



## Hilti PROFIS Engineering 3.0.88

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Phone   Fax:		Project Title:	
E-mail:		Date:	9/11/2023
Contact:			

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### Specifier's comments:

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### Project Details

Company:  
Address:  
Phone | Fax: |  
E-mail:  
Project Number:  
Project Title:  
Contract Number:  
Structural Plan Sheet Number:  
Prepared By:  
Checked By:  
Date: 9/11/2023  
Comments:

### Design Settings

Design Method: LRFD  
Design Standard: AISI S310-20  
Relevant Loads: Wind



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### Area Area 1

Deck Type:	Steel roof deck	
Support Construction:	Bar Joists	Sidelap Connector Spacing from: 3.000 in
Joist / Beam Spacing:	6.00 ft	Sidelap Connector Spacing to: 36.000 in
Joist / Beam Thickness:	0.125 in	Sidelap Connector Spacing incr: 1.000 in
Deck Panel:	1-1/2" B-Deck - Fy = 50 ksi - Wide Rib or WR	
$f_u / f_y$ :	65 ksi / 50 ksi	
Panel Type:	Nestable:	
Panel Width:	36 in	



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## Zone Area 1 - Zone:

### Required Input Loads

Relevant Loads:	Wind
Diaphragm Shear Q:	1629.00 plf
Net Uplift T (W):	53.00 psf
Req. Shear Stiffness $G'_{req}$ :	0.00 kip/in

### Proposed Diaphragm System

Frame Fastener:	Hilti X-HSN 24	Deck Thickness:	20 ga (0.0358 in)
		Pattern:	36/9
		Pattern Drawing:	

Sidelap Connector: S-SLC 02 M HWH Sidelap Connector

Sidelap Connector Spacing:	12 in
Min. No. Edge Fast. Per Span:	6
$\Phi_{wind}$ :	0.80
$\Phi_{uplift}$ :	0.50
$\Phi_{PB, Buckling}$ :	0.80

### Proposed System Diaphragm Shear and Stiffness/Flexibility

Design Shear:	1755.48 plf	Design Uplift:	326.67 psf
Shear Stiffness G:	100.60 kip/in		

### Design Checks

Design Shear	= 1755.48 plf >= Q = 1629.00 plf => OK
Design Uplift	= 326.67 psf >= T = 53.00 psf => OK
Shear Stiffness G	= 100.60 kip/in >= G' = 0.00 kip/in => OK

Shear design does not match Vulcraft's calc, why is there a difference?

**Design OK**



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## Zone Area 1 - Zone (1):

### Required Input Loads

Relevant Loads:	Wind
Diaphragm Shear Q:	805.00 plf
Net Uplift T (W):	53.00 psf
Req. Shear Stiffness $G'_{req}$ :	0.00 kip/in

### Proposed Diaphragm System

Frame Fastener:	Hilti X-HSN 24	Deck Thickness:	20 ga (0.0358 in)
		Pattern:	36/7 (914/7)
		Pattern Drawing:	

Sidelap Connector: S-SLC 02 M HWH Sidelap Connector

Sidelap Connector Spacing:	18 in
Min. No. Edge Fast. Per Span:	4
$\Phi_{wind}$ :	0.80
$\Phi_{uplift}$ :	0.50
$\Phi_{PB, Buckling}$ :	0.80

### Proposed System Diaphragm Shear and Stiffness/Flexibility

Design Shear:	1180.82 plf	Design Uplift:	280.00 psf
Shear Stiffness G:	87.65 kip/in		

### Design Checks

Design Shear	= 1180.82 plf >= Q = 805.00 plf => OK
Design Uplift	= 280.00 psf >= T = 53.00 psf => OK
Shear Stiffness G	= 87.65 kip/in >= G' = 0.00 kip/in => OK

Shear design does not match Vulcraft's calc, why is there a difference?

Design OK



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Date: 9/11/2023

Area 1

Zone	Deck Gauge	Frame Fastener Pattern	Frame Fastener	Sidelap Connector	Sidelap Connector Spacing	Diaphragm shear, Q	Uplift, W	Stiffness, G'	Status
1 Zone	20 ga	36/9	Hilti X-HSN 24	S-SLC 02 M HWH Sidelap Connector	12 in o.c.	1755.48 plf	326.67 psf	100.60 kip/in	OK
2 Zone (1)	20 ga	36/7 (914/7)	Hilti X-HSN 24	S-SLC 02 M HWH Sidelap Connector	18 in o.c.	1180.82 plf	280.00 psf	87.65 kip/in	OK



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### References:

**AISI S100** North American Specification for the Design of Cold-Formed Steel Structural Members  
**AISI S310** North American Standard for the Design of Profiled Steel Diaphragm Panels  
**SDI DDM04** Steel Deck Institute Diaphragm Design Manual Edition 4  
**ESR-2776** Steel Deck Diaphragms attached with Hilti Powder-Actuated Fasteners and Hilti SLC Sidelap Connectors  
**ESR-3693** Steel Deck Diaphragms attached with S-MD 12-24 x 1 5/8 M HWH5 Frame Fasteners  
**ESR-2197** Steel Deck and Concrete Filled Diaphragms Attached with Hilti Fasteners  
**AISI S100** North American Specification for the Design of Cold-Formed Steel Structural Members

### Remarks; Your cooperation duties:

- Nominal diaphragm shear strength resistance strength is not calculated for local web buckling of the panel over the exterior support. Contact the deck manufacturer to review if this controls the design.
- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis.

## 20 ga 1.5B-36 Grade 50 Roof Deck

### Diaphragm Shear & Wind Uplift Interaction

For Both Ends Butted Deck  
with MWFRS Design Net Wind Uplift (LRFD) of 53 psf

Hilti X-HSN24 PAF Connections to Supports  
36 / 9 Perpendicular Connection Pattern to Supports  
Hilti Screw S-SLC 01 or S-SLC 02 Sidelap Connections

A572 GR50 Support Member or Equivalent  
0.25 ≤ Support Thickness (in.) ≤ 0.375  
3 in. Minimum Deck End Bearing Length

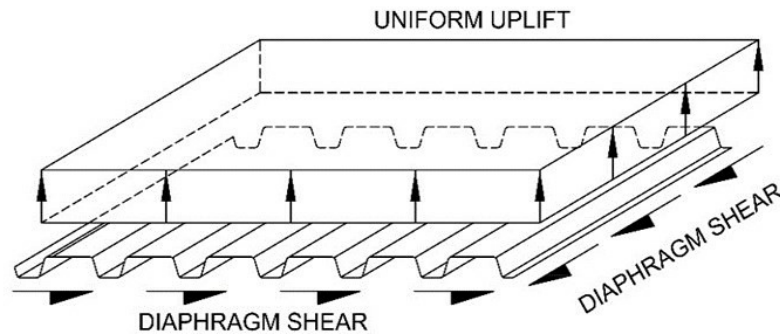
#### LRFD Design Combined Wind Uplift & Diaphragm Shear Strength $\Phi S_n$ (plf)

Generic 3 Span Condition

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	1921	1906	1853	1841	1828	1816	1771	1761	1750
6	1617	1620	1566	1570	1521	1526	1481	1486	1444
8	1487	1432	1380	1396	1349	1364	1320	1279	1295
12	1262	1211	1162	1192	1148	1107	1067	1097	1060
18	1091	1043	999	1039	998	960	924	890	858
24	998	953	911	957	918	882	848	815	781
36	902	857	812	872	833	795	759	726	695

#### Average Connection Spacing to Supports at Parallel Chords & Collectors (in.)

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	9	10	10	9	10	9	9	10	9
6	13	12	12	13	13	12	12	12	11
8	13	14	14	15	16	14	14	15	13
12	22	17	18	19	20	20	21	17	18
18	22	23	24	19	20	20	21	22	23
24	22	23	24	19	20	20	21	22	23
36	22	23	24	19	20	20	21	22	23



## 20 ga 1.5B-36 Grade 50 Roof Deck

### Seismic Diaphragm Shear

For Both Ends Butted Deck



Hilti X-HSN24 PAF Connections to Supports  
36 / 9 Perpendicular Connection Pattern to Supports  
Hilti Screw S-SLC 01 or S-SLC 02 Sidelap Connections

A572 GR50 Support Member or Equivalent  
0.25 ≤ Support Thickness (in.) ≤ 0.375  
3 in. Minimum Deck End Bearing Length

### Seismic or Wind Diaphragm Shear Stiffness, G' (kip/in.)

Generic 3 Span Condition

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	115	117	119	121	123	125	126	127	129
6	109	111	112	114	115	117	118	120	120
8	106	106	107	110	110	112	113	113	115
12	99	100	100	103	103	103	103	106	106
18	94	94	94	97	97	97	97	97	96
24	90	90	90	94	94	94	93	93	92
36	86	86	85	90	90	89	89	88	88

### LRFD Design Seismic Diaphragm Shear Strength $\Phi S_n$ (plf)

Generic 3 Span Condition

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	1912	1907	1860	1857	1855	1852	1812	1811	1810
6	1598	1607	1560	1570	1526	1537	1496	1508	1470
8	1472	1423	1377	1396	1354	1373	1334	1297	1317
12	1259	1214	1171	1201	1162	1126	1091	1121	1089
18	1102	1060	1021	1060	1024	990	959	924	892
24	1019	979	940	985	951	913	879	846	816
36	928	885	846	901	864	830	798	769	741

### Average Connection Spacing to Supports at Parallel Chords & Collectors (in.)

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	10	10	10	10	10	10	10	10	10
6	14	14	14	14	14	14	14	14	14
8	17	17	18	19	16	16	17	17	18
12	22	23	24	19	20	20	21	22	23
18	22	23	24	19	20	20	21	22	23
24	22	23	24	19	20	20	21	22	23
36	22	23	24	19	20	20	21	22	23

Bare Deck Diaphragm V5.3 in accordance with:  
AISI S100-16 (2020) w/ S2-20  
IAPMO UES ER-0423  
IAPMO UES ER-0652  
CAN/CSA-S136 (R2021) for Canadian references

Date: 9/12/2023

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## 20 ga 1.5B-36 Grade 50 Roof Deck

### Diaphragm Shear & Wind Uplift Interaction

For Both Ends Butted Deck  
with MWFRS Design Net Wind Uplift (LRFD) of 53 psf

Hilti X-HSN24 PAF Connections to Supports  
36 / 7 Perpendicular Connection Pattern to Supports  
Hilti Screw S-SLC 01 or S-SLC 02 Sidelap Connections

A572 GR50 Support Member or Equivalent  
 $0.25 \leq \text{Support Thickness (in.)} \leq 0.375$   
3 in. Minimum Deck End Bearing Length

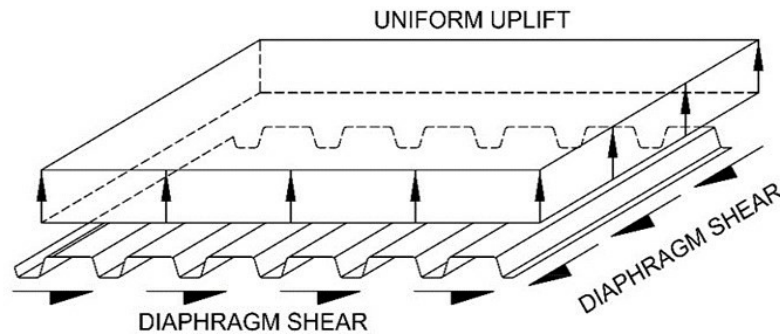
### LRFD Design Combined Wind Uplift & Diaphragm Shear Strength $\Phi S_n$ (plf)

Generic 3 Span Condition

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	1642	1631	1587	1577	1568	1558	1519	1510	1500
6	1360	1369	1325	1334	1292	1301	1263	1271	1236
8	1233	1188	1145	1167	1128	1148	1112	1078	1097
12	1006	964	925	965	929	896	864	900	870
18	828	791	757	809	777	747	719	692	668
24	732	698	666	725	695	667	641	617	594
36	630	599	568	637	610	584	560	536	514

### Average Connection Spacing to Supports at Parallel Chords & Collectors (in.)

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	9	10	9	9	10	9	9	9	9
6	11	12	12	11	11	12	12	11	11
8	13	14	14	13	13	14	14	12	13
12	17	17	18	19	16	16	17	17	18
18	22	23	24	19	20	20	21	22	23
24	22	23	24	19	20	20	21	22	23
36	22	23	24	19	20	20	21	22	23



## 20 ga 1.5B-36 Grade 50 Roof Deck

### Seismic Diaphragm Shear

For Both Ends Butted Deck



Hilti X-HSN24 PAF Connections to Supports  
36 / 7 Perpendicular Connection Pattern to Supports  
Hilti Screw S-SLC 01 or S-SLC 02 Sidelap Connections

A572 GR50 Support Member or Equivalent  
 $0.25 \leq \text{Support Thickness (in.)} \leq 0.375$   
3 in. Minimum Deck End Bearing Length

#### Seismic or Wind Diaphragm Shear Stiffness, G' (kip/in.) Generic 3 Span Condition

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	114	116	117	119	121	123	124	126	128
6	106	109	110	112	113	115	115	117	118
8	103	103	104	106	107	109	109	110	112
12	95	95	95	99	99	99	98	102	101
18	88	88	87	92	91	91	91	90	90
24	83	83	82	87	87	86	86	85	85
36	77	77	76	82	81	81	80	79	79

#### LRFD Design Seismic Diaphragm Shear Strength $\Phi S_n$ (plf) Generic 3 Span Condition

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	1663	1664	1624	1626	1628	1630	1595	1598	1601
6	1351	1368	1327	1344	1306	1323	1288	1305	1273
8	1221	1180	1141	1168	1133	1159	1126	1094	1119
12	999	963	928	968	936	906	878	915	888
18	834	802	771	821	792	766	741	717	695
24	746	717	689	743	717	693	667	643	621
36	651	622	595	660	634	609	586	565	545

#### Average Connection Spacing to Supports at Parallel Chords & Collectors (in.)

Sidelap Connection Spacing (in.)	Span								
	5'-6"	5'-9"	6'-0"	6'-3"	6'-6"	6'-9"	7'-0"	7'-3"	7'-6"
4	10	10	10	10	10	10	10	10	10
6	13	14	14	13	13	14	14	14	14
8	17	17	18	15	16	16	17	17	15
12	22	23	24	19	20	20	21	22	23
18	22	23	24	19	20	20	21	22	23
24	22	23	24	19	20	20	21	22	23
36	22	23	24	19	20	20	21	22	23

Bare Deck Diaphragm V5.3 in accordance with:  
AISI S100-16 (2020) w/ S2-20  
IAPMO UES ER-0423  
IAPMO UES ER-0652  
CAN/CSA-S136 (R2021) for Canadian references

Date: 9/12/2023

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