

# WELDED (W) and PRESS-LOCKED (P) Bearing Bars

## LOAD & DEFLECTION TABLE

**General:** Loads and deflections are theoretical and based on static loading.

- U = safe uniform load, psf
- C = safe concentrated load, psf
- D = deflection, inches
- E = modulus of elasticity, 29,000,000 psi
- F = fiber stress, 18,000 psi

**Material:** ASTM A-1011 standard

**Deflection:** Spans and loads to the right of the bold line exceed 1/4" deflection for uniform load of 100 psf which provides safe pedestrian comfort. These can be exceeded for other types of loads with engineer's approval.

**Serrated Bars:** For serrated grating, the depth of grating required for a specified load is 1/4" deeper than that shown in the table.

Bar Size	Symbol	Approx. Weight psf	Sec. Mod Per Ft. of Width	SPAN (Direction of Bearing Bar)														
				24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"				
3/4" x 1/8"	19-W-4	3.9	0.118	U	355	227	158	116	89	70								
				D	0.099	0.155	0.223	0.304	0.397	0.503								
	19-P-4	4.3		C	355	284	237	203	178	158								
	19-P-2	5.2		D	0.079	0.124	0.179	0.243	0.318	0.402								
3/4" x 3/16"	19-W-4	5.6	0.178	U	533	341	237	174	133	105								
				D	0.099	0.155	0.223	0.304	0.397	0.503								
	19-P-4	6.4		C	533	426	355	305	266	237								
	19-P-2	7.8		D	0.079	0.124	0.179	0.243	0.318	0.402								
1" x 1/8"	19-W-4	5.0	.0211	U	632	404	281	206	158	125	101	84						
				D	0.074	0.116	0.168	0.228	0.298	0.377	0.466	0.563						
	19-P-4	5.4		C	632	505	421	361	316	281	253	230						
	19-P-2	6.3		D	0.060	0.093	0.134	0.182	0.238	0.302	0.372	0.451						
1" x 3/16"	19-W-4	7.2	0.316	U	947	606	421	309	237	187	152	125						
				D	0.074	0.116	0.168	0.228	0.298	0.377	0.466	0.563						
	19-P-4	8.1		C	947	758	632	541	474	421	379	344						
	19-P-2	9.5		D	0.060	0.093	0.134	0.182	0.238	0.302	0.372	0.451						
1-1/4" x 1/8"	19-W-4	6.1	0.329	U	987	632	439	322	247	195	158	130	110	93	81			
				D	0.060	0.093	0.134	0.182	0.238	0.302	0.372	0.451	0.536	0.629	0.730			
	19-P-4	6.8		C	987	789	658	564	493	439	395	359	329	304	282			
	19-P-2	8.1		D	0.048	0.074	0.107	0.146	0.191	0.241	0.298	0.360	0.429	0.504	0.584			
1-1/4" x 3/16"	19-W-4	8.9	0.493	U	1480	947	658	483	370	292	237	196	164	140	121			
				D	0.060	0.093	0.134	0.182	0.238	0.302	0.372	0.451	0.536	0.629	0.730			
	19-P-4	10.2		C	1480	1184	987	846	740	658	592	538	493	455	423			
	19-P-2	12.1		D	0.048	0.074	0.107	0.146	0.191	0.241	0.298	0.360	0.429	0.504	0.584			

Continued

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## LOAD & DEFLECTION TABLE

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**Material:** ASTM A-1011 standard  
**Deflection:** Spans and loads to the right of the bold line exceed 1/4" deflection for uniform load of 100 psf which provides safe pedestrian comfort. These can be exceeded for other types of loads with engineer's approval.

**Serrated Bars:** For serrated grating, the depth of grating required for a specified load is 1/4" deeper than that shown in the table.

Bar Size	Symbol	Approx. Weight psf	Sec. Mod Per Ft. of Width	SPAN (Direction of Bearing Bar)													
				24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"	96"	108"	
1-1/2" x 1/8"	19-W-4		0.474	U	1421	909	632	464	355	281	227	188	158	135	116	89	70
	19-W-2	7.7		D	0.050	0.078	0.112	0.152	0.199	0.251	0.310	0.376	0.447	0.524	0.608	0.794	1.006
	19-P-4	7.9		C	1421	1137	947	812	711	632	568	517	474	437	406	355	316
	19-P-2	9.2		D	0.040	0.062	0.089	0.122	0.159	0.201	0.248	0.300	0.358	0.420	0.487	0.636	0.804
1-1/2" x 3/16"	19-W-4	10.5	0.711	U	2132	1364	947	696	533	421	341	282	237	202	174	133	105
	19-W-2	11.2		D	0.050	0.078	0.112	0.152	0.199	0.251	0.310	0.376	0.447	0.524	0.608	0.794	1.006
	19-P-4	11.8		C	2132	1705	1421	1218	1066	947	853	775	711	656	609	533	474
	19-P-2	13.8		D	0.040	0.062	0.089	0.122	0.159	0.201	0.248	0.300	0.358	0.420	0.487	0.636	0.804
1-3/4" x 3/16"	19-W-4	12.2	0.967	U	2901	1857	1289	947	725	573	464	384	322	275	237	181	143
	19-W-2	12.8		D	0.043	0.067	0.096	0.130	0.170	0.215	0.266	0.322	0.383	0.450	0.521	0.681	0.862
	19-P-4	13.5		C	2901	2321	1934	1658	1451	1289	1161	1055	967	893	829	725	645
	19-P-2	15.4		D	0.034	0.053	0.077	0.104	0.136	0.172	0.213	0.257	0.306	0.360	0.417	0.545	0.689
2" x 3/16"	19-W-4	13.9	1.263	U	3789	2425	1684	1237	947	749	606	501	421	359	309	237	187
	19-W-2	14.5		D	0.037	0.058	0.084	0.114	0.149	0.189	0.233	0.282	0.335	0.393	0.456	0.596	0.754
	19-P-4	15.2		C	3789	3032	2526	2165	1895	1684	1516	1378	1263	1166	1083	947	842
	19-P-2	17.1		D	0.030	0.047	0.067	0.091	0.119	0.151	0.186	0.225	0.268	0.315	0.365	0.477	0.603
2-1/4" x 3/16"	19-W-4	15.5	1.599	U	4796	3069	2132	1566	1199	947	767	634	533	454	392	300	237
	19-W-2	16.1		D	0.033	0.052	0.074	0.101	0.132	0.168	0.207	0.250	0.298	0.350	0.406	0.530	0.670
	19-P-4	16.8		C	4796	3837	3197	2741	2398	2132	1918	1744	1599	1476	1370	1199	1066
	19-P-2	18.7		D	0.026	0.041	0.060	0.081	0.106	0.134	0.166	0.200	0.238	0.280	0.324	0.424	0.536
2-1/2" x 3/16"	19-W-4	17.2	1.974	U	5921	3789	2632	1933	1480	1170	947	783	658	561	483	370	292
	19-W-2	17.8		D	0.030	0.047	0.067	0.091	0.119	0.151	0.186	0.225	0.268	0.315	0.365	0.477	0.603
	19-P-4	18.5		C	5921	4737	3947	3383	2961	2632	2368	2153	1974	1822	1692	1480	1316
	19-P-2	20.4		D	0.024	0.037	0.054	0.073	0.095	0.121	0.149	0.180	0.215	0.252	0.292	0.381	0.483

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# HEAVY-DUTY WELDED (H) Bearing Bars

- U = safe uniform load, psf
- C = safe concentrated load, psf
- D = deflection, inches
- E = modulus of elasticity, 29,000,000 psi
- F = fiber stress, 20,000 psi

**Material:** ASTM A-36

**Serrated Bars:** For serrated grating, the depth of grating required for a specified load is 1/4" deeper than that shown in the table.

**General:** Loads and deflections are theoretical and based on static loading.

**Deflection:** Spans and loads to the right of the bold line exceed 1/4" deflection for uniform load of 100 psf which provides safe pedestrian comfort. These can be exceeded for other types of loads with engineer's approval.

## LOAD & DEFLECTION TABLE

### SPAN ( Direction of Bearing Bar)

Bar Size	Symbol	Approx. Weight psf	Sec. Mod Per Ft. of Width	SPAN ( Direction of Bearing Bar)											
				24"	30"	36"	42"	48"	54"	60"	66"	72"	84"	96"	
1" x 1/4"	19-H-4	9.5	0.421	U	1,404	898	624	458	351	277	225	186	156	115	88
	19-H-2	10.1		C	1,404	1,123	936	802	702	624	561	510	468	401	351
1" x 5/16"	19-H-4	12.1	0.526	U	1,754	1,123	780	573	439	347	281	232	195	143	110
	19-H-2	13.3		C	1,754	1,404	1,170	1,003	877	780	702	638	585	501	439
1" x 3/8"	19-H-4	14.3	0.632	U	2,105	1,347	936	687	526	416	337	278	234	172	132
	19-H-2	15.4		C	2,105	1,684	1,404	1,203	1,053	936	842	766	702	602	526
1-1/4" x 1/4"	19-H-4	11.7	0.658	U	2,193	1,404	975	716	548	433	351	290	244	179	137
	19-H-2	12.3		C	2,193	1,754	1,462	1,253	1,096	975	877	797	731	627	548
1-1/4" x 5/16"	19-H-4	14.3	0.822	U	2,741	1,754	1,218	895	685	541	439	362	305	224	171
	19-H-2	16.0		C	2,741	2,193	1,827	1,566	1,371	1,218	1,096	997	914	783	685
1-1/4" x 3/8"	19-H-4	17.6	0.987	U	3,289	2,105	1,462	1,074	822	650	526	435	365	269	206
	19-H-2	18.7		C	3,289	2,632	2,193	1,880	1,645	1,462	1,316	1,196	1,096	940	822
1-1/2" x 1/4"	19-H-4	13.9	0.947	U	3,158	2,021	1,404	1,031	789	624	505	418	351	258	197
	19-H-2	14.5		C	3,158	2,526	2,105	1,805	1,579	1,404	1,263	1,148	1,053	902	789
1-1/2" x 5/16"	19-H-4	17.8	1.184	U	3,947	2,526	1,754	1,289	987	780	632	522	439	322	247
	19-H-2	18.8		C	3,947	3,158	2,632	2,256	1,974	1,754	1,579	1,435	1,316	1,128	987
1-1/2" x 3/8"	19-H-4	20.9	1.421	U	4,737	3,032	2,105	1,547	1,184	936	758	626	526	387	296
	19-H-2	22.0		C	4,737	3,789	3,158	2,707	2,368	2,105	1,895	1,722	1,579	1,353	1,184

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## LOAD & DEFLECTION TABLE

### SPAN ( Direction of Bearing Bar)

Bar Size	Symbol	Approx. Weight psf	Sec. Mod Per Ft. of Width	SPAN ( Direction of Bearing Bar)											
				24"	30"	36"	42"	48"	54"	60"	66"	72"	84"	96"	
1-3/4" x 1/4"	19-H-4	16.1	1.289	U	4,298	2,751	1,910	1,404	1,075	849	688	568	478	351	269
	19-H-2	16.7		C	4,298	3,439	2,865	2,456	2,149	1,910	1,719	1,563	1,433	1,228	1,075
1-3/4" x 5/16"	19-H-4	20.4	1.612	U	5,373	3,439	2,388	1,754	1,343	1,061	860	710	597	439	336
	19-H-2	21.5		C	5,373	4,298	3,582	3,070	2,686	2,388	2,149	1,954	1,791	1,535	1,343
1-3/4" x 3/8"	19-H-4	24.2	1.934	U	6,447	4,126	2,865	2,105	1,612	1,274	1,032	853	716	526	403
	19-H-2	25.3		C	6,447	5,158	4,298	3,684	3,224	2,865	2,579	2,344	2,149	1,842	1,612
2" x 1/4"	19-H-4	18.3	1.684	U	5,614	3,593	2,495	1,833	1,404	1,109	898	742	624	458	351
	19-H-2	18.9		C	5,614	4,491	3,743	3,208	2,807	2,495	2,246	2,041	1,871	1,604	1,404
2" x 5/16"	19-H-4	23.1	2.105	U	7,018	4,491	3,119	2,291	1,754	1,386	1,123	928	780	573	439
	19-H-2	24.6		C	7,018	5,614	4,678	4,010	3,509	3,119	2,807	2,552	2,339	2,005	1,754
2" x 3/8"	19-H-4	27.5	2.526	U	8,421	5,389	3,743	2,750	2,105	1,663	1,347	1,114	936	687	526
	19-H-2	28.6		C	8,421	6,737	5,614	4,812	4,211	3,743	3,368	3,062	2,807	2,406	2,105
2-1/4" x 1/4"	19-H-4	20.5	2.132	U	7,105	4,547	3,158	2,320	1,776	1,404	1,137	940	789	580	444
	19-H-2	21.1		C	7,105	5,684	4,737	4,060	3,553	3,158	2,842	2,584	2,368	2,030	1,776
2-1/4" x 5/16"	19-H-4	25.9	2.664	U	8,882	5,684	3,947	2,900	2,220	1,754	1,421	1,174	987	725	555
	19-H-2	27.0		C	8,882	7,105	5,921	5,075	4,441	3,947	3,553	3,230	2,961	2,538	2,220
2-1/4" x 3/8"	19-H-4	30.8	3.197	U	10,658	6,821	4,737	3,480	2,664	2,105	1,705	1,409	1,184	870	666
	19-H-2	31.9		C	10,658	8,526	7,105	6,090	5,329	4,737	4,263	3,876	3,553	3,045	2,664
2-1/2" x 1/4"	19-H-4	22.7	2.632	U	8,772	5,614	3,899	2,864	2,193	1,733	1,404	1,160	975	716	548
	19-H-2	23.3		C	8,772	7,018	5,848	5,013	4,386	3,899	3,509	3,190	2,924	2,506	2,193

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# ALUMINUM GRATING

## Load and Deflection Table for Type 19S4 and I-Bar

Recommended maximum span for 1/4" deflection under concentrated load (C) 300# at midspan on 6' or less, 400# on over 6'

Bearing Bar Size	WT., LBS./SF*			Clear Span															
	19S4	I-Bar		2'0"	2'6"	3'0"	3'6"	4'0"	4'6"	5'0"	5'6"	6'0"	6'6"	7'0"	8'0"				
1" x 3/16" or 1" I-Bar	2.65	2.13	3'5"	U	.686	.439	.305	.224	.172	.136	.110	U—Safe uniform load in pounds/sq. ft.							
				D	.144	.225	.324	.441	.576	.728	.899	C—Safe concentrated load in pounds ft. grating width							
				C	.686	.549	.458	.392	.343	.305	.274	D—Deflection in inches							
				D	.115	.180	.259	.352	.461	.583	.719	Loads and deflections given in this table are theoretical, and are based on a unit stress of 12,000 psi.							
1 1/4" x 3/16" or 1 1/4" I-Bar	3.25	2.51	4'3"	U	1.074	.687	.477	.350	.268	.212	.172	.142	.119	Loads and deflections given in this table are theoretical, and are based on a unit stress of 12,000 psi.					
				D	.115	.180	.259	.351	.460	.581	.717	.866	1.030						
				C	1.074	.859	.716	.614	.537	.477	.429	.390	.358						
				D	.092	.144	.207	.282	.369	.466	.575	.695	.827						
1 1/2" x 3/16" or 1 1/2" I-Bar	3.86	2.91	5'1"	U	1.547	.990	.687	.505	.387	.306	.247	.204	.172	.146	.126	.97			
				D	.096	.150	.216	.294	.383	.485	.599	.724	.861	1.012	1.174	1.542			
				C	1.547	1.237	1.031	.884	.773	.687	.619	.562	.516	.476	.442	.387			
				D	.077	.120	.173	.235	.307	.389	.480	.579	.690	.812	.941	1.230			
1 3/4" x 3/16" or 1 3/4" I-Bar	4.48	3.29	5'11"	U	2.105	1.347	.936	.687	.526	.416	.337	.278	.234	.199	.172	.132			
				D	.082	.128	.185	.252	.329	.417	.515	.622	.741	.868	1.009	1.321			
				C	2.105	1.684	1.404	1.203	1.053	.936	.842	.766	.702	.648	.602	.526			
				D	.066	.103	.148	.202	.264	.334	.412	.498	.593	.696	.807	1.053			
2" x 3/16" or 2" I-Bar	5.08	3.71	6'2"	U	2.750	1.760	1.222	.898	.688	.543	.440	.364	.306	.260	.224	.172			
				D	.072	.112	.162	.220	.288	.364	.450	.545	.649	.759	.880	1.153			
				C	2.750	2.200	1.833	1.571	1.375	1.222	1.100	1.000	.917	.846	.786	.688			
				D	.058	.090	.130	.176	.230	.292	.360	.436	.518	.608	.706	.922			
2 1/4" x 3/16" or 2 1/4" I-Bar	5.69	4.06	6'11"	U	3.480	2.227	1.547	1.136	.870	.687	.557	.460	.387	.330	.284	.218			
				D	.064	.100	.144	.196	.256	.324	.400	.484	.577	.677	.784	1.027			
				C	3.480	2.784	2.320	1.989	1.740	1.547	1.392	1.266	1.160	1.071	.994	.870			
				D	.051	.080	.115	.157	.205	.259	.320	.387	.461	.541	.627	.819			
2 1/2" x 3/16" or 2 1/2" I-Bar	6.29	4.49	7'9"	U	4.297	2.750	1.910	1.403	1.074	.849	.687	.568	.477	.407	.351	.268			
				D	.058	.090	.130	.176	.230	.292	.360	.436	.518	.609	.706	.920			
				C	4.297	3.437	2.864	2.455	2.148	1.910	1.719	1.562	1.432	1.322	1.228	1.074			
				D	.046	.072	.104	.141	.184	.233	.288		.415	.487	.565	.737			

NOTE: 1/4" is recommended as the maximum deflection consistent with pedestrian comfort, but can be exceeded for other loading conditions at the discretion of the engineer.

NOTE: The carrying capacity of a piece of grating subjected to a concentrated load over only a portion of its width is determined by the stiffness of both the bearing bars and the cross bars, and therefore differs with the type of grating used. To determine the carrying capacity of gratings subject to such loadings, your engineering department should be consulted.

### CONVERSION FACTORS:

For gratings with other than 1 3/16" bearing bar spacing, or for different design stresses, proportionate conversion factors apply. For information on other types of grating, consult O'Neal Grating Dept.

