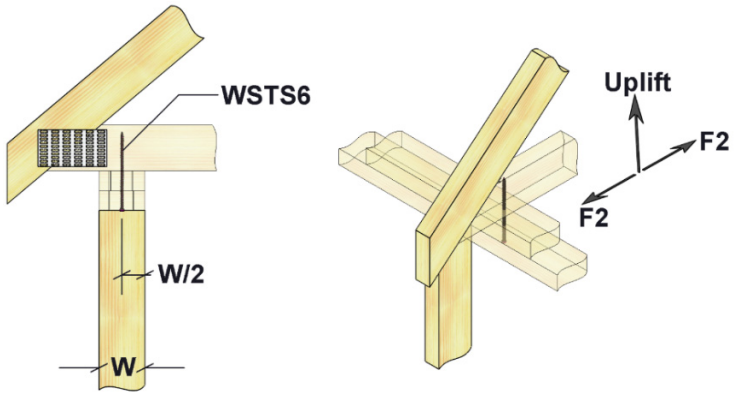


FIGURE 2—CONNECTION OF DOUBLE TOP PLATES TO BEARING TRUSS WITH WSTS SCREWS

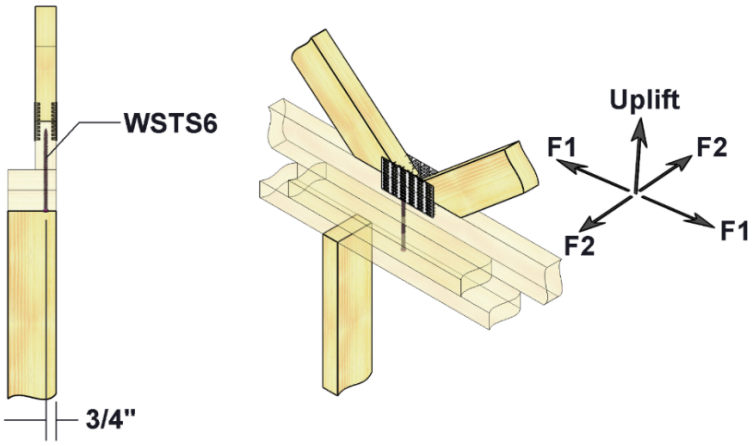


FIGURE 3—CONNECTION OF DOUBLE TOP PLATES TO END WALL TRUSS WITH WSTS SCREWS

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings

REPORT HOLDER:

MITEK® INC.

EVALUATION SUBJECT:

MITEK PRO SERIES WS, WSWH, WSBH, WSTS AND LUMBERLOK SERIES STRUCTURAL WOOD SCREWS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the MiTek Pro Series WS, WSWH, WSBH, WSTS and Lumberlock Series Structural Wood Screws, described in ICC-ES evaluation report ESR-2761, have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2020 *City of Los Angeles Building Code* (LABC)
- 2020 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The MiTek Structural Wood Screws, described in Sections 2.0 through 7.0 of the evaluation report ESR-2761, comply with the LABC Chapter 23 and the LARC and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The MiTek Structural Wood Screws described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-2761.
- The design, installation, conditions of use and identification of the MiTek Structural Wood Screws are in accordance with the 2018 *International Building Code®* (IBC) provisions noted in the evaluation report ESR-2761.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16, 17 and 23, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

This supplement expires concurrently with the evaluation report, reissued October 2019 and revised July 2020.

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23—Wood, Plastic, and Composite Fastenings

REPORT HOLDER:

MITEK® INC.

EVALUATION SUBJECT:

MITEK PRO SERIES WS, WSWH, WSBH, WSTS AND LUMBERLOK SERIES STRUCTURAL WOOD SCREWS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that MiTek Pro Series WS, WSWH, WSBH, WSTS and LumberLok Series Structural Wood Screws, described in ICC-ES evaluation report ESR-2761, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2020 and 2017 *Florida Building Code—Building*
- 2020 and 2017 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The MiTek Structural Wood Screws, described in Sections 2.0 through 7.0 of the ICC-ES evaluation report ESR-2761, comply with the *Florida Building Code—Building and Florida Building Code—Residential*, provided the design requirements are determined in accordance with the *Florida Building Code-Building* or the *Florida Building Code-Residential,* as applicable. The installation requirements noted in ICC-ES evaluation report ESR-2761 for the 2018 and 2015 *International Building Code®* meet the requirements of the *Florida Building Code-Building* or the *Florida Building Code-Residential*, as applicable.

Use of the MiTek Structural Wood Screws has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building and Florida Building Code—Residential* with the following condition:

a) For connections subject to uplift, the connection must be designed for no less than 700 pounds (3114 N).

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the ICC-ES evaluation report ESR-2761, reissued October 2019 and revised July 2020.