ET&F FASTENING SYSTEMS, INC. ET&F PNEUMATICALLY DRIVEN PINS

CSI Section: 05 05 23—Metal Fastenings
CSI Section: 06 05 23—Wood, Plastic and Composite Fastenings

1.0 RECOGNITION

ET&F pneumatically driven pins have been evaluated as fasteners in compliance with Chapters 22 and 23 of the IBC and Chapters R5 and R8 of the IRC. The pneumatically driven pins have been evaluated for connecting wood structural panel sheathing to steel frame construction. The pneumatically driven pins evaluated in this report are satisfactory alternatives to the following codes and regulations:

- 2015, 2012, 2009, and 2006 International Building Code® (IBC)
- 2015, 2012, 2009, and 2006 International Residential Code® (IRC)
- 2013 California Building Code® (CBC) – Supplement attached

2.0 LIMITATIONS

The ET&F pneumatically driven pins as described in this report comply with the codes listed in Section 1.0 of this report subject to the following conditions:

2.1 Fasteners shall be manufactured, installed and identified in accordance with this report and the manufacturer's published installation guidelines. Where conflicts occur the more restrictive shall prevail.

2.2 Plans and structural calculations shall be submitted to the building official demonstrating compliance with the provisions of this report and applicable code requirements. Construction documents shall be prepared by a registered design professional when required by the statutes of the jurisdiction where the project will be constructed**.**

2.3 The design wind and seismic loads to be resisted by the diaphragm assemblies described in this report shall not exceed the nominal shear values noted in this report in Tables 1 and 2 of this report, and reduced by applicable factors shown for allowable (ASD) (Ω) or strength (LFRD) (φ) design.

2.4 Limitations based on deflection of horizontal diaphragms shall be considered in design.

2.5 The design withdrawal and lateral load on individual fasteners used for fastening wood structural panels in general construction assemblies shall not exceed values noted in Tables 3 and 4, respectively, of this report.

2.6 The AKN-100, AGS-100 and AKN-144 series fasteners are manufactured under a quality control program with inspections by Benchmark Holdings L.L.C.

2.7 The AKN-100, AGS-100 and AKN-144 series fasteners are limited to installation in dry interior locations, which include roof deck with complying weather protection; and that use in exterior or damp environments is outside the scope of this report.

2.8 The use of AKN-100, AGS-100 and AKN-144 series fasteners in contact with Preservative- or fire-retardant-treated wood is outside the scope of this report.

2.9 Use of fasteners in vertical shear walls is outside the scope of this report.

3.0 PRODUCT USE

3.1 ET&F pneumatically driven pins are high carbon, heat-treated, ballistic point knurled fasteners recognized for use in horizontal diaphragms constructed with steel framing and wood structural panels in accordance with Sections 2210 and 2211 of the 2012 and 2015 IBC and Section 2209 and 2210 of the 2006 and 2009 IBC.

3.2 ET&F pneumatically driven pins are also recognized for the attachment of wood structural panel sheathing to steel framing members in accordance with Sections 2210 and 2211 of the 2012 and 2015 IBC and Section 2209 and 2210 of the 2006 and 2009 IBC.

3.3 Use under the IRC as an alternative to IRC Sections R505 and R804 is permitted where an engineering design is submitted in accordance with IRC Section R301.1.3.

4.0 PRODUCT DESCRIPTION

4.1 Fasteners: ET&F pneumatically driven pins are manufactured using a standard cold-forming process from steel wire with carbon content ranging from 0.39 percent to 0.66 percent in compliance with the chemistry requirements in the manufacturer's quality control documentation. The fasteners are heat-treated to a through hardness of RC 52 to 54, as determined in accordance with ASTM E140 and ASTM E384. The fasteners have a ballistic point, knurled shank and are either zinc-plated or coated with a proprietary Aericote®

4.2 1000 coating. Types evaluated in this report are the AGS-100, AKN-100 and AKN-144 series pins. AGS-100 series pins have a basic shank diameter of 0.100 inch and a nominal head diameter of 5/16 inch. The AKN-100 series pins have a basic shank diameter of 0.100 inch and nominal head diameter of ¼ inch. The AKN-144 series pins have a basic shank diameter of 0.140 inch and nominal head diameter of 5/16 inch.

4.3 Framing: Steel framing members shall have the following uncoated minimum base-metal thicknesses:

No. 118 mil (No. 10 gage): 0.1180 inch
No. 97 mil (No. 12 gage): 0.0966 inch
No. 68 mil (No. 14 gage): 0.0677 inch
No. 54 mil (No. 16 gage): 0.0538 inch
No. 43 mil (No. 18 gage): 0.0428 inch
No. 33 mil (No. 20 gage): 0.0329 inch

Minimum flange width for all framing members shall be 1-5/8 inches. Steel framing members shall comply with IBC Sections 2211.1 and 2211.5 and are manufactured from steel complying with ASTM A653/A653M and ASTM A1003/A1003M, or an equivalent grade complying with the requirements of AISI S100 and having an elongation greater than or equal to 10 percent. Steel members of 33 mil and 43 mil thicknesses have minimum yield strength of 33 ksi. Steel members of 54 mil and 68 mil thicknesses have minimum yield strength of 50 ksi. Steel members of 97 mil and 118 mil thicknesses have a yield strength of 40 ksi. All steels shall have protective coatings complying with AISI S200.

4.4 Wood Structural Panel Sheathing

Wood Structural Panel sheathing shall comply with IBC Section 2303.1.4 and be oriented strand board (OSB) or plywood, Exposure 1, complying with U.S. Department of Commerce (DOC) Voluntary Product Standard PS2. Rated sheathing shall be minimum 7/16 inch thickness. Structural 1 plywood shall be Exposure 1 and comply with U.S. DOC Voluntary Product Standard PS1. Structural 1 plywood shall be minimum 23/32 inch thickness.

4.5 Documented Values

ET&F pneumatically driven pins fasten code-complying OSB and plywood wood structural panels (WSP) to steel framing members for horizontal diaphragm assemblies. Nominal shear values for WSP attached with either AKN-100 series or AGS-100 series pins (0.100 inch diameter) are shown in Table 1 of this report. Nominal shear values for WSP attached with AKN-144 series pins (0.144 inch diameter) are shown in Table 2 of this report.

For available ASD seismic strength, table values shall be divided by Ω = 2.5. For available ASD wind strength, table values shall be divided by Ω = 2.0. For available LRFD seismic strength, table values shall be multiplied by φ = 0.60. For available LRFD wind strength, table values shall be multiplied by φ = 0.65. Panels noted in Tables 1 and 2 of this report shall be capable of supporting vertical loads based on the panel span ratings indicated. Steel framing shall be designed in accordance with the IBC or IRC for the required vertical loads. Where diaphragm blocking is required, it shall be provided in accordance with the applicable code as shown in Figure 1 of this report. The maximum blocked diaphragm span-to-width (aspect) ratio is 4:1.

The mid-span deflection of a simply supported, uniformly loaded, blocked diaphragm shall be computed using the following Equation 1:

$$\Delta_{mid} = \omega_1 \frac{5vL^3}{8(12)E_s A_c b} + \omega_1 \frac{vL}{12G_v t_v} + \sqrt[4]{\omega_2}\sqrt{\omega_3}\left(\frac{v}{\frac{\beta}{\beta_{f,p}}}\right)^{\alpha} + \frac{\sum_{i=1}^{n}(\Delta_{ci}X_i)}{2b}$$

Equation 1

Where:
A_c = gross cross-sectional area of chord, in^2
b = diaphragm depth parallel to loaded direction, in.
d_p = nominal pin diameter, in.
E_s = modulus of elasticity of chords = 29,500,000 psi
$G_v t_v$ = shear stiffness, lb/in. of panel depth
L = diaphragm length perpendicular to loaded direction, in.
n = number of chord splices
s = maximum fastener spacing at panel edges, in.
t_{joist} = design thickness of framing, in.
v = diaphragm unit shear, plf
X_i = distance between the "ith" chord splice and the nearest support (braced wall line), in.
α = inelastic connection deformation parameter (Table 6 of this report)
β = inelastic connection deformation parameter, plf/in$^{(1/\alpha)}$ (Table 5 of this report)
$\beta_{f,p}$ = pin diameter factor = $0.100/d_p$
Δ_{ci} = deformation parameter associated with the "ith" chord splice, in.
$\omega_1 = 0.825(s/6)$
$\omega_2 = (t_{joist}/0.0346)$
$\omega_3 = (L/b)/2$

For unblocked diaphragms, the maximum diaphragm aspect ratio shall not exceed 3:1 and the mid-span deflection given in Equation 1 shall be multiplied by 2.5.

In addition, the diaphragm length and width shall be limited by one of the following: engineering mechanics; applied loads; shear capacity of the diaphragm; diaphragm shear deflection limited by the requirements of ASCE 7 in Sections 12.8.6 entitled, "Story Drift Determination"; or Section 12.12 entitled, "Drift and Deformation".

ET&F pneumatically driven pins are also permitted to be used to fasten wood-based structural panels for general purposes. Fastener information, attachment dimensions, required penetrations and nominal strengths are set forth in Tables 3 and 4 of this report for withdrawal and shear/lateral loads, respectively.

4.6 Installation

ET&F pneumatically driven pins shall be installed using the pneumatic tools recommended by ET&F. The fasteners shall pierce the wood structural panel being fastened and shall protrude through the steel framing member a minimum 1/4 inch. The heads of the fasteners shall be flush with the wood panel without overdriving. The minimum distance of the fasteners from the edge of the wood panel is 3/8 inch. The minimum distance of the fasteners from the edge of the steel framing shall comply with AISI S100, Chapter E, Section E4.2. The maximum spacing of the pins used in horizontal diaphragms is as noted in Tables 1 through 8 of this report.

5.0 IDENTIFICATION

The pins are identified by printing or labels on their containers or cartons bearing the ET&F Fastening Systems, Inc. name, address and logo, fastener part number, size and description, quantity, manufacturing lot number, recommended ET&F pneumatic tool for installation, and the IAPMO UES Marks of Conformity and the Evaluation Report number (ER-0335). Each fastener head is stamped with the "E" head logo shown in Figure 2 of this report.

6.0 SUBSTANTIATING DATA

Data in accordance with the Evaluation Criteria for Composite Steel Sheet and Noncombustible Sheathing Panels (EC-012), Adopted January 2015, ICC-ES AC262, approved October 2004 (editorially revised September 2010), comparative analysis white paper, reports of full-scale horizontal diaphragm test small scale fastener tests, descriptive details, structural calculations and a quality control manual. Test results are from laboratories in compliance with ISO/IEC 17025.

7.0 CONTACT INFORMATION

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SOLON, OHIO 44139
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8.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on ET&F FASTENING SYSTEMS, INC. ET&F pneumatically driven pins to assess its conformance to the codes and standards shown in Section 1.0 of this report and documents the product's certification.

or

IAPMO ER #335

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CEO, The IAPMO Group

For additional information about this evaluation report please visit www.uniform-es.org or email at info@uniform-es.org

TABLE 1
HORIZONTAL DIAPHRAGM CONSTRUCTION USING 0.100-INCH DIAMETER PIN FASTENERS

Nominal unit shear values in lb/ft. for wood structural-use panel diaphragms with **33 mil (20 ga.) framing** and ET&F 0.100-in. diameter pin fasteners [1, 2, 3, 4, 5, 6]

Sheathing grade	Nominal sheathing thickness, in.	Span rating (roof/floor)	Minimum joist flange width, in.	Blocked diaphragms: Pin spacing at (a) diaphragm boundaries (DB), (b) continuous panel edges parallel to load, and (c) continuous panel edges perpendicular to load, in. 6	4	2 1/2	2	Unblocked diaphragms [7] Case 1	Unblocked diaphragms [7] Cases 2 - 6
				Pin spacing at all other panel edges: 6	6	4	3		
OSB/Plywood rated sheathing or Structural I OSB	7/16	24/16	1.625	**286**	**429**	**687**	**859**	**286**	**215**
	15/32	32/16		**326**	**489**	**783**	**979**	**326**	**245**
	19/32	40/20		359	538	861	1077	359	269
	23/32	48/24		376	565	904	1129	376	282

[1] Maximum fastener spacing at panel interiors shall be 6 in. for support framing at 48 in. on center and 12 in. for closer support framing.

[2] Minimum fastener edge distance = 3/8 in.

[3] Minimum yield strength of steel framing = 33 ksi. Minimum tensile strength of steel framing = 45 ksi.

[4] Values are for loads imposed by wind or earthquake and must be reduced 25 percent for normal loading or 33 percent for permanent loading.

[5] The pin must be long enough to penetrate through the metal framing a minimum of 1/4 in.

[6] For available ASD seismic strength, table values shall be divided by $\Omega = 2.5$. For available ASD wind strength, table values shall be divided by $\Omega = 2.0$.

For available LRFD seismic strength, table values shall be multiplied by $\phi = 0.60$. For available LRFD wind strength, table values shall be multiplied by $\phi = 0.65$.

[7] 6 in. fastener spacing at diaphragm boundaries and supporting members.

Nominal unit shear values in lb/ft. for wood structural-use panel diaphragms with **43 mil (18 ga.) framing** and ET&F 0.100-in. diameter pin fasteners [1, 2, 3, 4, 5, 6]

Sheathing grade	Nominal sheathing thickness, in.	Span rating (roof/floor)	Minimum joist flange width, in.	Blocked diaphragms: Pin spacing at (a) diaphragm boundaries (DB), (b) continuous panel edges parallel to load, and (c) continuous panel edges perpendicular to load, in. 6	4	2 1/2	2	Unblocked diaphragms [7] Case 1	Unblocked diaphragms [7] Cases 2 - 6
				Pin spacing at all other panel edges: 6	6	4	3		
OSB/Plywood rated sheathing or Structural I OSB	7/16	24/16	1.625	**373**	**560**	**896**	**1119**	**373**	**280**
	15/32	32/16		**425**	**638**	**1021**	**1276**	**425**	**319**
	19/32	40/20		468	702	1123	1403	468	351
	23/32	48/24		491	736	1178	1472	491	368

[1] Maximum fastener spacing at panel interiors shall be 6 in. for support framing at 48 in. on center and 12 in. for closer support framing.

[2] Minimum fastener edge distance = 3/8 in.

[3] Minimum yield strength of steel framing = 33 ksi. Minimum tensile strength of steel framing = 45 ksi.

[4] Values are for loads imposed by wind or earthquake and must be reduced 25 percent for normal loading or 33 percent for permanent loading.

[5] The pin must be long enough to penetrate through the metal framing a minimum of 1/4 in.

[6] For available ASD seismic strength, table values shall be divided by $\Omega = 2.5$. For available ASD wind strength, table values shall be divided by $\Omega = 2.0$.

For available LRFD seismic strength, table values shall be multiplied by $\phi = 0.60$. For available LRFD wind strength, table values shall be multiplied by $\phi = 0.65$.

[7] 6 in. fastener spacing at diaphragm boundaries and supporting members.

TABLE 1--Continued
HORIZONTAL DIAPHRAGM CONSTRUCTION USING
0.100-INCH DIAMETER PIN FASTENERS

Nominal unit shear values in lb/ft. for wood structural-use panel diaphragms with **54 mil (16 ga.) framing** and ET&F 0.100-in. diameter pin fasteners [1, 2, 3, 4, 5, 6]

Sheathing grade	Nominal sheathing thickness, in.	Span rating (roof/floor)	Minimum joist flange width, in.	Blocked diaphragms: Pin spacing at (a) diaphragm boundaries (DB), (b) continuous panel edges parallel to load, and (c) continuous panel edges perpendicular to load, in.				Unblocked diaphragms [7]	
				6	4	2 1/2	2		
				Pin spacing at all other panel edges					
				6	6	4	3	Case 1	Cases 2 - 6
OSB/Plywood rated sheathing or Structural I OSB	7/16	24/16	1.625	**602**	**903**	**1444**	**1806**	**602**	**451**
	15/32	32/16		**686**	**1029**	**1646**	**2058**	**686**	**515**
	19/32	40/20		740	1110	1777	2221	740	555
	23/32	48/24		901	1352	2163	2704	901	676

[1] Maximum fastener spacing at panel interiors shall be 6 in. for support framing at 48 in. on center and 12 in. for closer support framing.

[2] Minimum fastener edge distance = 3/8 in.

[3] Minimum yield strength of steel framing = 50 ksi. Minimum tensile strength of steel framing = 65 ksi.

[4] Values are for loads imposed by wind or earthquake and must be reduced 25 percent for normal loading or 33 percent for permanent loading.

[5] The pin must be long enough to penetrate through the metal framing a minimum of 1/4 in.

[6] For available ASD seismic strength, table values shall be divided by $\Omega = 2.5$. For available ASD wind strength, table values shall be divided by $\Omega = 2.0$.
For available LRFD seismic strength, table values shall be multiplied by $\phi = 0.60$. For available LRFD wind strength, table values shall be multiplied by $\phi = 0.65$.

[7] 6 in. fastener spacing at diaphragm boundaries and supporting members.

Nominal unit shear values in lb/ft. for wood structural-use panel diaphragms with **68 mil (14 ga.) framing** and ET&F 0.100-in. diameter pin fasteners [1, 2, 3, 4, 5, 6]

Sheathing grade	Nominal sheathing thickness, in.	Span rating (roof/floor)	Minimum joist flange width, in.	Blocked diaphragms: Pin spacing at (a) diaphragm boundaries (DB), (b) continuous panel edges parallel to load, and (c) continuous panel edges perpendicular to load, in.				Unblocked diaphragms [7]	
				6	4	2 1/2	2		
				Pin spacing at all other panel edges					
				6	6	4	3	Case 1	Cases 2 - 6
OSB/Plywood rated sheathing or Structural I OSB	7/16	24/16	1.625	**619**	**928**	**1485**	**1856**	**619**	**464**
	15/32	32/16		**705**	**1058**	**1693**	**2116**	**705**	**529**
	19/32	40/20		826	1239	1982	2478	826	619
	23/32	48/24		990	1484	2375	2969	990	742

[1] Maximum fastener spacing at panel interiors shall be 6 in. for support framing at 48 in. on center and 12 in. for closer support framing.

[2] Minimum fastener edge distance = 3/8 in.

[3] Minimum yield strength of steel framing = 50 ksi. Minimum tensile strength of steel framing = 65 ksi.

[4] Values are for loads imposed by wind or earthquake and must be reduced 25 percent for normal loading or 33 percent for permanent loading.

[5] The pin must be long enough to penetrate through the metal framing a minimum of 1/4 in.

[6] For available ASD seismic strength, table values shall be divided by $\Omega = 2.5$. For available ASD wind strength, table values shall be divided by $\Omega = 2.0$.
For available LRFD seismic strength, table values shall be multiplied by $\phi = 0.60$. For available LRFD wind strength, table values shall be multiplied by $\phi = 0.65$.

[7] 6 in. fastener spacing at diaphragm boundaries and supporting members.

TABLE 1--Continued
HORIZONTAL DIAPHRAGM CONSTRUCTION USING
0.100-INCH DIAMETER PIN FASTENERS

Nominal unit shear values in lb/ft. for wood structural-use panel diaphragms with **97 mil (12 ga.) framing** and ET&F 0.100-in. diameter pin fasteners [1, 2, 3, 4, 5, 6]

Sheathing grade	Nominal sheathing thickness, in.	Span rating (roof/floor)	Minimum joist flange width, in.	Blocked diaphragms: Pin spacing at (a) diaphragm boundaries (DB), (b) continuous panel edges parallel to load, and (c) continuous panel edges perpendicular to load, in. 6	4	2 1/2	2	Unblocked diaphragms [7]
				Pin spacing at all other panel edges: 6	6	4	3	Case 1 / Cases 2 - 6
OSB/Plywood rated sheathing or Structural I OSB	7/16	24/16	1.625	672	1007	1612	2015	672 / 504
	15/32	32/16		765	1148	1837	2296	765 / 574
	19/32	40/20		885	1328	2125	2656	885 / 664
	23/32	48/24		1048	1572	2515	3144	1048 / 786

[1] Maximum fastener spacing at panel interiors shall be 6 in. for support framing at 48 in. on center and 12 in. for closer support framing.

[2] Minimum fastener edge distance = 3/8 in.

[3] Minimum yield strength of steel framing = 40 ksi. Minimum tensile strength of steel framing = 50 ksi.

[4] Values are for loads imposed by wind or earthquake and must be reduced 25 percent for normal loading or 33 percent for permanent loading.

[5] The pin must be long enough to penetrate through the metal framing a minimum of 1/4 in.

[6] For available ASD seismic strength, table values shall be divided by $\Omega = 2.5$. For available ASD wind strength, table values shall be divided by $\Omega = 2.0$.

For available LRFD seismic strength, table values shall be multiplied by $\phi = 0.60$. For available LRFD wind strength, table values shall be multiplied by $\phi = 0.65$.

[7] 6 in. fastener spacing at diaphragm boundaries and supporting members.

TABLE 2
HORIZONTAL DIAPHRAGM CONSTRUCTION USING
0.1440-INCH DIAMETER PIN FASTENERS

Nominal unit shear values in lb/ft. for wood structural-use panel diaphragms with **68 mil (14 ga.) framing** and ET&F 0.144-in. diameter pin fasteners [1, 2, 3, 4, 5, 6]

Sheathing grade	Nominal sheathing thickness, in.	Span rating (roof/floor)	Minimum joist flange width, in.	Blocked diaphragms: Pin spacing at (a) diaphragm boundaries (DB), (b) continuous panel edges parallel to load, and (c) continuous panel edges perpendicular to load, in. 6	4	2 1/2	2	Unblocked diaphragms [7]
				Pin spacing at all other panel edges: 6	6	4	3	Case 1 / Cases 2 - 6
OSB/Plywood rated sheathing or Structural I OSB	19/32	40/20	1.625	1086	1629	2606	3258	1086 / 814
	23/32	48/24		1243	1865	2984	3730	1243 / 932
	1 1/8	48 oc		1507	2261	3617	4521	1507 / 1130
Structural I Plywood	23/32	24 oc		1430	2145	3431	4289	1430 / 1072
	1 1/8	48 oc		1733	2600	4159	5199	1733 / 1300

[1] Maximum fastener spacing at panel interiors shall be 6 in. for support framing at 48 in. on center and 12 in. for closer support framing.

[2] Minimum fastener edge distance = 3/8 in.

[3] Minimum yield strength of steel framing = 50 ksi. Minimum tensile strength of steel framing = 65 ksi.

[4] Values are for loads imposed by wind or earthquake and must be reduced 25 percent for normal loading or 33 percent for permanent loading.

[5] The pin must be long enough to penetrate through the metal framing a minimum of 1/4 in.

[6] For available ASD seismic strength, table values shall be divided by $\Omega = 2.5$. For available ASD wind strength, table values shall be divided by $\Omega = 2.0$.

For available LRFD seismic strength, table values shall be multiplied by $\phi = 0.60$. For available LRFD wind strength, table values shall be multiplied by $\phi = 0.65$.

[7] 6 in. fastener spacing at diaphragm boundaries and supporting members.

TABLE 2--Continued
HORIZONTAL DIAPHRAGM CONSTRUCTION USING
0.1440-INCH DIAMETER PIN FASTENERS

Nominal unit shear values in lb/ft. for wood structural-use panel diaphragms with **97 mil (12 ga.) framing** and ET&F 0.144-in. diameter pin fasteners [1, 2, 3, 4, 5, 6]

Sheathing grade	Nominal sheathing thickness, in.	Span rating (roof/floor)	Minimum joist flange width, in.	Blocked diaphragms: Pin spacing at (a) diaphragm boundaries (DB), (b) continuous panel edges parallel to load, and (c) continuous panel edges perpendicular to load, in. 6	4	2 1/2	2	Unblocked diaphragms [7]
				Pin spacing at all other panel edges: 6	6	4	3	Case 1	Cases 2 - 6
OSB/Plywood rated sheathing or Structural I OSB	19/32	40/20	1.625	1193	1789	2863	3579	1193	895
	23/32	48/24		1475	2212	3540	4425	1475	1106
	1 1/8	48 oc		1773	2659	4255	5319	1773	1330
Structural I Plywood	23/32	24 oc		1630	2445	3912	4891	1630	1223
	1 1/8	48 oc		2025	3038	4861	6076	2025	1519

[1] Maximum fastener spacing at panel interiors shall be 6 in. for support framing at 48 in. on center and 12 in. for closer support framing.

[2] Minimum fastener edge distance = 3/8 in.

[3] Minimum yield strength of steel framing = 40 ksi. Minimum tensile strength of steel framing = 50 ksi.

[4] Values are for loads imposed by wind or earthquake and must be reduced 25 percent for normal loading or 33 percent for permanent loading.

[5] The pin must be long enough to penetrate through the metal framing a minimum of 1/4 in.

[6] For available ASD seismic strength, table values shall be divided by $\Omega = 2.5$. For available ASD wind strength, table values shall be divided by $\Omega = 2.0$. For available LRFD seismic strength, table values shall be multiplied by $\phi = 0.60$. For available LRFD wind strength, table values shall be multiplied by $\phi = 0.65$.

[7] 6 in. fastener spacing at diaphragm boundaries and supporting members.

Nominal unit shear values in lb/ft. for wood structural-use panel diaphragms with **118 mil (10 ga.) framing** and ET&F 0.144-in. diameter pin fasteners [1, 2, 3, 4, 5, 6]

Sheathing grade	Nominal sheathing thickness, in.	Span rating (roof/floor)	Minimum joist flange width, in.	Blocked diaphragms: Pin spacing at (a) diaphragm boundaries (DB), (b) continuous panel edges parallel to load, and (c) continuous panel edges perpendicular to load, in. 6	4	2 1/2	2	Unblocked diaphragms [7]
				Pin spacing at all other panel edges: 6	6	4	3	Case 1	Cases 2 - 6
OSB/Plywood rated sheathing or Structural I OSB	19/32	40/20	1.625	1247	1871	2993	3741	1247	935
	23/32	48/24		1418	2126	3402	4253	1418	1063
	1 1/8	48 oc		1761	2642	4227	5283	1761	1321
Structural I Plywood	23/32	24 oc		1630	2445	3912	4891	1630	1223
	1 1/8	48 oc		2025	3038	4861	6076	2025	1519

[1] Maximum fastener spacing at panel interiors shall be 6 in. for support framing at 48 in. on center and 12 in. for closer support framing.

[2] Minimum fastener edge distance = 3/8 in.

[3] Minimum yield strength of steel framing = 40 ksi. Minimum tensile strength of steel framing = 50 ksi.

[4] Values are for loads imposed by wind or earthquake and must be reduced 25 percent for normal loading or 33 percent for permanent loading.

[5] The pin must be long enough to penetrate through the metal framing a minimum of 1/4 in.

[6] For available ASD seismic strength, table values shall be divided by $\Omega = 2.5$. For available ASD wind strength, table values shall be divided by $\Omega = 2.0$. For available LRFD seismic strength, table values shall be multiplied by $\phi = 0.60$. For available LRFD wind strength, table values shall be multiplied by $\phi = 0.65$.

[7] 6 in. fastener spacing at diaphragm boundaries and supporting members.

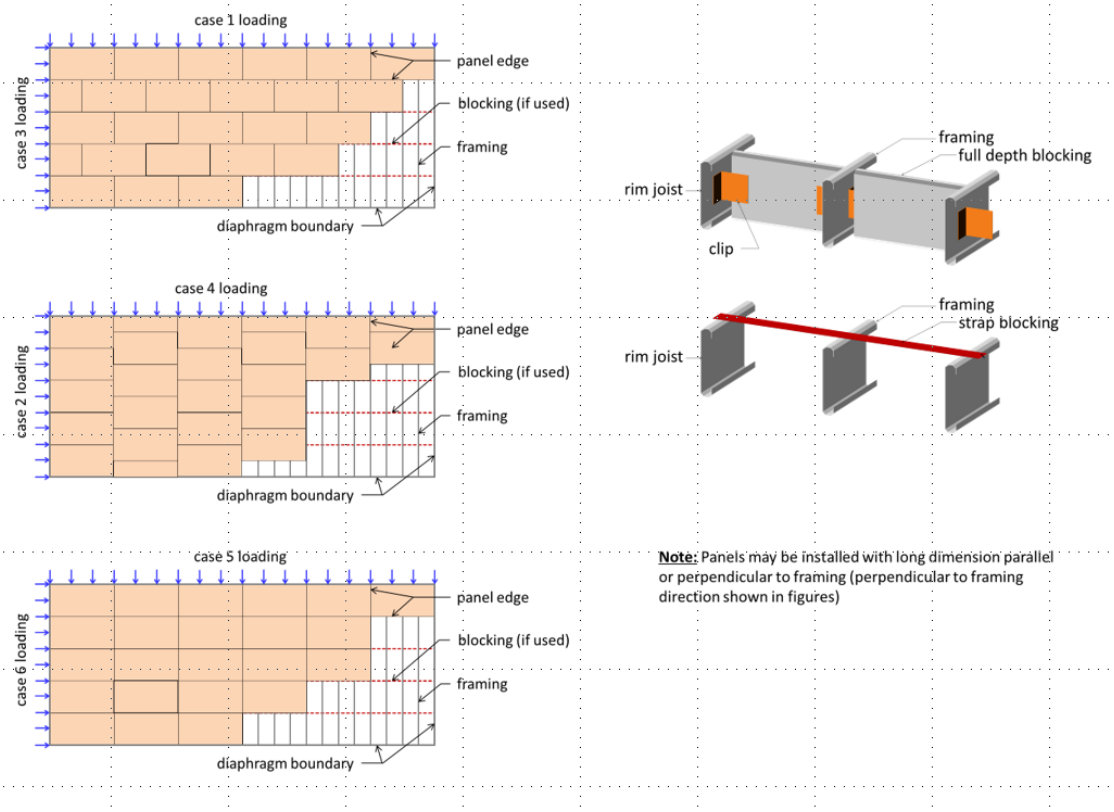

FIGURE 1
HORIZONTAL DIAPHRAGM CONSTRUCTION DETAILS

TABLE 3
NOMINAL FASTENER WITHDRAWAL STRENGTH[1,2,3,4]

ET&F Pin Type	Framing		Material properties		Nominal Withdrawal Strength, lb. Sheathing Thickness and Grade						
	Designated Thickness, mils	Gage Thickness	Minimum Yield Strength, ksi	Minimum Tensile Strength, ksi	7/16-in. OSB Rated Sheathing and Structural I	15/32-in. OSB Rated Sheathing and Structural I	19/32-in. OSB Rated Sheathing and Structural I	23/32-in. OSB Rated Sheathing and Structural I	1 1/8-in. OSB Rated Sheathing and Structural I	23/32-in. Structural I PWD	1 1/8-in. Structural I PWD
AKN-100 or AGS-100 series	33	20	33	45	66	68	85	90			
	43	18	33	45	86	88	111	118			
	54	16	50	65	148	157	202	213			
	68	14	50	65	148	157	224	263			
	97	12	40	50	148	157	224	263			
AKN-144 series	68	14	50	65			344	454	485	434	485
	97	12	40	50			344	498	532	434	532
	118	10	40	50			344	573	650	434	650

1. Tabulated values are for short-term loading and shall be reduced 25 percent for normal loading and 33 percent for permanent loading.
2. For allowable strength design (ASD), tabulated values shall be divided by Ω = 2.23.
3. For strength design (LRFD), tabulated values shall be multiplied by ϕ = 0.72.
4. Minimum panel edge distance is 0.375 inch.

TABLE 4
NOMINAL FASTENER SHEAR/LATERAL STRENGTH[1,2,3,4,5]

ET&F Pin Type	Framing		Material properties		Nominal Shear/Lateral Strength, lb. Sheathing Thickness and Grade						
	Designated Thickness, mils	Gage Thickness	Minimum Yield Strength, ksi	Minimum Tensile Strength, ksi	7/16-in. OSB Rated Sheathing and Structural I	15/32-in. OSB Rated Sheathing and Structural I	19/32-in. OSB Rated Sheathing and Structural I	23/32-in. OSB Rated Sheathing and Structural I	1 1/8-in. OSB Rated Sheathing and Structural I	23/32-in. Structural I PWD	1 1/8-in. Structural I PWD
AKN-100 or AGS-100 series	33	20	33	45	143	166	176	185			
	43	18	33	45	181	210	223	234			
	54	16	50	65	296	344	364	382			
	68	14	50	65	336	390	414	434			
	97	12	40	50	315	371	418	459			
AKN-144 series	68	14	50	65			596	625	699	719	804
	97	12	40	50			601	662	828	761	952
	118	10	40	50			671	739	924	849	1063

1. Tabulated values are for short-term loading and shall be reduced 25 percent for normal loading and 33 percent for permanent loading.
2. Connection strength values are limited to OSB panels with specific gravity G = 0.56 and plywood panels with G = 0.53.
3. For allowable strength design (ASD), tabulated values shall be divided by Ω = 2.03.
4. For strength design (LRFD), tabulated values shall be multiplied by ϕ = 0.79.
5. Minimum panel edge distance is 0.375 inch.

Table 5. β values for estimating diaphragm deflection in accordance with Equation 1

(a) For applications with AKN-100 series pins $\beta = F_1\beta^*$

Designated framing thickness, mil	β* OSB/Plywood rated sheathing or Structural I OSB			
	7/16 in.	15/32 in.	19/32 in.	23/32 in.
33 and 43	735	735	735	735
54 and 68	1025	1025	1179	1333
97 and 118	1550	1550	1783	2015

$$F_1 = \left(\frac{s}{6}\right)^{-0.889}$$

(b) For applications with AKN-144 series pins $\beta = F_1\beta^*$

Designated framing thickness, mil	β* OSB/Plywood rated sheathing or Structural I OSB			β* Structural I Plywood	
	19/32 in.	23/32 in.	1 1/8 in.	23/32 in.	1 1/8 in.
68	1150	1323	1495	1540	1740
97 and 118	1850	2128	2405	2477	2800

$$F_1 = \left(\frac{s}{6}\right)^{-0.889}$$

Table 6. α values for estimating diaphragm deflection in accordance with Equation 1

(a) For applications with AKN-100 series pins $\alpha = G\alpha^*$

Designated framing thickness, mil	α^*			
	OSB/Plywood rated sheathing or Structural I OSB			
	7/16 in.	15/32 in.	19/32 in.	23/32 in.
33 and 43	3.102	3.102	4.033	4.963
54 and 68	2.200	2.200	2.398	2.596
97 and 118	4.300	4.300	4.300	4.300

For 33 and 43 mil framing: $G = \left(\frac{s}{6}\right)^{0.551}$

For 54 through 118 mil framing: $G = \left(\frac{s}{6}\right)^{0.131}$

(b) For applications with AKN-144 series pins $\alpha = G\alpha^*$

Designated framing thickness, mil	α^*				
	OSB/Plywood rated sheathing or Structural I OSB			Structural I Plywood	
	19/32 in.	23/32 in.	1 1/8 in.	23/32 in.	1 1/8 in.
68	2.813	2.672	2.532	2.939	2.785
97 and 118	4.759	4.178	3.617	4.590	3.979

For 68 through 118 mil framing: $G = \left(\frac{s}{6}\right)^{0.131}$

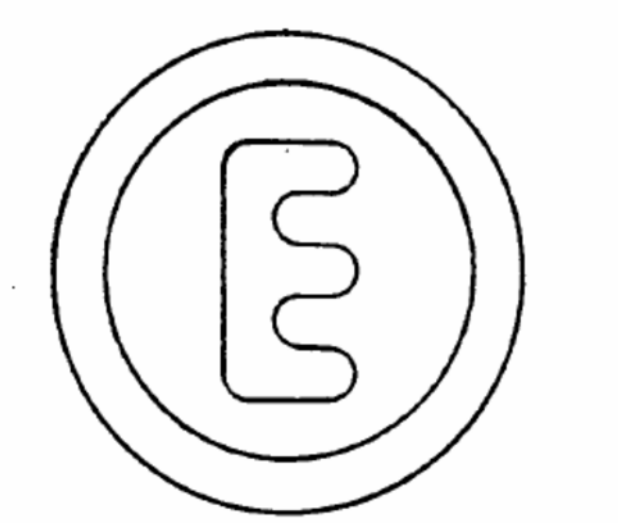

FIGURE 1
ET&F PIN HEAD LOGO

CALIFORNIA SUPPLEMENT

EVALUATION SUBJECT:

ET&F FASTENING SYSTEMS, INC. ET&F PNEUMATICALLY DRIVEN PINS; AKN-100, AGS-100 and AKN-144 series

REPORT HOLDER:

ET&F FASTENING SYSTEMS, INC
29019 SOLON ROAD
SOLON, OHIO 44139
800-248-2376
www.etf-fastening.com

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

1.0 SCOPE OF EVALUATION

1.1 Compliance with the following codes:

- 2013 California Building Code (CBC)

1.2 Evaluated in Accordance With:

- EC-012-2013, approved May 2013
- ICC-ES AC262, approved October 2004 (editorially revised September 2010)

1.3 Properties Evaluated:

- Structural

ADDITIONAL REQUIREMENTS

2.0 USES

Uses are as set forth in Section 2.0 of ER-335. Additionally, the pins are use in horizontal diaphragms constructed with steel framing and wood structural panels in accordance with CBC Sections 2210 and 2211 and recognized for the attachment of wood structural panel sheathing to steel framing members in accordance with CBC Sections 2210 and 2211.

3.0 DESCRIPTION

The description of the pins and other components are as set forth in Sections 4.1 through 4.3 of ER-335.

4.0 DESIGN AND INSTALLATION

The design and installation shall be as set forth in Sections 4.4 and 4.5 of ER-335.

5.0 LIMITATIONS

The ET&F pneumatically driven pins, described in this report, comply with the codes listed in Section 1.0 of this supplement, subject to the following limitations.

5.1 The limitations in Section 2.0 of ER-335 shall apply.

5.2 For applications regulated by DSA or OSHPD, structural calculations shall comply with CBC Section 1603A.3.

5.3 The AKN-100, AGS-100 and AKN-144 series fasteners are limited to installation in dry interior locations, which include roof deck with complying weather protection; and that use in exterior or damp environments is outside the scope of this report.

5.4 The use of AKN-100, AGS-100 and AKN-144 series fasteners in contact with preservative- or fire-retardant-treated wood is outside the scope of this report.

6.0 SUBSTANTIATING DATA

Data in accordance with the IAPMO-UES Evaluation Criteria for Composite Steel Sheet and Noncombustible Sheathing Panels (EC-012), Adopted January 2015, ICC-ES AC262, approved October 2004 (editorially revised September 2010), comparative analysis white paper, and an IAPMO ES approved quality control manual.