

DIAPHRAGM N-DECK

WELDED ATTACHMENT - BUTTON PUNCH 50KSI



N-Deck 32/3 Welded Pattern - Button Punch 50KSI

Support fastening	5/8" arc spot welds or equivalent
Side-lap fastening	Non-piercing Button Punch

F _u	60 ksi
F _y	50 ksi
F _{xx}	60 ksi

Loading	φdf	Ωdf
Seismic	0.55	3.00
Wind	0.75	2.15
Other	0.55	3.00

Fastener Layout	Side-lap Conn/Span	Nominal Shear Strength, S _{nr} plf ^{1,2}									K ₁ 1/ft
		Span, ft.									
		8	8.5	9	9.5	10	10.5	11	11.5	12	
3DR22 0.0295" 32/3	2	320	300	285							0.980
	3	335	315	295	280	265	255	240	230	220	0.932
	4	345	325	305	290	275	265	250	240	230	0.888
	5	360	335	320	300	285	275	260	250	240	0.849
	6	370	350	330	310	295	280	270	255	245	0.812
	7	385	360	340	325	305	290	280	265	255	0.779
	8	395	375	350	335	315	300	285	275	265	0.748
	9	410	385	365	345	325	310	295	285	270	0.720
	10	420	395	375	355	335	320	305	290	280	0.694
	11	435	410	385	365	345	330	315	300	290	0.669
	12	445	420	395	375	355	340	325	310	295	0.646
		I, in4/ft	Nominal Shear Strength due to Panel Buckling, S_{nb}, plf								
	0.808	6643	5884	5249	4711	4252	3856	3514	3215	2952	

Fastener Layout	Side-lap Conn/Span	Nominal Shear Strength, S _{nr} plf ^{1,2}									K ₁ 1/ft
		Span, ft.									
		9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	
3DR20 0.0358 32/3	2	370									1.079
	3	380	360	345	325	310	300	285			1.026
	4	395	370	355	335	320	305	295	280	270	0.978
	5	405	380	365	345	330	315	300	290	280	0.935
	6	415	395	375	355	340	325	310	300	285	0.895
	7	425	405	385	365	350	335	320	305	295	0.858
	8	435	415	395	375	355	340	325	315	300	0.824
	9	450	425	405	385	365	350	335	320	310	0.793
	10	460	435	415	395	375	360	345	330	315	0.764
	11	470	445	425	405	385	370	350	340	325	0.737
	12	480	455	435	410	395	375	360	345	335	0.712
		I, in4/ft	Nominal Shear Strength due to Panel Buckling, S_{nb}, plf								
	0.989	7060	6337	5719	5187	4726	4324	3971	3660	3384	

Fastener Layout	Side-lap Conn/Span	Nominal Shear Strength, S_{nr} plf ^{1,2}									K_1	
		Span, ft.										
		10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	1/ft	
3DR18 0.0474 32/3	3	435	415	395	380	365					1.181	
	4	445	425	405	390	370	355	345	330	320	1.126	
	5	455	435	415	395	380	365	350	340	325	1.076	
	6	465	445	425	405	390	375	360	345	335	1.030	
	7	475	455	435	415	395	380	365	355	340	0.987	
	8	485	465	445	425	405	390	375	360	345	0.949	
	9	495	475	450	430	415	395	380	370	355	0.913	
	10	505	485	460	440	420	405	390	375	360	0.879	
	11	515	490	470	450	430	415	395	380	370	0.848	
	12	525	500	480	460	440	420	405	390	375	0.819	
	13	535	510	490	465	445	430	415	395	385	0.792	
	l, in4/ft		Nominal Shear Strength due to Panel Buckling, S_{nb} plf									
	1.323		8782	7966	7258	6640	6099	5620	5196	4819	4481	

Fastener Layout	Side-lap Conn/Span	Nominal Shear Strength, S_{nr} plf ^{1,2}									K_1	
		Span, ft.										
		11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	1/ft	
3DR16 0.0598 32/3	3	455	435	415							1.327	
	4	465	445	425	410	390	380	365	350	340	1.265	
	5	475	455	435	415	400	385	370	360	345	1.208	
	6	480	460	440	425	410	395	380	365	355	1.157	
	7	490	470	450	430	415	400	385	370	360	1.109	
	8	500	480	460	440	425	405	395	380	365	1.065	
	9	510	485	465	450	430	415	400	385	375	1.025	
	10	520	495	475	455	440	420	405	395	380	0.988	
	11	530	505	485	465	445	430	415	400	385	0.953	
	12	535	515	490	470	455	435	420	405	395	0.920	
	13	545	520	500	480	460	445	430	415	400	0.890	
	l, in4/ft		Nominal Shear Strength due to Panel Buckling, S_{nb} plf									
	1.672		10299	9423	8654	7975	7374	6838	6358	5927	5538	

	ϕ_{df}	Ω_{df}
Buckling	0.80	2.00

¹ Nominal shear strength of bare deck shown above may be limited by shear buckling.

² Design Strengths: ASD Required strength (Service Applied Load) $\leq \text{Min} \{S_{nf} / \Omega_{df}, S_{nb} / \Omega_{db}\}$ • LRFD Required strength (Factored Applied Load) $\leq \text{Min} \{\phi_{df} S_{nf}, \phi_{db} S_{nb}\}$

N-Deck 32/5 Welded Pattern - Button Punch 50KSI

Support fastening	5/8" arc spot welds or equivalent
Side-lap fastening	Non-piercing Button Punch

F _u	60 ksi
F _y	50 ksi
F _{xx}	60 ksi

Loading	φdf	Ωdf
Seismic	0.55	3.00
Wind	0.75	2.15
Other	0.55	3.00

Fastener Layout	Side-lap Conn/Span	Nominal Shear Strength, S _{nr} , plf ^{1,2}									K ₁ 1/ft
		Span, ft.									
		8	8.5	9	9.5	10	10.5	11	11.5	12	
3DR22 0.0295" 32/5	2	410	385	365							0.676
	3	420	395	375	355	335	320	305	290	280	0.653
	4	435	410	385	365	345	330	315	300	290	0.632
	5	445	420	395	375	355	340	325	310	295	0.611
	6	460	430	410	385	365	350	335	320	305	0.592
	7	470	445	420	395	375	360	340	325	315	0.574
	8	485	455	430	405	385	370	350	335	320	0.557
	9	495	465	440	420	395	380	360	345	330	0.542
	10	510	480	450	430	405	385	370	355	340	0.527
	11	520	490	465	440	415	395	380	360	345	0.512
	12	535	500	475	450	425	405	390	370	355	0.499
		I, in4/ft	Nominal Shear Strength due to Panel Buckling, S_{nb}, plf								
	0.808	6643	5884	5249	4711	4252	3856	3514	3215	2952	

Fastener Layout	Side-lap Conn/Span	Nominal Shear Strength, S _{nr} , plf ^{1,2}									K ₁ 1/ft
		Span, ft.									
		9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	
3DR20 0.0358 32/5	2	475									0.745
	3	485	460	435	415	395	380	365			0.720
	4	495	470	445	425	405	385	370	355	340	0.696
	5	505	480	455	435	415	395	380	365	350	0.673
	6	520	490	465	445	425	405	390	370	360	0.652
	7	530	500	475	455	430	415	395	380	365	0.633
	8	540	510	485	465	440	420	405	390	375	0.614
	9	550	520	495	470	450	430	415	395	380	0.597
	10	560	535	505	480	460	440	420	405	390	0.580
	11	575	545	515	490	470	450	430	410	395	0.564
	12	585	555	525	500	480	455	440	420	405	0.550
		I, in4/ft	Nominal Shear Strength due to Panel Buckling, S_{nb}, plf								
	0.989	7060	6337	5719	5187	4726	4324	3971	3660	3384	

Fastener Layout	Side-lap Conn/Span	Nominal Shear Strength, S_{nr} plf ^{1,2}									K_1
		Span, ft.									
		10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	1/ft
3DR18 0.0474 32/5	3	560	530	505	485	465					0.828
	4	570	540	515	495	475	455	435	420	405	0.801
	5	580	550	525	500	480	460	445	425	410	0.775
	6	590	560	535	510	490	470	450	435	420	0.751
	7	600	570	545	520	500	480	460	440	425	0.728
	8	610	580	550	530	505	485	465	450	435	0.707
	9	620	590	560	535	515	495	475	455	440	0.686
	10	630	600	570	545	525	500	480	465	450	0.667
	11	640	605	580	555	530	510	490	470	455	0.649
	12	650	615	590	565	540	520	500	480	460	0.632
	13	660	625	600	570	550	525	505	485	470	0.616
	l, in4/ft		Nominal Shear Strength due to Panel Buckling, S_{nb} plf								
	1.323		8782	7966	7258	6640	6099	5620	5196	4819	4481

Fastener Layout	Side-lap Conn/Span	Nominal Shear Strength, S_{nr} plf ^{1,2}									K_1
		Span, ft.									
		11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	1/ft
3DR16 0.0598 32/5	3	580	555	535							0.930
	4	590	565	540	520	500	480	465	450	435	0.899
	5	600	575	550	530	505	490	470	455	440	0.870
	6	610	580	560	535	515	495	480	460	445	0.843
	7	620	590	565	545	525	505	485	470	455	0.818
	8	625	600	575	550	530	510	490	475	460	0.794
	9	635	610	585	560	540	520	500	480	465	0.771
	10	645	615	590	570	545	525	505	490	475	0.750
	11	655	625	600	575	555	535	515	495	480	0.729
	12	665	635	610	585	560	540	520	505	485	0.710
	13	675	645	615	590	570	550	530	510	495	0.692
	l, in4/ft		Nominal Shear Strength due to Panel Buckling, S_{nb} plf								
	1.672		10299	9423	8654	7975	7374	6838	6358	5927	5538

	ϕ_{df}	Ω_{df}
Buckling	0.80	2.00

¹Nominal shear strength of bare deck shown above may be limited by shear buckling.

²Design Strengths: ASD Required strength (Service Applied Load) $\leq \text{Min} \{S_{nf} / \Omega_{df}, S_{nb} / \Omega_{db}\}$ • LRFD Required strength (Factored Applied Load) $\leq \text{Min} \{\phi_{df}S_{nf}, \phi_{db}S_{nb}\}$