DIAPHRAGM DESIGN MANUAL

THIRD EDITION

Appendix VI Addendum November 2006

HILTI PIN X-ENP-19 L15

Authored By

Dr. Larry Luttrell, P.E.

Revised and Adapted For

The ASD and LRFD methods
According to Table D5 of the 2001 Edition of the North American
Specification for the Design of Cold-Formed Steel Structural Members
As modified by
The Supplement 2004 to the North American Specification for the Design of
Cold-Formed Steel Structural Members, 2001 Edition

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USER INSTRUCTION

NOVEMBER 2006

Dear Specifier,

The SDI DDM03 is updated with this Addenda with Hilti X-ENP19 fastener data.

The following steps can be followed:

- Insert page AVI-5 of this Addenda in Section IV of DDM03;
- Replace Tables on pages AVI-9, AVI-10 and AVI-13 of DDM03 with the ones on the corresponding pages AVI-7, AVI-8 and AVI-9 in this Addenda;
- Insert page AVI-12 of this Addenda in Appendix V of DDM03, after page AV-4;
- Insert all X-ENP19 diaphragm load tables from this Addenda (page AVI-13 to AVI-24) in Appendix AV of DDM03.

Thank you for updating your DDM03,

Steel Deck Institute

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ADDITIONAL POWER DRIVEN FASTENERS

Refer to Section 4.6, 4.9 and 4.10 for general instruction on power driven fasteners in shear, tension and combined shear and tension.

Hilti X-ENP-19 L15

[Applicable for 1/4 in. {6mm} and thicker support steel]

For 0.0280 in. {0.71mm} ≤ t ≤0.060 in. {1.52mm}

$Q_f = 56t\ (1\text{-}t),\ kip$

$\left\{Q_f = 9.81t(1\text{-}t/25.4)\right\},\ kN$ (Eq. A-VI-1)

and

$S_f = \dfrac{0.75}{1000\sqrt{t}},\ \dfrac{in.}{kip}$

$\left\{S_f = \dfrac{21.6}{1000\sqrt{t}}\right\},\ \dfrac{mm}{kN}$ (Eq. A-VI-2)

where t = base sheet metal thickness, *in. {mm}*

For t<0.0280 in. {0.71mm}

$Q_f = 61.1t\ (1\text{-}4t),\ kip$

$\left\{Q_f = 10.7t(1\text{-}t/6.35)\right\},\ kN$ (Eq. 4.6-5)

and

$S_f = \dfrac{1.25}{1000\sqrt{t}},\ \dfrac{in.}{kip}$

$\left\{S_f = \dfrac{36}{1000\sqrt{t}}\right\},\ \dfrac{mm}{kN}$ (Eq. 4.6-6)

where t = base sheet metal thickness, *in. {mm}*

The general equation for nominal resistance of these pins in tension is

$T_{nov} = 1.7\ t\ d_w F_u$

where t is the thickness of the deck sheet in contact with fastener head, in.

d_w is the lesser of the actual diameter of the fastener washer (0.591) or 1/2 in.

F_u is the ultimate strength of the deck sheet, ksi

Diaphragm Tables with Hilti X-ENP-19 L15 used as support fastener are listed hereafter.

General Notes of Appendix V (page AV-3) is shown again on page AVI-11 for explanation of the tables.

Table IV - TYPICAL FASTENER VALUES - NOMINAL SHEAR STRENGTH (Q_f & Q_s) & FLEXIBILITY (S_f & S_s)

SUPPORT FASTENER NOMINAL SHEAR STRENGTH							
	Q_f, lbf / Deck Thickness No.						
TYPE OF SUPPORT FASTENER	**28**	**26**	**24**	**22**	**20**	**18**	**16**
5/8" puddle weld or equivalent				1739	2088	2710	3346
3/4" puddle weld or equivalent				2104	2531	3297	4086
16 gauge weld washer with 3/8" hole — E70XX	1199	1552	2371				
Buildex or ElcoTextron #12 or #14 TEKS	652	859	1325	1016	1233	1633	2060
Buildex BX-12	594	769	1147	1484	1734	2134	2473
Buildex BX-14	629	814	1215	1572	1837	2260	2620
Pneutek SDK61-series (0.113" to 0.155" support steel)	642	807	1173	1527	1828	2360	2896
Pneutek SDK63-series (0.155" to 0.25" support steel)	725	912	1325	1711	1973	2403	2812
Pneutek K64-series (0.187" to 0.312" support steel)	729	916	1332	1699	2209	2985	3686
Pneutek K66-series (0.281" & greater support steel)	621	780	1134	1814	2251	3101	4076
Hilti X-ENP-19L15 (0.25" min. support steel)	822	984	1306	1603	1933	2529	3149
Hilti ENP2 or ENPH2 (0.25" minimum support steel)	856	1015	1321	1590	1874	2347	2780
Hilti ENP2K. X-EDN19. or X-EDNK22 (0.125" to 0.375" support steel)	763	914	1213	1489	1795	2348	2924

SUPPORT FASTENER FLEXIBILITY							
	S_f, in./Kip / Deck Thickness No.						
TYPE OF SUPPORT FASTENER	**28**	**26**	**24**	**22**	**20**	**18**	**16**
5/8" puddle weld or equivalent				0.0067	0.0061	0.0053	0.0047
3/4" puddle weld or equivalent				0.0067	0.0061	0.0053	0.0047
16 gauge weld washer with 3/8" hole — E70XX	0.0094	0.0086	0.0074				
Buildex or ElcoTextron #12 or #14 TEKS	0.0107	0.0097	0.0084	0.0076	0.0069	0.0060	0.0053
Buildex BX-12	0.0205	0.0187	0.0162	0.0146	0.0132	0.0115	0.0102
Buildex BX-14	0.0205	0.0187	0.0162	0.0146	0.0132	0.0115	0.0102
Pneutek SDK61-series (0.113" to 0.155" support steel)	0.0246	0.0224	0.0194	0.0175	0.0159	0.0138	0.0123
Pneutek SDK63-series (0.155" to 0.25" support steel)	0.0246	0.0224	0.0194	0.0175	0.0159	0.0138	0.0123
Pneutek K64-series (0.187" to 0.312" support steel)	0.0246	0.0224	0.0194	0.0175	0.0159	0.0138	0.0123
Pneutek K66-series (0.281" & greater support steel)	0.0246	0.0224	0.0194	0.0175	0.0159	0.0138	0.0123
Hilti X-ENP-19L15 (0.25" min. support steel)	0.0061	0.0056	0.0049	0.0044	0.0040	0.0034	0.0031
Hilti ENP2 or ENPH2 (0.25" minimum support steel)	0.0102	0.0093	0.0081	0.0073	0.0066	0.0057	0.0051
Hilti ENP2K. X-EDN19. or X-EDNK22 (0.125" to 0.375" support steel)	0.0102	0.0093	0.0081	0.0073	0.0066	0.0057	0.0051

SIDE-LAP FASTENER NOMINAL SHEAR STRENGTH							
	Q_S, lbf / Deck Thickness No.						
TYPE OF SIDE-LAP FASTENER	**28**	**26**	**24**	**22**	**20**	**18**	**16**
5/8" puddle weld or 1.5" long fillet weld				1304	1566	2033	2510
#8 screws	280	337	449	555	673	891	1124
#10 screws	320	384	513	633	769	1018	1284
#12 screws	362	435	580	716	869	1151	1452
#14 screws	424	510	681	840	1020	1350	1703

SIDE-LAP FASTENER FLEXIBILITY							
	Ss, in/Kip / Deck Thickness No.						
TYPE OF SIDE-LAP FASTENER	**28**	**26**	**24**	**22**	**20**	**18**	**16**
5/8" puddle weld or 1.5" long fillet weld				0.0073	0.0066	0.0057	0.0051
#8 screws	0.0246	0.0224	0.0194	0.0175	0.0159	0.0138	0.0123
#10 screws	0.0246	0.0224	0.0194	0.0175	0.0159	0.0138	0.0123
#12 screws	0.0246	0.0224	0.0194	0.0175	0.0159	0.0138	0.0123
#14 screws	0.0246	0.0224	0.0194	0.0175	0.0159	0.0138	0.0123

Table IV-M - TYPICAL FASTENER VALUES - NOMINAL SHEAR STRENGTH (Q_f & Q_s) & FLEXIBILITY (S_f & S_s)

SUPPORT FASTENER NOMINAL SHEAR STRENGTH							
	Q_f, kN / Deck Thickness No.						
TYPE OF SUPPORT FASTENER	**28**	**26**	**24**	**22**	**20**	**18**	**16**
16 mm puddle weld or equivalent				7.80	9.27	12.11	14.83
19 mm puddle weld or equivalent				9.33	11.11	14.57	17.90
1.5 mm weld washer with 10 mm hole — E70XX	5.50	6.96	10.55				
Buildex and Elco Textron #12 or #14 TEKS	2.92	3.76	5.79	4.56	5.48	7.30	9.13
Buildex BX-12	2.66	3.37	5.02	6.60	7.65	9.47	10.92
Buildex BX-14	2.80	3.56	5.30	6.97	8.07	9.99	11.52
Pneutek SDK61-series (3 mm to 4 mm support steel)	2.87	3.54	5.13	6.81	8.07	10.49	12.77
Pneutek SDK63-series (4 mm to 6 mm support steel)	3.24	4.00	5.80	7.63	8.72	10.68	12.42
Pneutek K64-series (5 mm to 8 mm support steel)	3.26	4.02	5.83	7.59	9.73	13.27	16.26
Pneutek K66-series (7 mm & greater support steel)	2.77	3.42	4.96	8.07	9.89	13.73	17.85
Hilti X-ENP-19L15 (6mm min. support steel)	3.69	4.36	5.78	7.18	8.57	11.29	13.93
Hilti ENP2 or ENPH2 (6 mm minimum support steel)	3.82	4.47	5.81	7.08	8.27	10.41	12.26
Hilti ENP2K. X-EDN19. or X-EDNK22 (3 mm to 10 mm support steel)	3.41	4.03	5.34	6.63	7.91	10.42	12.86

SUPPORT FASTENER FLEXIBILITY							
	S_f, mm/kN / Deck Thickness No.						
TYPE OF SUPPORT FASTENER	**28**	**26**	**24**	**22**	**20**	**18**	**16**
16 mm puddle weld or equivalent				0.0382	0.0349	0.0302	0.0270
19 mm puddle weld or equivalent				0.0382	0.0349	0.0302	0.0270
1.5 mm weld washer with 10 mm hole — E70XX	0.0537	0.0493	0.0427				
Buildex and Elco Textron #12 or #14 TEKS	0.0607	0.0558	0.0483	0.0432	0.0394	0.0341	0.0305
Buildex BX-12	0.1166	0.1072	0.0928	0.0830	0.0758	0.0656	0.0587
Buildex BX-14	0.1166	0.1072	0.0928	0.0830	0.0758	0.0656	0.0587
Pneutek SDK61-series (3 mm to 4 mm support steel)	0.1400	0.1286	0.1114	0.0997	0.0910	0.0788	0.0705
Pneutek SDK63-series (4 mm to 6 mm support steel)	0.1400	0.1286	0.1114	0.0997	0.0910	0.0788	0.0705
Pneutek K64-series (5 mm to 8 mm support steel)	0.1400	0.1286	0.1114	0.0997	0.0910	0.0788	0.0705
Pneutek K66-series (7 mm & greater support steel)	0.1400	0.1286	0.1114	0.0997	0.0910	0.0788	0.0705
Hilti X-ENP-19L15 (6mm min. support steel)	0.0350	0.0322	0.0279	0.0249	0.0227	0.0197	0.0176
Hilti ENP2 or ENPH2 (6 mm minimum support steel)	0.0584	0.0537	0.0465	0.0416	0.0379	0.0329	0.0294
Hilti ENP2K. X-EDN19. or X-EDNK22 (3 mm to 10 mm. support steel)	0.0584	0.0537	0.0465	0.0416	0.0379	0.0329	0.0294

SIDE-LAP FASTENER NOMINAL SHEAR STRENGTH							
	Q_S, kN / Deck Thickness No.						
TYPE OF SIDE-LAP FASTENER	**28**	**26**	**24**	**22**	**20**	**18**	**16**
16 mm puddle weld or 38 mm fillet weld				5.85	6.95	9.08	11.1
#8 screws	1.25	1.48	1.97	2.47	2.96	3.95	4.94
#10 screws	1.43	1.69	2.26	2.82	3.38	4.51	5.64
#12 screws	1.62	1.91	2.55	3.19	3.83	5.10	6.38
#14 screws	1.90	2.24	2.99	3.74	4.49	5.99	7.48

SIDE-LAP FASTENER FLEXIBILITY							
	Ss, mm/kN / Deck Thickness No.						
TYPE OF SIDE-LAP FASTENER	**28**	**26**	**24**	**22**	**20**	**18**	**16**
16 mm puddle weld or 38 mm fillet weld				0.0416	0.0379	0.0329	0.0294
#8 screws	0.1400	0.1286	0.1114	0.0997	0.0910	0.0788	0.0705
#10 screws	0.1400	0.1286	0.1114	0.0997	0.0910	0.0788	0.0705
#12 screws	0.1400	0.1286	0.1114	0.0997	0.0910	0.0788	0.0705
#14 screws	0.1400	0.1286	0.1114	0.0997	0.0910	0.0788	0.0705

Table IX - HILTI FASTENER IN TENSION

Deck Thickness in.	T_n, lbf[1] Hilti Fastener Type / Fastener Washer Diameter, in.		
	ENP2/ ENPH2/ ENP2K	X-EDN19/ X-EDNK22	X-ENP-19L15
	0.591	0.474	0.591
0.0295	1128	1070	1128
0.0358	1369	1298	1369
0.0474	1813	1719	1813
0.0598	2287	2168	2287

[1] $T_{nov} = 1.7\ t\ d_w\ F_u$ per this manual, page 4-14, section 4.9.3

Table IX-M - HILTI FASTENER IN TENSION

Deck Thickness in.	T_n, kN Hilti Fastener Type / Fastener Washer Diameter, mm		
	ENP2/ ENPH2/ ENP2K	X-EDN19/ X-EDNK22	X-ENP-19L15
	15	12	15
0.75	5.02	4.76	5.02
0.91	6.09	5.77	6.09
1.20	8.06	7.65	8.06
1.52	10.17	9.65	10.17

LOAD TABLES

THE LOAD TABLES ARE SHOWING NOMINAL STRENGTH VALUES. THE VALUES MUST NOT BE USED WITHOUT APPLYING THE PROPER SAFETY OR RESISTANCE FACTOR.

LRFD

The values of the load tables must be multiplied by a resistance factor (number smaller than or equal to 0.70) when comparing to forces evaluated using Load and Resistance Factor Design.

ASD

The values of the load tables must be divided by a safety factor (number larger than or equal to 2.35) when comparing to forces evaluated using Allowable Stress Design.

The following load tables are for typical panel configurations and connector types. Specific design applications may dictate an arrangement, not listed, which would require the designer to make direct use of the strength and stiffness formulas shown in Sections 1 through 5.

The tables are arranged showing the fastener types, safety factor and resistance factor at the top along with the fastener patterns as defined in Appendix IV. For each steel base sheet metal design thickness given, nominal shear strengths are listed under the specific span lengths. The column "SIDE-LAP CONN./SPAN" shows the number of connectors between structural supports at the sheet edge. For example, "5" would represent six even spaces or stitch fasteners at 12 in. on center within a 6 ft deck span.

Nominal diaphragm shears due to panel buckling are tabulated at the bottom of the pages to check whether the panel buckling governs over connector strength for diaphragm design. The asterisk (*) in the strength table indicates the potential of panel buckling governing over connector strength under a certain type of lateral load. The tables were done in this manner because of the different safety or resistance factors that apply to connector strength and panel buckling.

For roof deck and composite floor deck, the steel yield point is taken at 33 ksi; form deck yield strength is taken at 80 ksi. Structural concrete strength is 3000 psi, and the densities are 145 pcf and 110 pcf for normal weight and light weight concrete respectively. Though design tables show side-lap stitch welds for all thickness listed, they are not recommended for design thickness of 0.0295 in. and less.

The Dxx-values are the warping constants for the particular connector pattern and panel profile. They may be substituted directly into the G' stiffness equation in Appendix IV. Dxx-values, K2-, K3-, and K4-values are listed in Appendix IV. K1-values are found with the appropriate load table.

The tables for structural concrete filled deck are for 1.5 in., 2 in. and 3 in. composite deck attached with a 36/4 pattern. The values would not appreciably change for 24 in. wide deck attached with a 24/3 pattern. The concrete thickness above the deck is 2.5 in. as a minimum.

The load tables for 9/16 in. form decks are shown with structural concrete fill of minimum 2.5 in. cover or with insulating concrete assembled as Type I and Type II attached at a basic 30/4 pattern. Type I decks have 2.5 in. of insulating concrete above the deck. Type II decks have insulating concrete poured to the top of the steel deck; Next, rigid insulating boards of expanded polystyrene, having about 2% of the area containing holes, are embedded into the insulating concrete with the excess concrete moving into the holes (rigid insulating boards should be held 3 ft away from diaphragm shear resisting lines); Finally a topping layer of 2 in. or more of insulating concrete is placed above the rigid insulating board. The strength of the insulating concrete is taken as $f'_c = 125$ *psi*.

There may be shaded values or no values on portions of a load table. The shaded values do not comply with the minimum spacing for side-lap connections and shall not be used except with properly spaced side-lap connections. The shaded areas will be the rows for 0 side-lap connection and are shown for reference. A conservative approach to get nominal shear for diaphragms with button punched side-laps is to use the values from the 0 side-lap connection rows.

TABLE OF CONTENTS FOR DIAPHRAGM LOAD TABLES

STANDARD ROOF DECK

DECK TYPE	SIDE-LAP CONNECTION	FASTENING PATTERN	FRAME FASTENER HILTI X-ENP-19 L15
1 1/2'' ROOF DECK	#10 SCREWS	36/9 36/5 36/4 36/3	AVI-13 thur AVI-16
		30/6 30/4 30/3	
3'' ROOF DECK	#10 SCREWS	24/4	AVI-17

STANDARD FORM DECK (Side-lap Connection #10 Screws)

DECK TYPE	TYPE OF FILL	FASTENING PATTERN	FRAME FASTENER HILTI X-ENP-19 L15
9/16'' X 2 1/2'' FORM DECK	WITHOUT FILL	35/8 36/7 36/6 36/5 36/7 30/5 30/4	AVI-18 AVI-19 AVI-20
	N.W. & L.W. CONCRETE	30/4	
	TYPE I & T II INSULATING CONCRETE	30/4	

STANDARD COMPOSITE DECK (Support Fastener Pattern 36/4)

DECK TYPE	SIDE-LAP CONNECT.	TYPE OF CONCRETE	FRAME FASTENER HILTI X-ENP-19 L15
1 1/2" x 6" 2" x 12" 3" x 12"	#10 SCREWS	NONE (MULTIPLE FASTENER LAYOUT)	AVI-21 thru AVI-24
		NORMAL WEIGHT CONCRETE (2 1/2" COVER)	

1.5 (WR, IR, NR)
t = design thickness = 0.0295"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 Ω (EQ): 2.50
ϕ (WIND): 0.70 Ω (WIND): 2.35
ϕ (Other): 0.65 Ω (Other): 2.50

FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF SPAN, FT 3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	K1
36/9	0	1640	1440	1285	1135	1015	915	835	765	705	0.211
	1	1785	1580	1410	1275	1140	1030	940			0.188
	2	1925	1710	1535	1390	1265	1145	1045	960	885 *	0.169
	3	2050	1835	1650	1500	1370	1260	1150	1055 *	975 *	0.154
	4	2170	1950	1765	1605	1470	1355	1255 *	1155 *	1065 *	0.141
	5	2280	2060	1870	1705	1565	1445 *	1345 *	1250 *	1155 *	0.130
	6	2380	2160	1970	1805	1660	1535 *	1425 *	1330 *	1245 *	0.121
36/7	0	1050	910	795	700	625	565	515	475	435	0.317
	1	1220	1065	945	840	755	680	620			0.267
	2	1380	1215	1080	975	880	795	725	670	615	0.230
	3	1530	1355	1210	1090	995	910	830	765	710	0.203
	4	1670	1485	1330	1205	1100	1010	935	865	800	0.181
	5	1795	1605	1450	1315	1205	1110	1025	955	890 *	0.163
	6	1910	1720	1555	1420	1300	1200	1115	1035 *	970 *	0.149
36/5	0	925	815	725	645	580	520	475	435	400	0.380
	1	1075	950	855	770	705	640	580			0.310
	2	1200	1075	970	880	805	740	685	630	585	0.262
	3	1310	1185	1075	985	905	835	775	720	675	0.227
	4	1410	1285	1175	1080	995	920	860	800	750	0.200
	5	1490	1370	1260	1165	1080	1005	935	875	825	0.179
	6	1565	1450	1340	1245	1160	1080	1010	950	895 *	0.162
36/4	0	710	625	555	490	435	395	355	325	300	0.475
	1	850	760	680	615	565	510	465			0.371
	2	970	875	790	725	665	610	570	520	480	0.304
	3	1065	970	890	820	755	700	650	610	570	0.258
	4	1145	1055	975	900	835	780	730	685	645	0.224
	5	1210	1125	1050	975	910	855	800	755	710	0.197
	6	1265	1185	1110	1045	980	920	865	820	775	0.177
30/6	0	955	815	710	625	560	505	460	420	390	0.422
	1	1130	985	870	765	685	620	565			0.349
	2	1300	1140	1010	910	815	735	670	615	570	0.298
	3	1455	1280	1145	1030	935	850	775	715	660	0.260
	4	1595	1415	1270	1145	1045	960	880	810	750	0.230
	5	1730	1545	1390	1260	1150	1055	980	910	840	0.207
	6	1850	1660	1500	1365	1250	1155	1070	995	930 *	0.188
30/4	0	865	765	680	605	545	490	445	410	375	0.475
	1	1005	895	805	730	665	605	550			0.385
	2	1125	1015	915	835	765	705	655	605	555	0.323
	3	1230	1120	1020	935	860	795	740	690	645	0.279
	4	1320	1210	1110	1025	945	880	820	770	720	0.245
	5	1395	1290	1190	1105	1025	960	895	840	790	0.219
	6	1460	1360	1265	1180	1100	1030	965	910	860	0.197

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**

THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.

ϕ (Buckling): 0.80 Ω (Buckling): 2.00

DECK PROFILE	I in^4 / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
NR	0.099	4130	3035	2320	1835	1485	1225	1030	880	755
IR	0.108	4410	3240	2480	1960	1585	1310	1100	935	810
WR	0.152	5695	4185	3205	2530	2050	1695	1420	1210	1045

NOTE:
ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

1.5 (WR, IR, NR)
t = design thickness = 0.0358"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 Ω (EQ): 2.50
ϕ (WIND): 0.70 Ω (WIND): 2.35
ϕ (Other): 0.65 Ω (Other): 2.50

FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF SPAN, FT 4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	K1
36/9	0	1545	1380	1230	1115	1015	930	855	795	740	0.233
	1	1705	1535	1385	1250	1140					0.207
	2	1850	1675	1530	1390	1270	1165	1075	1000	930	0.186
	3	1995	1810	1655	1520	1395	1285	1185	1100 *	1025 *	0.169
	4	2130	1940	1775	1635	1515	1400	1295 *	1205 *	1125 *	0.155
	5	2255	2060	1895	1750	1620	1510 *	1405 *	1305 *	1220 *	0.143
	6	2380	2180	2005	1855	1725 *	1610 *	1510 *	1410 *	1315 *	0.133
36/7	0	960	850	760	685	625	575	530	490	460	0.349
	1	1140	1020	915	825	755					0.294
	2	1305	1175	1065	965	880	810	750	695	650	0.254
	3	1460	1320	1200	1100	1010	930	860	800	745	0.223
	4	1610	1460	1330	1220	1130	1045	970	900	845	0.199
	5	1750	1590	1455	1340	1240	1155	1075	1005	940 *	0.180
	6	1885	1715	1575	1455	1345	1255	1175	1100 *	1035 *	0.164
36/5	0	875	785	700	635	580	530	490	455	425	0.419
	1	1030	930	850	775	705					0.342
	2	1170	1065	975	895	830	765	710	660	615	0.289
	3	1300	1190	1090	1010	935	875	815	760	710	0.250
	4	1420	1305	1200	1115	1035	970	910	855	805	0.220
	5	1525	1410	1305	1215	1135	1060	995	940	890	0.197
	6	1620	1505	1400	1305	1225	1150	1080	1020	965 *	0.178
36/4	0	670	595	530	480	435	400	365	340	315	0.523
	1	820	745	680	620	565					0.408
	2	955	875	800	740	685	635	585	545	510	0.335
	3	1075	990	910	845	785	735	690	645	605	0.284
	4	1180	1090	1010	945	880	825	775	735	695	0.246
	5	1265	1180	1100	1030	970	910	860	810	770	0.217
	6	1345	1260	1185	1110	1045	990	935	885	840	0.195
30/6	0	860	760	680	615	560	515	475	440	410	0.465
	1	1050	930	835	755	685					0.385
	2	1220	1095	985	895	815	750	695	645	600	0.328
	3	1380	1245	1130	1035	945	865	800	745	695	0.286
	4	1535	1385	1265	1160	1070	985	910	850	795	0.254
	5	1680	1520	1390	1280	1180	1100	1020	950	890	0.228
	6	1815	1650	1515	1395	1290	1200	1125	1055	985 *	0.207
30/4	0	820	735	660	595	540	495	460	425	395	0.523
	1	970	880	800	735	670					0.424
	2	1110	1010	925	855	790	735	680	630	590	0.356
	3	1230	1130	1040	960	895	835	780	730	685	0.307
	4	1340	1235	1145	1065	990	930	870	820	775	0.270
	5	1440	1335	1240	1160	1085	1015	955	905	855	0.241
	6	1525	1425	1330	1245	1170	1100	1035	980	930	0.217

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**

THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.

ϕ (Buckling): 0.80 Ω (Buckling): 2.00

DECK PROFILE	I in^4 / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
NR	0.128	3255	2570	2085	1720	1445	1230	1060	925	810
IR	0.139	3465	2735	2215	1830	1540	1310	1130	985	865
WR	0.198	4515	3570	2890	2390	2005	1710	1475	1285	1125

NOTE:
ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

1.5 (WR, IR, NR)
t = design thickness = 0.0474"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 Ω (EQ): 2.50
ϕ (WIND): 0.70 Ω (WIND): 2.35
ϕ (Other): 0.65 Ω (Other): 2.50

FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF SPAN, FT 5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	K1
36/9	0	1625	1470	1340	1230	1135	1050	980	915	860	0.268
	1	1830	1655	1510							0.238
	2	2005	1840	1680	1540	1425	1325	1235	1155	1085	0.214
	3	2170	1995	1845	1700	1570	1460	1360	1275	1200 *	0.195
	4	2330	2150	1990	1855	1715	1595	1490 *	1395 *	1315 *	0.178
	5	2485	2295	2130	1985	1860	1730 *	1615 *	1515 *	1425 *	0.165
	6	2635	2440	2265	2115	1980 *	1865 *	1745 *	1635 *	1540 *	0.153
36/7	0	1000	905	825	760	700	650	605	570	535	0.401
	1	1205	1090	995							0.338
	2	1400	1275	1165	1070	990	920	860	810	760	0.292
	3	1575	1445	1335	1230	1135	1060	990	930	875	0.257
	4	1750	1605	1485	1380	1285	1195	1115	1050	985	0.229
	5	1915	1760	1630	1515	1415	1330	1245	1165	1100	0.207
	6	2070	1910	1770	1650	1545	1450	1365	1285	1215 *	0.189
36/5	0	925	835	765	700	645	600	560	525	495	0.482
	1	1110	1020	935							0.393
	2	1280	1175	1090	1015	940	870	815	765	720	0.332
	3	1435	1325	1230	1145	1075	1010	940	885	830	0.288
	4	1580	1465	1365	1275	1195	1125	1060	1005	945	0.253
	5	1715	1595	1490	1395	1310	1235	1170	1105	1050	0.227
	6	1840	1715	1610	1510	1420	1340	1270	1205	1145	0.205
36/4	0	700	635	575	530	485	450	420	395	370	0.602
	1	890	820	745							0.470
	2	1050	970	900	840	780	725	675	630	595	0.385
	3	1200	1110	1035	965	905	855	800	750	705	0.327
	4	1330	1240	1160	1085	1020	965	910	865	820	0.283
	5	1450	1355	1275	1195	1130	1070	1010	960	915	0.250
	6	1555	1460	1375	1300	1230	1165	1105	1055	1005	0.224
30/6	0	895	810	740	680	625	580	540	505	475	0.535
	1	1100	995	910							0.443
	2	1305	1180	1080	990	915	850	795	745	700	0.378
	3	1485	1360	1245	1145	1060	990	925	865	815	0.329
	4	1660	1525	1405	1305	1205	1125	1050	985	930	0.292
	5	1830	1680	1555	1445	1350	1260	1180	1105	1040	0.262
	6	1990	1835	1700	1580	1480	1390	1305	1225	1155	0.238
30/4	0	870	785	715	655	605	565	525	490	460	0.602
	1	1050	965	885							0.488
	2	1215	1120	1035	965	895	835	780	730	685	0.410
	3	1365	1265	1175	1095	1025	965	905	850	800	0.354
	4	1505	1395	1305	1220	1145	1080	1020	965	915	0.311
	5	1630	1520	1425	1335	1260	1185	1125	1065	1015	0.277
	6	1750	1635	1535	1445	1365	1290	1225	1160	1105	0.250

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**

THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.

ϕ (Buckling): 0.80 Ω (Buckling): 2.00

DECK PROFILE	I in^4 / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
NR	0.181	3335	2755	2315	1970	1700	1480	1300	1155	1030
IR	0.196	3540	2925	2460	2095	1805	1570	1380	1225	1090
WR	0.284	4675	3865	3245	2765	2385	2075	1825	1615	1440

NOTE:
ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

1.5 (WR, IR, NR)
t = design thickness = 0.0598"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 Ω (EQ): 2.50
ϕ (WIND): 0.70 Ω (WIND): 2.35
ϕ (Other): 0.65 Ω (Other): 2.50

FASTENER LAYOUT	SIDE-LAP CONN./SPAN	NOMINAL SHEAR STRENGTH, PLF SPAN, FT 6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	K1
	0	1680	1545	1425	1325	1235	1155	1085	1020	965	0.301
	1	1895									0.267
	2	2110	1940	1790	1665	1555	1455	1370			0.240
36/9	3	2305	2135	1975	1835	1715	1610	1515	1430	1350 *	0.219
	4	2490	2315	2160	2010	1875	1760	1655	1565 *	1480 *	0.200
	5	2665	2485	2325	2180	2035	1910 *	1800 *	1700 *	1610 *	0.185
	6	2835	2645	2480	2330	2195 *	2060 *	1940 *	1835 *	1735 *	0.172
	0	1035	950	880	815	765	715	670	635	600	0.451
	1	1250									0.380
	2	1465	1345	1245	1160	1085	1015	955			0.328
36/7	3	1670	1545	1430	1330	1245	1170	1100	1040	985	0.289
	4	1860	1725	1610	1500	1405	1320	1245	1175	1115	0.258
	5	2040	1900	1775	1665	1565	1470	1385	1310	1240	0.233
	6	2220	2070	1935	1815	1710	1620	1530	1445	1370 *	0.212
	0	955	880	810	755	705	660	620	585	555	0.541
	1	1170									0.442
	2	1360	1265	1180	1095	1025	960	905			0.373
36/5	3	1535	1435	1340	1260	1185	1115	1050	990	940	0.323
	4	1705	1595	1495	1405	1330	1255	1190	1125	1065	0.285
	5	1865	1745	1640	1545	1460	1385	1315	1255	1195	0.255
	6	2015	1890	1780	1680	1590	1510	1435	1370	1310	0.230
	0	725	665	615	570	530	495	465	440	415	0.676
	1	940									0.528
	2	1125	1050	980	910	850	800	750			0.433
36/4	3	1295	1210	1135	1070	1010	950	895	845	800	0.367
	4	1450	1360	1280	1205	1140	1085	1030	980	925	0.318
	5	1595	1500	1415	1340	1270	1205	1145	1095	1045	0.281
	6	1725	1630	1540	1460	1390	1320	1260	1205	1150	0.252
	0	925	850	785	730	680	640	600	565	535	0.601
	1	1140									0.498
	2	1355	1245	1155	1070	1000	940	885			0.424
30/6	3	1570	1445	1335	1245	1160	1090	1025	970	920	0.370
	4	1760	1635	1520	1415	1325	1240	1170	1105	1050	0.328
	5	1950	1810	1690	1585	1485	1395	1315	1240	1175	0.294
	6	2130	1985	1855	1740	1640	1545	1455	1375	1305	0.267
	0	900	825	760	710	660	620	580	545	515	0.676
	1	1110									0.548
	2	1295	1205	1130	1050	980	920	865			0.460
30/4	3	1470	1370	1285	1210	1140	1070	1010	955	900	0.397
	4	1630	1525	1435	1350	1275	1210	1150	1090	1030	0.349
	5	1780	1675	1575	1485	1405	1335	1270	1210	1155	0.311
	6	1925	1810	1710	1615	1535	1455	1385	1325	1265	0.281

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**

THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.

ϕ (Buckling): 0.80 Ω (Buckling): 2.00

DECK PROFILE	I in^4 / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
NR	0.226	3255	2775	2390	2085	1830	1620	1445	1300	1170
IR	0.245	3460	2950	2540	2215	1945	1725	1535	1380	1245
WR	0.355	4570	3895	3355	2925	2570	2275	2030	1820	1645

NOTE:
ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

3.0 DR SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel) **ϕ (Buckling): 0.80 Ω (Buckling): 2.00 ϕ (EQ): 0.65 Ω (EQ): 2.50**
SIDE-LAP FASTENING: #10 screws **ϕ (Other): 0.65 Ω (Other): 2.50 ϕ (WIND): 0.70 Ω (WIND): 2.35**

FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF t = design thickness = 0.0295 in. SPAN, FT									
		8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	K1
24/4	0	255	240	230	215	205	195	185	180	170	0.713
	2	415	390	370							0.456
	3	495	465	440	415	395	375	360	345	330	0.387
	4	575	540	510	485	460	435	415	400	380	0.335
	5	655	615	580	550	520	495	475	455	435	0.296
	6	730	690	650	615	585	560	530	510	490	0.265
	7	805	760	720	685	650	620	590	565	540	0.240
	8	870	825	780	745	710	680	650	620	595	0.219
	9	930	885	840	800	765	735	700	675	645	0.202
	10	990	945	900	855	820	785	750	720	695	0.187
	11	1050	1000	955	910	870	835	800	770	740	0.174
	I (in4/ft)	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (Sn), PLF									
	0.551	2035	1800	1605	1440	1300	1180	1075	985	905	

FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF t = design thickness = 0.0358 in. SPAN, FT									
		9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	K1
24/4	0	275	260	250	235	225	215	205	200	190	0.785
	2	445									0.502
	3	530	505	480	455	435	415	400			0.426
	4	615	585	555	530	505	485	465	445	425	0.369
	5	705	665	630	600	575	550	525	505	485	0.326
	6	790	745	710	675	645	615	590	565	545	0.292
	7	875	825	785	750	715	685	655	630	605	0.264
	8	945	900	860	820	785	750	720	690	665	0.242
	9	1020	970	925	885	850	815	785	750	725	0.222
	10	1085	1035	990	950	910	875	840	810	780	0.206
	12	1220	1165	1115	1070	1030	990	950	915	885	0.179
	I (in4/ft)	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (Sn), PLF									
	0.714	2260	2025	1830	1660	1510	1380	1270	1170	1080	

FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF t = design thickness = 0.0474 in. SPAN, FT									
		10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	K1
24/4	0	325	310	295	280	270	260	250	240	230	0.903
	3	630	600	570	550	525					0.490
	4	730	695	665	635	610	585	565	540	520	0.425
	5	835	795	755	725	695	665	640	615	595	0.375
	6	935	890	850	815	780	750	720	695	670	0.336
	7	1035	985	940	900	865	830	795	770	740	0.304
	8	1135	1085	1035	990	950	910	875	845	815	0.278
	9	1220	1170	1120	1075	1035	990	955	920	885	0.256
	10	1305	1250	1200	1155	1110	1070	1030	995	960	0.237
	11	1390	1330	1280	1230	1185	1140	1100	1065	1025	0.221
	13	1550	1490	1430	1375	1325	1280	1235	1195	1155	0.194
	I (in4/ft)	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (Sn), PLF									
	1.036	2985	2710	2465	2255	2075	1910	1765	1635	1520	

FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF t = design thickness = 0.0598 in. SPAN, FT									
		11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	K1
24/4	0	365	350	335	325	310	300	290	280	270	1.015
	3	715	685	660							0.550
	4	835	800	765	735	705	680	655	635	610	0.477
	5	950	910	870	835	805	775	745	720	695	0.422
	6	1065	1020	980	940	905	870	840	810	785	0.378
	7	1185	1135	1085	1040	1000	965	930	900	870	0.342
	8	1300	1245	1195	1145	1100	1060	1020	985	955	0.312
	9	1410	1350	1300	1250	1200	1155	1115	1075	1040	0.287
	10	1510	1450	1395	1345	1295	1250	1205	1165	1125	0.266
	11	1605	1545	1485	1435	1380	1335	1290	1250	1210	0.248
	13	1795	1730	1665	1605	1550	1500	1450	1405	1365	0.218
	I (in4/ft)	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (Sn), PLF									
	1.295	3475	3175	2920	2690	2485	2305	2145	2000	1865	

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**
THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.
NOTE: ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

9/16" x 2 1/2" FORM DECK — ϕ (EQ): 0.65 — Ω (EQ): 2.50 — ϕ (FILLED, EQ): 0.50 — Ω (FILLED, EQ): 3.25

t = design thickness = 0.0149" — ϕ (WIND): 0.70 — Ω (WIND): 2.35 — ϕ (FILLED, WIND): 0.50 — Ω (FILLED, WIND): 3.25

SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel) — ϕ (Other): 0.65 — Ω (Other): 2.50 — ϕ (FILLED, Other): 0.50 — Ω (FILLED, Other): 3.25

SIDE-LAP FASTENING: #10 screws

TYPE OF FILL	FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF, SPAN, FT 1.0	1.5	2.0	2.5	3.0	3.5	4.0	K1
NO FILL (BARE DECK)	35/8	0	1360	1055	850	700	595 *	520 *	455 *	0.203
		1	1470	1175	960	805	685 *	600 *	530 *	0.174
		2	1555	1280	1060	895 *	770 *	675 *	600 *	0.152
		3	1620	1365	1150	985 *	855 *	750 *	670 *	0.136
		4	1675	1440	1235	1065 *	930 *	820 *	735 *	0.122
	35/7	0	1250	1000	815	680	580 *	505 *	450 *	0.216
		1	1335	1100	915	775	665 *	585 *	520 *	0.184
		2	1400	1185	1005	860 *	745 *	655 *	585 *	0.160
		3	1450	1255	1080	935 *	820 *	725 *	650 *	0.142
		4	1490	1315	1150	1005 *	890 *	790 *	710 *	0.127
	35/5	0	890	735	610	515	445	390	345 *	0.295
		1	950	815	695	600	525	460 *	415 *	0.238
		2	990	875	765	670	595 *	530 *	475 *	0.199
		3	1020	925	825	735	655 *	590 *	530 *	0.172
		4	1040	960	870	785	710 *	640 *	585 *	0.151
	30/7	0	1290	985	785	645	545	475 *	415 *	0.270
		1	1415	1115	900	750	640 *	555 *	490 *	0.227
		2	1510	1225	1010	845 *	725 *	635 *	560 *	0.196
		3	1585	1320	1105	940 *	810 *	710 *	630 *	0.173
		4	1645	1400	1190	1020 *	890 *	785 *	700 *	0.154
	30/5	0	950	750	610	505	430	375	330 *	0.360
		1	1040	855	710	600	520	455 *	400 *	0.288
		2	1100	940	800	685	595 *	525 *	470 *	0.240
		3	1145	1005	870	760	670 *	595 *	535 *	0.206
		4	1180	1055	935	825 *	735 *	655 *	590 *	0.180
	30/4	0	765	625	520	435	375	330	290	0.405
		1	830	710	605	520	455	400	360 *	0.316
		2	870	770	675	595	525	470 *	420 *	0.259
		3	900	815	730	655	585 *	525 *	475 *	0.220
		4	915	850	775	700	635 *	580 *	530 *	0.191
2 1/2" NW CONC. (ABOVE DECK)	30/4	0	6125	5715	5515	5390	5310	5255	5210	0.405
		1	6445	5930	5675	5520	5415	5345	5290	0.316
		2	6765	6145	5835	5650	5525	5435	5370	0.259
		3	7085	6355	5995	5775	5630	5525	5450	0.220
		4	7405	6570	6155	5905	5735	5620	5530	0.191
2 1/2" LW CONC. (ABOVE DECK)	30/4	0	4460	4055	3850	3730	3645	3590	3545	0.405
		1	4780	4265	4010	3855	3755	3680	3625	0.316
		2	5100	4480	4170	3985	3860	3770	3705	0.259
		3	5420	4695	4330	4110	3965	3865	3785	0.220
		4	5740	4905	4490	4240	4075	3955	3865	0.191
TYPE I INSUL. FILL	30/4	0	1665	1260	1055	935	855	795	750	0.405
		1	1985	1475	1215	1065	960	885	830	0.316
		2	2305	1685	1375	1190	1065	980	910	0.259
		3	2625	1900	1535	1320	1175	1070	990	0.220
		4	2945	2115	1695	1445	1280	1160	1070	0.191
TYPE II INSUL. FILL	30/4	0	1935	1530	1325	1205	1120	1065	1020	0.405
		1	2255	1740	1485	1330	1230	1155	1100	0.316
		2	2575	1955	1645	1460	1335	1245	1180	0.259
		3	2895	2170	1805	1585	1440	1340	1260	0.220
		4	3215	2380	1965	1715	1550	1430	1340	0.191

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**

WHEN FILLED DIAPHRAGMS ARE USED, IT MAY BE NECESSARY TO INCREASE THE NUMBER, OR STRENGTH, OF THE PERIMETER CONNECTIONS TO DEVELOP THE VALUES SHOWN IN THE TABLE. CHECK SECTION 5.4.

ϕ (Buckling): 0.80 **Ω (Buckling): 2.00**

TYPE OF FILL	FASTENER LAYOUT	I in^4 / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 1.0	1.5	2.0	2.5	3.0	3.5	4.0
NO FILL	ALL	0.011	4465	1985	1115	715	495	365	275

NOTE: ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]

LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

9/16" x 2 1/2" FORM DECK
t = design thickness = 0.0179"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 Ω (EQ): 2.50 ϕ (FILLED, EQ): 0.50 Ω (FILLED, EQ): 3.25
ϕ (WIND): 0.70 Ω (WIND): 2.35 ϕ (FILLED, WIND): 0.50 Ω (FILLED, WIND): 3.25
ϕ (Other): 0.65 Ω (Other): 2.50 ϕ (FILLED, Other): 0.50 Ω (FILLED, Other): 3.25

TYPE OF FILL	FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF SPAN, FT 1.5	2.0	2.5	3.0	3.5	4.0	4.5	K1
NO FILL (BARE DECK)	35/8	0	1265	1015	840	715	620 *	545 *	490 *	0.222
		1	1410	1150	960	825 *	715 *	635 *	570 *	0.191
		2	1530	1270	1075 *	925 *	810 *	720 *	645 *	0.167
		3	1635	1380	1180 *	1025 *	900 *	800 *	720 *	0,.149
		4	1725	1480	1275 *	1115 *	985 *	880 *	795 *	0.134
	35/7	0	1195	975	815	695	605 *	535 *	480 *	0.237
		1	1320	1095	925	800 *	700 *	620 *	555 *	0.202
		2	1420	1205	1030	895 *	790 *	700 *	630 *	0.175
		3	1505	1295	1125 *	985 *	870 *	780 *	705 *	0.155
		4	1575	1380	1210 *	1065 *	950 *	855 *	775 *	0.139
	35/5	0	880	730	620	535	465	415	370 *	0.323
		1	975	835	720	625	555 *	495 *	445 *	0.261
		2	1050	920	805	710	635 *	570 *	515 *	0.219
		3	1105	985	880	785 *	705 *	640 *	580 *	0.188
		4	1150	1040	940	850 *	770 *	700 *	640 *	0.165
	30/7	0	1180	935	770	655	565 *	500 *	440 *	0.296
		1	1335	1080	900	765 *	665 *	590 *	525 *	0.249
		2	1470	1210	1015	870 *	760 *	675 *	605 *	0.215
		3	1580	1325	1125 *	970 *	850 *	755 *	680 *	0.189
		4	1680	1425	1225 *	1065 *	940 *	835 *	755 *	0.169
	30/5	0	900	730	605	515	450	395	355 *	0.395
		1	1025	850	720	620	545 *	480 *	435 *	0.316
		2	1125	955	820	715	630 *	565 *	505 *	0.263
		3	1205	1045	910	800 *	710 *	640 *	580 *	0.226
		4	1265	1120	990	880 *	785 *	710 *	645 *	0.197
	30/4	0	750	620	525	450	395	350	315	0.444
		1	850	725	625	545	480	430 *	385 *	0.347
		2	925	810	710	630	560 *	505 *	455 *	0.284
		3	980	875	785	700	630 *	570 *	520 *	0.241
		4	1015	930	840	765 *	695 *	635 *	580 *	0.209
2 1/2" NW CONC. (ABOVE DECK)	30/4	0	5875	5635	5490	5390	5320	5270	5230	0.444
		1	6135	5825	5640	5520	5430	5365	5315	0.347
		2	6390	6020	5795	5645	5540	5460	5400	0.284
		3	6645	6210	5950	5775	5650	5555	5485	0.241
		4	6900	6405	6105	5905	5760	5655	5570	0.209
2 1/2" LW CONC. (ABOVE DECK)	30/4	0	4215	3970	3825	3725	3660	3605	3565	0.444
		1	4470	4160	3980	3855	3765	3700	3650	0.347
		2	4725	4355	4130	3985	3875	3800	3735	0.284
		3	4980	4545	4285	4110	3985	3895	3820	0.241
		4	5240	4740	4440	4240	4095	3990	3905	0.209
TYPE I INSUL. FILL	30/4	0	1420	1175	1030	935	865	810	770	0.444
		1	1675	1370	1185	1060	975	910	855	0.347
		2	1935	1560	1340	1190	1085	1005	940	0.284
		3	2190	1755	1490	1320	1195	1100	1030	0.241
		4	2445	1945	1645	1445	1305	1195	1115	0.209
TYPE II INSUL. FILL	30/4	0	1690	1445	1300	1200	1135	1080	1040	0.444
		1	1945	1640	1455	1330	1240	1175	1125	0.347
		2	2200	1830	1605	1460	1350	1275	1210	0.284
		3	2455	2020	1760	1585	1460	1370	1295	0.241
		4	2715	2215	1915	1715	1570	1465	1380	0.209

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**
WHEN FILLED DIAPHRAGMS ARE USED, IT MAY BE NECESSARY TO INCREASE THE NUMBER, OR STRENGTH, OF THE PERIMETER CONNECTIONS TO DEVELOP THE VALUES SHOWN IN THE TABLE. CHECK SECTION 5.4.

ϕ (Buckling): 0.80 Ω (Buckling): 2.00

TYPE OF FILL	FASTENER LAYOUT	I in⁴ / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 1.5	2.0	2.5	3.0	3.5	4.0	4.5
NO FILL	ALL	0.013	2580	1450	930	645	470	360	285

NOTE: ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

9/16" x 2 1/2" FORM DECK
t = design thickness = 0.0239"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 Ω (EQ): 2.50 ϕ (FILLED, EQ): 0.50 Ω (FILLED, EQ): 3.25
ϕ (WIND): 0.70 Ω (WIND): 2.35 ϕ (FILLED, WIND): 0.50 Ω (FILLED, WIND): 3.25
ϕ (Other): 0.65 Ω (Other): 2.50 ϕ (FILLED, Other): 0.50 Ω (FILLED, Other): 3.25

TYPE OF FILL	FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF SPAN, FT 2.0	2.5	3.0	3.5	4.0	4.5	5.0	K1
NO FILL (BARE DECK)	35/8	0	1350	1115	950	825 *	725 *	650 *	585 *	0.257
		1	1530	1280	1095	950 *	845 *	755 *	685 *	0.220
		2	1690	1430	1230 *	1075 *	955 *	860 *	775 *	0.193
		3	1835	1570	1360 *	1195 *	1065 *	960 *	870 *	0.172
		4	1965	1695 *	1480 *	1310 *	1170 *	1055 *	960 *	0.155
	35/7	0	1295	1080	925	805	710 *	635 *	575 *	0.274
		1	1455	1230	1060	930 *	825 *	740 *	670 *	0.233
		2	1600	1370	1190 *	1045 *	930 *	840 *	765 *	0.203
		3	1725	1495	1310 *	1160 *	1035 *	935 *	850 *	0.179
		4	1830	1605	1415 *	1260 *	1135 *	1025 *	940 *	0.161
	35/5	0	970	820	705	620	550	495	445 *	0.373
		1	1110	955	835	735	655 *	590 *	540 *	0.301
		2	1220	1070	945	840 *	755 *	685 *	625 *	0.253
		3	1310	1170	1045	935 *	850 *	770 *	705 *	0.217
		4	1385	1250	1130 *	1025 *	930 *	855 *	785 *	0.191
	30/7	0	1245	1025	870	750	660 *	590 *	530 *	0.342
		1	1435	1195	1015	885 *	780 *	700 *	630 *	0.288
		2	1605	1350	1160 *	1010 *	895 *	805 *	725 *	0.249
		3	1760	1495	1290 *	1130 *	1005 *	905 *	820 *	0.219
		4	1895	1630 *	1415 *	1250 *	1115 *	1005 *	910 *	0.195
	30/5	0	965	805	685	595	525	470	420 *	0.456
		1	1130	955	825	720	640 *	575 *	520 *	0.365
		2	1270	1090	950	840 *	750 *	675 *	615 *	0.304
		3	1390	1210	1065	945 *	850 *	770 *	700 *	0.261
		4	1485	1315	1170 *	1045 *	945 *	855 *	785 *	0.228
	30/4	0	825	695	595	520	465	415	375	0.513
		1	965	830	725	640	570	515 *	470 *	0.401
		2	1075	945	835	745	670 *	605 *	555 *	0.328
		3	1165	1040	930	840 *	760 *	695 *	635 *	0.278
		4	1235	1120	1015	920 *	840 *	770 *	710 *	0.241
2 1/2" NW CONC. (ABOVE DECK)	30/4	0	5875	5680	5550	5460	5390	5335	5290	0.513
		1	6130	5885	5720	5605	5515	5450	5395	0.401
		2	6385	6090	5890	5750	5645	5565	5495	0.328
		3	6645	6295	6065	5900	5775	5675	5600	0.278
		4	6900	6500	6235	6045	5900	5790	5700	0.241
2 1/2" LW CONC. (ABOVE DECK)	30/4	0	4210	4015	3885	3795	3725	3670	3630	0.513
		1	4465	4220	4055	3940	3855	3785	3730	0.401
		2	4720	4425	4230	4085	3980	3900	3835	0.328
		3	4980	4630	4400	4235	4110	4015	3935	0.278
		4	5235	4835	4570	4380	4240	4125	4040	0.241
TYPE I INSUL. FILL	30/4	0	1415	1220	1095	1000	930	880	835	0.513
		1	1670	1425	1265	1145	1060	990	935	0.401
		2	1930	1635	1435	1295	1190	1105	1040	0.328
		3	2185	1840	1605	1440	1315	1220	1140	0.278
		4	2440	2045	1775	1585	1445	1335	1245	0.241
TYPE II INSUL. FILL	30/4	0	1685	1490	1360	1270	1200	1145	1105	0.513
		1	1940	1695	1530	1415	1330	1260	1205	0.401
		2	2195	1900	1705	1560	1455	1375	1310	0.328
		3	2455	2105	1875	1710	1585	1490	1410	0.278
		4	2710	2310	2045	1855	1715	1600	1515	0.241

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**
WHEN FILLED DIAPHRAGMS ARE USED, IT MAY BE NECESSARY TO INCREASE THE NUMBER, OR STRENGTH, OF THE PERIMETER CONNECTIONS TO DEVELOP THE VALUES SHOWN IN THE TABLE. CHECK SECTION 5.4.

ϕ (Buckling): 0.80 Ω (Buckling): 2.00

TYPE OF FILL	FASTENER LAYOUT	I in^4 / ft	NOMINALDIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 2.0	2.5	3.0	3.5	4.0	4.5	5.0
NO FILL	ALL	0.017	2205	1410	980	720	550	435	350

NOTE: ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

COMPOSITE DECK
t = design thickness = 0.0295"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 **Ω (EQ): 2.50** **ϕ (FILLED, EQ): 0.50** **Ω (FILLED, EQ): 3.25**
ϕ (WIND): 0.70 **Ω (WIND): 2.35** **ϕ (FILLED, WIND): 0.50** **Ω (FILLED, WIND): 3.25**
ϕ (Other): 0.65 **Ω (Other): 2.50** **ϕ (FILLED, Other): 0.50** **Ω (FILLED, Other): 3.25**

TYPE OF FILL	FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF — SPAN, FT 4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	K1
1 1/2" x 6" NO FILL (BARE DECK)	36/4	0	555	435	355	300	260	230	205	185	170	160	0.475
		1	680	565	465								0.371
		2	790	665	570	480	415	370					0.304
		3	890	755	650	570	495	440	395	360	330		0.258
		4	975	835	730	645	575	510	460	415	380	355	0.224
		5	1050	910	800	710	635	575	520	475	435 *	400 *	0.197
		6	1110	980	865	775	695	630	575	530 *	490 *	450 *	0.177
		8	1215	1090	980	885	805	735	675 *	625 *	580 *	540 *	0.146
2" x 12" NO FILL (BARE DECK)	36/4	0	540	425	345	295	255	230	205	185	170	160	0.475
		1	680	550	450								0.371
		2	790	665	555	475	415	370					0.304
		3	890	755	650	565	495	440	395	360	330		0.258
		4	975	835	730	645	575	510	460	415	380	355	0.224
		5	1050	910	800	710	635	575	520	475	435 *	400 *	0.197
		6	1110	980	865	775	695	630	575	530 *	490 *	450 *	0.177
		8	1215	1090	980	885	805	735	675 *	625 *	580 *	540 *	0.146
3" x 12" NO FILL (BARE DECK)	36/4	0	515	410	345	295	255	230	205	185	170	160	0.475
		1	675	540	450								0.371
		2	790	665	555	475	415	370					0.304
		3	890	755	650	565	495	440	395	360	330		0.258
		4	975	835	730	645	575	510	460	415	380	355	0.224
		5	1050	910	800	710	635	575	520	475	435 *	400 *	0.197
		6	1110	980	865	775	695	630	575	530 *	490 *	450 *	0.177
		8	1215	1090	980	885	805	735	675 *	625 *	580 *	540 *	0.146
2 1/2" NW CONC. (ABOVE DECK)	36/4	0	5500	5380	5300	5245	5200	5170	5140	5120	5100	5085	0.475
		1	5655	5505	5405								0.371
		2	5815	5635	5510	5425	5360	5310					0.304
		3	5975	5760	5615	5515	5440	5380	5330	5295	5260		0.258
		4	6130	5885	5725	5605	5520	5450	5395	5350	5315	5280	0.224
		5	6290	6015	5830	5695	5595	5520	5460	5410	5365	5330	0.197
		6	6450	6140	5935	5785	5675	5590	5520	5465	5420	5380	0.177
		8	6765	6395	6145	5970	5835	5730	5650	5580	5525	5475	0.146
2 1/2" LW CONC. (ABOVE DECK)	36/4	0	3835	3715	3635	3580	3540	3505	3480	3455	3440	3425	0.475
		1	3995	3845	3740								0.371
		2	4150	3970	3850	3760	3695	3645					0.304
		3	4310	4095	3955	3850	3775	3715	3670	3630	3595		0.258
		4	4470	4225	4060	3940	3855	3785	3730	3685	3650	3620	0.224
		5	4625	4350	4165	4035	3935	3855	3795	3745	3705	3665	0.197
		6	4785	4475	4270	4125	4015	3925	3860	3800	3755	3715	0.177
		8	5100	4730	4480	4305	4170	4070	3985	3915	3860	3815	0.146

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**
THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.
WHEN FILLED DIAPHRAGMS ARE USED, IT MAY BE NECESSARY TO INCREASE THE NUMBER, OR STRENGTH, OF THE PERIMETER CONNECTIONS TO DEVELOP THE VALUES SHOWN IN THE TABLE. CHECK SECTION 5.4.
REFER TO THE 0 SIDE-LAP CONNECTION ROWS FOR DESIGN SHEAR OF DIAPHRAGMS WITH BUTTON PUNCHED SIDE-LAPS.

ϕ (Buckling): 0.80 **Ω (Buckling): 2.00**

TYPE OF DECK NO FILL	FASTENER LAYOUT	I in⁴ / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0
1 1/2" x 6"	36/4	0.165	3405	2180	1515	1110	850	670	545	450	375	320
2" x 12"	24/3 & 36/4	0.338	6115	3910	2715	1995	1525	1205	975	805	675	575
3" x 12"	24/3 & 36/4	0.797	11290	7225	5015	3685	2820	2230	1805	1490	1255	1065

NOTE: ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

COMPOSITE DECK
t = design thickness = 0.0358"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 **Ω (EQ): 2.50** **ϕ (FILLED, EQ): 0.50** **Ω (FILLED, EQ): 3.25**
ϕ (WIND): 0.70 **Ω (WIND): 2.35** **ϕ (FILLED, WIND): 0.50** **Ω (FILLED, WIND): 3.25**
ϕ (Other): 0.65 **Ω (Other): 2.50** **ϕ (FILLED, Other): 0.50** **Ω (FILLED, Other): 3.25**

TYPE OF FILL	FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF SPAN, FT 4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	K1
		0	670	530	435	365	315	275	250	225	205	190	0.523
		1	820	680	565								0.408
1 1/2" x 6"		2	955	800	685	585	510	445					0.335
NO FILL	36/4	3	1075	910	785	690	605	530	480	435	400		0.284
(BARE DECK)		4	1180	1010	880	775	695	615	555	505	465	425	0.246
		5	1265	1100	970	860	770	695	630	575	525	485	0.217
		6	1345	1185	1045	935	840	765	695	640	590	545 *	0.195
		8	1465	1320	1185	1070	975	890	815	755 *	700 *	655 *	0.161
		0	660	515	420	355	310	275	250	225	205	190	0.523
		1	820	670	550								0.408
2" x 12"		2	955	800	675	575	500	445					0.335
NO FILL	36/4	3	1075	910	785	685	600	530	480	435	400		0.284
(BARE DECK)		4	1180	1010	880	775	695	615	555	505	465	425	0.246
		5	1265	1100	970	860	770	695	630	575	525	485	0.217
		6	1345	1185	1045	935	840	765	695	640	590	545 *	0.195
		8	1465	1320	1185	1070	975	890	815	755 *	700 *	655 *	0.161
		0	630	495	415	355	310	275	250	225	205	190	0.523
		1	820	650	540								0.408
3" x 12"		2	955	800	670	575	500	445					0.335
NO FILL	36/4	3	1075	910	785	685	600	530	480	435	400		0.284
(BARE DECK)		4	1180	1010	880	775	695	615	555	505	465	425	0.246
		5	1265	1100	970	860	770	695	630	575	525	485	0.217
		6	1345	1185	1045	935	840	765	695	640	590	545 *	0.195
		8	1465	1320	1185	1070	975	890	815	755 *	700 *	655 *	0.161
		0	5620	5480	5380	5315	5265	5225	5190	5165	5145	5125	0.523
		1	5815	5630	5510								0.408
2 1/2"		2	6005	5785	5640	5535	5455	5395					0.335
NW CONC.	36/4	3	6195	5940	5765	5645	5550	5480	5420	5375	5335		0.284
(ABOVE DECK)		4	6390	6090	5895	5755	5645	5565	5500	5445	5400	5360	0.246
		5	6580	6245	6025	5865	5745	5650	5575	5515	5465	5420	0.217
		6	6775	6400	6150	5975	5840	5735	5650	5585	5525	5480	0.195
		8	7160	6705	6405	6190	6030	5905	5805	5725	5655	5600	0.161
		0	3955	3815	3720	3650	3600	3560	3525	3500	3480	3460	0.523
		1	4150	3965	3845								0.408
2 1/2"		2	4340	4120	3975	3870	3790	3730					0.335
LW CONC.	36/4	3	4535	4275	4105	3980	3885	3815	3760	3710	3670		0.284
(ABOVE DECK)		4	4725	4430	4230	4090	3985	3900	3835	3780	3735	3695	0.246
		5	4920	4580	4360	4200	4080	3985	3910	3850	3800	3755	0.217
		6	5110	4735	4485	4310	4175	4070	3990	3920	3865	3815	0.195
		8	5495	5045	4745	4530	4365	4240	4140	4060	3990	3935	0.161

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**
THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.
WHEN FILLED DIAPHRAGMS ARE USED, IT MAY BE NECESSARY TO INCREASE THE NUMBER, OR STRENGTH, OF THE PERIMETER CONNECTIONS TO DEVELOP THE VALUES SHOWN IN THE TABLE. CHECK SECTION 5.4.
REFER TO THE 0 SIDE-LAP CONNECTION ROWS FOR DESIGN SHEAR OF DIAPHRAGMS WITH BUTTON PUNCHED SIDE-LAPS.

ϕ (Buckling): 0.80 **Ω (Buckling): 2.00**

TYPE OF DECK NO FILL	FASTENER LAYOUT	I in^4 / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0
1 1/2" x 6"	36/4	0.212	4755	3040	2110	1550	1185	935	760	625	525	450
2" x 12"	24/3 & 36/4	0.420	8320	5325	3695	2715	2080	1640	1330	1100	925	785
3" x 12"	24/3 & 36/4	0.993	15395	9855	6840	5025	3850	3040	2460	2035	1710	1455

NOTE: ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

COMPOSITE DECK
t = design thickness = 0.0474"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 **Ω (EQ): 2.50** **ϕ (FILLED, EQ): 0.50** **Ω (FILLED, EQ): 3.25**
ϕ (WIND): 0.70 **Ω (WIND): 2.35** **ϕ (FILLED, WIND): 0.50** **Ω (FILLED, WIND): 3.25**
ϕ (Other): 0.65 **Ω (Other): 2.50** **ϕ (FILLED, Other): 0.50** **Ω (FILLED, Other): 3.25**

TYPE OF FILL	FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF — SPAN, FT 4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	K1
1 1/2" x 6" NO FILL (BARE DECK)	36/4	0	880	700	575	485	420	370	325	295	270	250	0.602
		1	1080	890	745								0.470
		2	1255	1050	900	780	675	595					0.385
		3	1410	1200	1035	905	800	705	630	570	525		0.327
		4	1545	1330	1160	1020	910	820	735	665	610	565	0.283
		5	1665	1450	1275	1130	1010	915	835	755	695	640	0.250
		6	1765	1555	1375	1230	1105	1005	920	845	780	720	0.224
		8	1925	1730	1560	1410	1280	1170	1075	995	925	860 *	0.185
2" x 12" NO FILL (BARE DECK)	36/4	0	875	685	560	470	405	360	325	295	270	250	0.602
		1	1080	890	730								0.470
		2	1255	1050	900	760	660	585					0.385
		3	1410	1200	1035	905	785	700	630	570	525		0.327
		4	1545	1330	1160	1020	910	815	730	665	610	565	0.283
		5	1665	1450	1275	1130	1010	915	835	755	695	640	0.250
		6	1765	1555	1375	1230	1105	1005	920	845	780	720	0.224
		8	1925	1730	1560	1410	1280	1170	1075	995	925	860 *	0.185
3" x 12" NO FILL (BARE DECK)	36/4	0	840	655	540	465	405	360	325	295	270	250	0.602
		1	1080	855	710								0.470
		2	1255	1050	880	755	660	585					0.385
		3	1410	1200	1035	900	785	700	630	570	525		0.327
		4	1545	1330	1160	1020	910	815	730	665	610	565	0.283
		5	1665	1450	1275	1130	1010	915	835	755	695	640	0.250
		6	1765	1555	1375	1230	1105	1005	920	845	780	720	0.224
		8	1925	1730	1560	1410	1280	1170	1075	995	925	860 *	0.185
2 1/2" NW CONC. (ABOVE DECK)	36/4	0	5840	5655	5530	5440	5375	5320	5280	5245	5195		0.602
		1	6095	5860	5700								0.470
		2	6350	6060	5870	5730	5625	5545					0.385
		3	6605	6265	6040	5875	5755	5660	5585	5525	5470		0.327
		4	6860	6470	6210	6020	5880	5775	5685	5615	5555	5505	0.283
		5	7115	6670	6375	6165	6010	5885	5790	5710	5640	5585	0.250
		6	7370	6875	6545	6310	6135	6000	5890	5800	5725	5660	0.224
		8	7875	7280	6885	6605	6390	6225	6095	5985	5895	5820	0.185
2 1/2" LW CONC. (ABOVE DECK)	36/4	0	4180	3990	3865	3775	3710	3655	3615	3580	3555	3530	0.602
		1	4430	4195	4035								0.470
		2	4685	4395	4205	4065	3965	3885					0.385
		3	4940	4600	4375	4210	4090	3995	3920	3860	3805		0.327
		4	5195	4805	4545	4360	4220	4110	4025	3950	3890	3840	0.283
		5	5450	5010	4715	4505	4345	4220	4125	4045	3975	3920	0.250
		6	5705	5210	4885	4650	4470	4335	4225	4135	4060	4000	0.224
		8	6215	5620	5220	4940	4725	4560	4430	4320	4230	4155	0.185

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**
THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.
WHEN FILLED DIAPHRAGMS ARE USED, IT MAY BE NECESSARY TO INCREASE THE NUMBER, OR STRENGTH, OF THE PERIMETER CONNECTIONS TO DEVELOP THE VALUES SHOWN IN THE TABLE. CHECK SECTION 5.4.
REFER TO THE 0 SIDE-LAP CONNECTION ROWS FOR DESIGN SHEAR OF DIAPHRAGMS WITH BUTTON PUNCHED SIDE-LAPS.

ϕ (Buckling): 0.80 **Ω (Buckling): 2.00**

TYPE OF DECK NO FILL	FASTENER LAYOUT	I in^4 / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0
1 1/2" x 6"	36/4	0.308	7765	4970	3450	2535	1940	1530	1240	1025	860	735
2" x 12"	24/3 & 36/4	0.560	12745	8155	5665	4160	3185	2515	2035	1685	1415	1205
3" x 12"	24/3 & 36/4	1.324	23580	15090	10480	7700	5895	4655	3770	3115	2620	2230

NOTE: ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]

COMPOSITE DECK
t = design thickness = 0.0598"
SUPPORT FASTENING: Hilti X-ENP-19 L15 (0.25" min. support steel)
SIDE-LAP FASTENING: #10 screws

ϕ (EQ): 0.65 **Ω (EQ): 2.50** **ϕ (FILLED, EQ): 0.50** **Ω (FILLED, EQ): 3.25**
ϕ (WIND): 0.70 **Ω (WIND): 2.35** **ϕ (FILLED, WIND): 0.50** **Ω (FILLED, WIND): 3.25**
ϕ (Other): 0.65 **Ω (Other): 2.50** **ϕ (FILLED, Other): 0.50** **Ω (FILLED, Other): 3.25**

TYPE OF FILL	FASTENER LAYOUT	SIDE-LAP CONN./SPAN	MAXIMUM NOMINAL SHEAR STRENGTH, PLF SPAN, FT 4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	K1
1 1/2" x 6" NO FILL (BARE DECK)	36/4	0	1095	880	725	615	530	465	415	370	335	310	0.676
		1	1345	1115	940								0.528
		2	1570	1315	1125	980	850	750					0.433
		3	1765	1500	1295	1135	1010	895	800	720	660		0.367
		4	1935	1665	1450	1280	1140	1030	925	840	765	705	0.318
		5	2080	1815	1595	1415	1270	1145	1045	955	870	805	0.281
		6	2205	1945	1725	1540	1390	1260	1150	1060	980	905	0.252
		8	2405	2165	1955	1765	1605	1470	1350	1245	1160	1080	0.208
2" x 12" NO FILL (BARE DECK)	36/4	0	1095	860	705	595	510	450	405	365	335	310	0.676
		1	1345	1115	920								0.528
		2	1570	1315	1125	960	835	735					0.433
		3	1765	1500	1295	1135	995	875	790	715	660		0.367
		4	1935	1665	1450	1280	1140	1020	915	835	765	705	0.318
		5	2080	1815	1595	1415	1270	1145	1045	950	870	805	0.281
		6	2205	1945	1725	1540	1390	1260	1150	1060	980	905	0.252
		8	2405	2165	1955	1765	1605	1470	1350	1245	1160	1080	0.208
3" x 12" NO FILL (BARE DECK)	36/4	0	1060	825	675	575	505	450	405	365	335	310	0.676
		1	1345	1085	885								0.528
		2	1570	1315	1100	945	825	735					0.433
		3	1765	1500	1295	1125	985	875	790	715	660		0.367
		4	1935	1665	1450	1280	1140	1020	915	835	765	705	0.318
		5	2080	1815	1595	1415	1270	1145	1045	950	870	805	0.281
		6	2205	1945	1725	1540	1390	1260	1150	1060	980	905	0.252
		8	2405	2165	1955	1765	1605	1470	1350	1245	1160	1080	0.208
2 1/2" NW CONC. (ABOVE DECK)	36/4	0	6070	5840	5680	5570	5490	5425	5370	5330	5295	5265	0.676
		1	6390	6095	5895								0.528
		2	6715	6350	6110	5940	5810	5710					0.433
		3	7035	6610	6325	6120	5970	5850	5755	5680	5615		0.367
		4	7355	6865	6540	6305	6130	5995	5885	5795	5720	5660	0.318
		5	7675	7120	6750	6490	6290	6135	6015	5910	5830	5755	0.281
		6	7995	7380	6965	6670	6450	6280	6140	6030	5935	5855	0.252
		8	8640	7890	7395	7040	6770	6565	6400	6260	6150	6055	0.208
2 1/2" LW CONC. (ABOVE DECK)	36/4	0	4410	4175	4020	3905	3825	3760	3705	3665	3630	3600	0.676
		1	4730	4430	4235								0.528
		2	5050	4690	4445	4275	4145	4045					0.433
		3	5370	4945	4660	4460	4305	4185	4095	4015	3950		0.367
		4	5690	5200	4875	4640	4465	4330	4220	4130	4060	3995	0.318
		5	6015	5460	5090	4825	4625	4475	4350	4250	4165	4095	0.281
		6	6335	5715	5300	5010	4785	4615	4480	4365	4270	4190	0.252
		8	6975	6230	5730	5375	5110	4900	4735	4600	4485	4390	0.208

*** DESIGN SHEAR SHOWN ABOVE MAY BE LIMITED BY SHEAR BUCKLING. SEE TABLE BELOW.**
THE SHADED VALUES DO NOT COMPLY WITH THE MINIMUM SPACING REQUIREMENTS FOR SIDE-LAP CONNECTIONS AND SHALL NOT BE USED EXCEPT WITH PROPERLY SPACED SIDE-LAP CONNECTIONS.
WHEN FILLED DIAPHRAGMS ARE USED, IT MAY BE NECESSARY TO INCREASE THE NUMBER, OR STRENGTH, OF THE PERIMETER CONNECTIONS TO DEVELOP THE VALUES SHOWN IN THE TABLE. CHECK SECTION 5.4.
REFER TO THE 0 SIDE-LAP CONNECTION ROWS FOR DESIGN SHEAR OF DIAPHRAGMS WITH BUTTON PUNCHED SIDE-LAPS.

ϕ (Buckling): 0.80 **Ω (Buckling): 2.00**

TYPE OF DECK NO FILL	FASTENER LAYOUT	I in^4 / ft	NOMINAL DIAPHRAGM SHEAR DUE TO PANEL BUCKLING (S_n), PLF / SPAN, FT 4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0
1 1/2" x 6"	36/4	0.400	11250	7200	5000	3670	2810	2220	1800	1485	1250	1065
2" x 12"	24/3 & 36/4	0.700	17935	11480	7970	5855	4480	3540	2870	2370	1990	1695
3" x 12"	24/3 & 36/4	1.666	33355	21345	14820	10890	8335	6585	5335	4410	3705	3155

NOTE: ASD Required Strength (Service Applied Load) <= Minimum [Nominal Shear Strength / Ω (EQ or WIND), Nominal Buckling Strength S_n / Ω (Buckling)]
LRFD Required Strength (Factored Applied Load) <= Minimum [ϕ (EQ or WIND) x Nominal Shear Strength, ϕ (Buckling) x Nominal Buckling Strength S_n]