

HSS

LRFD Column Load Tables



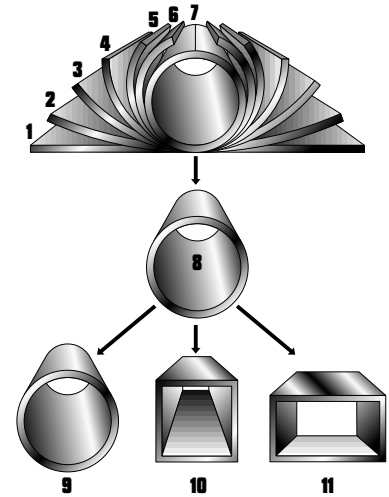
**Steel Tube
Institute**
OF NORTH AMERICA

HSS Manufacturing Methods

The transformation of steel strip into hollow structural sections (HSS) is the result of a series of operations including forming, welding and sizing. Currently three methods are being used in North America for the manufacture of HSS. These methods are described below. Each method meets ASTM A-500 and CSA G-40.21-92 requirements for the the manufacture of HSS, and the sizes listed in this brochure may be produced to either standard.

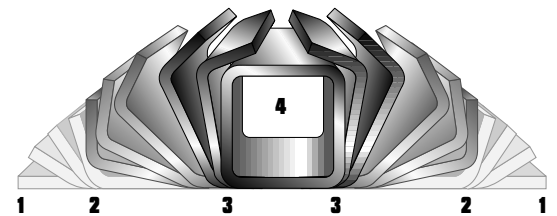
Electric Resistance Welding (ERW) Process

In the tube mill, flat steel strip (1) is formed continuously around its longitudinal axis to produce a round tube. This is done by moving the strip through a progressive set of rolls (2-6). The strip edges (7) are heated by either high frequency induction or contact welding and then forged together by weld rolls to create a continuous longitudinal weld without the addition of filler metal. The weld seam (8) is then cooled and processed through a set of sizing/shaping rolls which cold-form it into a round (9), square (10) or rectangular (11) section.



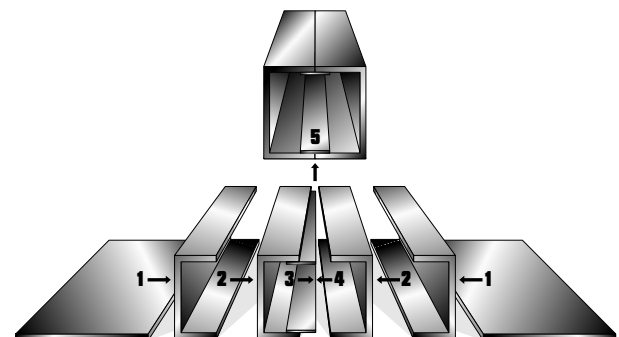
Form-Square Weld-Square (ERW) Process

In the weld mill, driven forming dies progressively shape the flat strip (1) by forming the top two corners (2) of the square or rectangular tube in the initial forming station. Subsequent stations form the bottom two corners (3) of the shape. No cold working of the sides of the shape is performed, and the shape's seam is welded by high-frequency contacts when the tube is near its final shape and size. The welded tube (4) is cooled and then driven through a series of sizing stations which qualifies the tube's final dimensions.



Submerged Arc Weld (SAW) Process

Two identical pieces of flat strip (1) are placed in a press brake and formed into two identical halves (2) of a finished tube size. A backup bar is tack welded to each leg of one of the half-sections (3). The two half-sections are fitted together toe-to-toe (4) and welded by the submerged arc process to complete the square or rectangular section (5).



Foreword

Load and Resistance Factor Design (LRFD) column load tables are presented for square, rectangular and round hollow structural sections (HSS) manufactured by the electric resistance welding (ERW) method and for square, and rectangular HSS manufactured by the submerged arc welding (SAW) method. Tables of design stresses for compression members for six minimum specified yield stress steels from $F_y = 42$ ksi to $F_y = 70$ ksi are also included.

The tabulated design strength loads and the compression member design stresses have been calculated in accordance with the new AISC “Specification for the Design of Steel Hollow Structural Sections” - April 15, 1997. This specification is a supplement to the AISC “Load and Resistance Factor Design Specification for Structural Steel Buildings-December, 1993.” The design strength loads are based upon section property data for HSS that were recalculated in 1996 to account for today’s more precise manufacturing methods. Revised section property data for HSS is published in “Hollow Structural Sections - Dimensions and Section Properties” available from the Steel Tube Institute of North America.

Tables for square and rectangular HSS are presented for $F_y = 46$ ksi and for $F_y = 50$ ksi. Separate tables are used for HSS sizes produced by the ERW and SAW manufacturing methods.

Tables for round HSS are presented for $F_y = 42$ ksi, $F_y = 46$ ksi and for $F_y = 50$ ksi. The round HSS are produced by the ERW manufacturing method.

The design strength loads have been calculated for effective lengths, KL , with respect to the least radius of gyration, r or r_y , varying from 0 to 40 feet. A HSS defined as a “slender element cross section”, in accordance with Section 2.2.1 of the AISC “Specification”, is identified in the tables with an asterisk (*) immediately following the design wall thickness parameter in the heading.

The tabulated values of compression member design stresses, on pages 124 through 126, are calculated in accordance with the requirements of AISC “Specification” Section 4.2. Note that these design stresses do not apply to a HSS defined as a “slender element cross section”.

Refer to part 3, Column Design, of the AISC 2nd Edition “Manual of Steel Construction - Load & Resistance Factor Design” for a discussion of the design strength of columns. The symbols in these tables follow those used in the AISC “Manual”.

The information presented in this publication has been prepared in accordance with recognized engineering principles and is for general information only. While it is believed to be accurate, this information should not be used or relied upon for any specific application without competent professional examination and verification of its accuracy, suitability, and applicability by a licensed professional engineer, designer, or architect. The publication of the material contained herein is not intended as a representation or warranty on the part of The Steel Tube Institute of North America or of any other person named herein, that this information is suitable for any general or particular use or of freedom from infringement of any patent or patents. Anyone making use of this information assumes all liability arising from such use.

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How To Use The Column Load Tables

Example 1

Design the lightest 6-inch square ERW HSS column of $F_y = 46$ ksi (ASTM A500 Gr. B) to support a factored concentric load of 148 kips. The largest effective length, KL, is 16 feet.

Enter the $F_y = 46$ ksi table (page 9) for the 6-inch square ERW HSS. Read across the row at KL = 16 ft. and note the following:

6 x 6 x 5/8	is good for 270 kips	> 148 kips - O.K.
x 1/2	is good for 231 kips	> 148 kips - O.K.
x 3/8	is good for 184 kips	> 148 kips - O.K.
x 5/16	is good for 158 kips	> 148 kips - O.K.
x 1/4	is good for 130 kips	< 148 kips - not good

Select: **6 x 6 x 5/16** HSS (Weight = 23.34 lbs./ft.)

Example 2

Design the lightest square ERW HSS column of $F_y = 46$ ksi (ASTM A500 Gr. B) to support a factored concentric load of 145 kips. The largest effective length, KL, is 12 feet.

Enter the $F_y = 46$ ksi tables for square ERW HSS. Read across the rows at KL = 12 ft. and note the following:

5 x 5 x 3/8 (22.37 lbs./ft.) is good for 162 kips > 145 kips - O.K.
(page 10)

5 1/2 x 5 1/2 x 5/16 (21.21 lbs./ft.) is good for 167 kips > 145 kips - O.K.
(page 9)

6 x 6 x 1/4 (19.02 lbs./ft.) is good for 159 kips > 145 kips - O.K.
(page 9)

7 x 7 x 3/16 (17.08 lbs./ft.) is good for 152 kips > 145 kips - O.K.
(page 8)

8 x 8 x 3/16 (19.63 lbs./ft.) is good for 178 kips > 145 kips - O.K.
(page 8)

Select: **7 x 7 x 1/4** HSS (Weight = 17.08 lbs./ft.)

Example 3

Design the lightest 8-inch by 4-inch rectangular ERW HSS column of $F_y = 50$ ksi (ASTM A500 Gr. C) to support a factored concentric load of 170 kips.

The effective length, KL, with respect to the minor axis is 14 feet. The effective length, KL, with respect to the major axis is 26 feet.

Enter the $F_y = 50$ ksi table (page 55) for the 8-inch x 4-inch rectangular ERW HSS. Read across the row at KL = 14 ft. and note the following:

8 x 4 x 5/8	is good for 201 kips	> 170 kips - O.K.
x 1/2	is good for 177 kips	> 170 kips - O.K.
x 3/8	is good for 145 kips	< 170 kips - not good

Tentatively select: **8 x 4 x 1/2**
 $r_x / r_y = 1.74$

Equivalent effective length for the major axis:
 $26 / 1.74 = 14.9$

Enter the same table, read across the row at KL = 14.9 and note the following:

8 x 4 x 5/8 is good for 178 kips (interpolated) > 170 kips
 $r_x / r_y = 1.75$ - O.K.

8 x 4 x 1/2 is good for 158 kips (interpolated) < 170 kips - not good

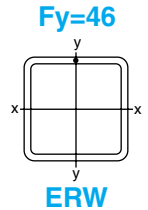
Select: **8 x 4 x 5/8** HSS (Weight = 42.30 lbs./ft.)

LRFD COLUMN LOAD TABLES



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



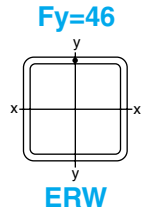
Nominal Size		16 x 16				14 x 14				12 x 12				
Wall Thickness		5/8	1/2	3/8	5/16	5/8	1/2	3/8	5/16	5/8	1/2	3/8	5/16	1/4
Weight Per Foot		127.37	103.30	78.52	65.87	110.36	89.68	68.31	57.36	93.34	76.07	58.10	48.86	39.43
Design Wall Thickness		0.581	0.465	0.349*	0.291*	0.581	0.465	0.349*	0.291*	0.581	0.465	0.349	0.291*	0.233*
$F_y = 46 \text{ ksi}$														
Effective length KL in feet	0	1370	1110	792	605	1180	962	731	564	1000	817	626	521	374
	2	1370	1110	792	604	1180	961	730	563	1000	816	625	521	373
	3	1370	1100	791	603	1180	959	729	563	1000	814	623	520	373
	4	1360	1100	790	603	1180	957	728	562	998	811	621	519	372
	5	1360	1100	789	602	1180	954	725	561	994	808	619	517	371
	6	1360	1100	787	600	1170	951	723	560	989	804	616	515	370
	7	1350	1090	786	599	1170	947	720	558	983	800	612	513	369
	8	1350	1090	784	597	1160	942	717	556	976	794	609	510	367
	9	1340	1080	781	596	1150	937	713	554	969	788	604	506	366
	10	1330	1080	779	594	1150	931	709	552	960	782	599	502	364
	11	1330	1070	776	592	1140	925	704	549	951	775	594	498	361
	12	1320	1070	773	590	1130	918	699	547	941	767	588	493	359
	13	1310	1060	770	587	1120	911	693	544	931	758	581	487	356
	14	1300	1060	766	584	1110	903	687	540	919	749	575	482	354
	15	1290	1050	762	582	1100	895	681	537	907	740	568	476	351
	16	1280	1040	758	579	1090	886	675	533	895	730	560	470	348
	17	1270	1030	754	576	1080	877	668	529	881	719	552	463	344
	18	1260	1020	749	572	1070	867	660	525	867	708	544	456	341
	19	1250	1010	744	569	1050	856	653	521	853	697	535	449	337
	20	1240	1000	739	565	1040	846	645	516	838	685	526	442	333
	21	1230	994	733	561	1030	835	636	511	823	672	517	434	329
	22	1210	984	728	557	1010	823	628	506	807	660	507	426	324
	23	1200	973	722	553	996	811	619	501	790	647	498	418	320
	24	1190	962	716	549	981	799	610	495	774	633	488	410	315
	25	1170	950	709	544	966	787	601	490	757	620	477	401	310
	26	1160	939	703	540	950	774	591	484	739	606	467	392	305
	27	1140	927	696	535	933	761	581	478	722	592	456	384	300
	28	1130	914	689	530	917	748	571	471	704	578	446	375	295
	29	1110	902	681	524	900	734	561	465	686	563	435	366	289
	30	1090	889	674	519	882	720	551	458	668	549	424	357	283
	31	1080	876	666	514	865	706	540	451	650	534	413	347	277
	32	1060	863	658	508	847	692	530	444	631	520	402	338	271
	33	1040	849	648	502	829	678	519	437	613	505	390	329	265
	34	1030	835	638	496	812	663	508	428	595	490	379	320	259
	35	1010	821	627	490	793	649	497	419	576	475	368	310	252
	36	992	807	617	484	775	634	486	410	558	461	357	301	244
	37	975	793	606	477	757	619	475	401	540	446	346	292	237
	38	957	779	596	471	738	605	464	392	522	431	335	283	230
	39	939	764	585	464	720	590	453	382	504	417	324	273	222
	40	920	750	574	473	702	575	442	373	486	403	313	264	215
PROPERTIES														
Area, In. ²	35.0	28.3	21.5	18.1	30.3	24.6	18.7	15.7	25.7	20.9	16.0	13.4	10.8	
I, In. ⁴	1370	1130	873	739	896	743	577	490	548	457	357	304	248	
r, In.	6.25	6.31	6.37	6.39	5.44	5.49	5.55	5.58	4.62	4.68	4.73	4.76	4.79	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



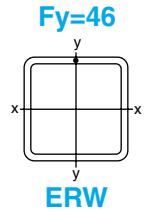
Nominal Size		10 x 10					9 x 9					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		76.33	62.46	47.90	40.35	32.63	24.73	55.66	42.79	36.10	29.23	22.18
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233*	0.174*	0.465	0.349	0.291	0.233*	0.174*
F_y = 46 ksi												
Effective length KL in feet	0	821	673	516	434	342	220	598	461	388	314	209
	2	819	671	515	433	341	220	596	460	387	313	209
	3	816	669	513	432	340	220	594	458	385	312	208
	4	812	666	511	430	339	219	590	456	383	310	208
	5	807	662	508	427	338	218	586	452	380	308	207
	6	802	657	505	424	336	217	581	449	377	305	206
	7	795	651	500	421	334	216	575	444	373	302	204
	8	787	645	496	417	332	215	568	439	369	299	203
	9	778	638	490	413	329	214	560	433	364	295	201
	10	768	630	485	408	326	212	551	426	359	291	199
	11	757	622	478	402	323	210	542	420	353	286	197
	12	745	612	471	397	319	209	532	412	347	281	195
	13	733	603	464	391	316	207	521	404	340	276	192
	14	720	592	456	384	311	204	510	395	333	270	189
	15	706	581	448	377	305	202	498	387	326	264	186
	16	692	569	439	370	299	200	486	377	318	258	183
	17	676	557	430	362	293	197	473	368	310	252	180
	18	661	545	421	355	287	194	460	358	302	245	177
	19	645	532	411	346	281	191	446	347	293	238	173
	20	628	519	401	338	274	188	432	337	285	231	169
	21	611	505	391	330	267	185	418	326	276	224	165
	22	593	491	380	321	260	182	403	315	267	217	161
	23	576	477	370	312	253	178	389	304	258	210	157
	24	558	462	359	303	246	174	374	293	249	202	152
	25	540	448	348	294	239	171	360	282	239	195	147
	26	522	433	337	285	231	167	345	271	230	187	143
	27	504	419	326	275	224	163	331	260	221	180	137
	28	485	404	315	266	216	158	316	249	212	172	131
	29	467	389	304	257	209	154	302	238	202	165	126
	30	449	375	293	248	201	150	288	227	193	158	120
	31	431	360	282	238	194	145	274	217	185	151	115
	32	413	346	271	229	187	141	260	206	176	144	110
	33	395	331	260	220	179	136	247	196	167	137	105
	34	378	317	249	211	172	131	234	186	159	130	99
	35	361	303	238	202	165	126	220	176	150	123	94
	36	344	290	228	193	158	121	208	166	142	116	89
	37	328	276	218	185	151	115	197	157	135	110	85
	38	311	263	208	176	144	110	187	149	128	104	80
	39	295	250	198	168	138	105	177	142	121	99	76
	40	281	237	188	160	131	100	169	135	115	94	72
PROPERTIES												
Area, In. ²		21.0	17.2	13.2	11.1	8.96	6.76	15.3	11.8	9.92	8.03	6.06
I, In. ⁴		304	256	202	172	141	108	182	145	124	102	78.2
r, In.		3.80	3.86	3.92	3.94	3.97	4.00	3.45	3.51	3.54	3.56	3.59

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



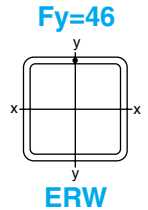
Nominal Size		8 x 8						7 x 7					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		59.32	48.85	37.69	31.84	25.82	19.63	50.81	42.05	32.58	27.59	22.42	17.08
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174*	0.581	0.465	0.349	0.291	0.233	0.174*
$F_y = 46 \text{ ksi}$													
Effective length KL in feet	0	641	528	407	343	278	198	547	454	351	297	241	183
	2	638	526	405	341	277	197	544	451	349	295	240	182
	3	635	523	403	339	275	196	540	448	347	293	238	181
	4	630	519	400	337	273	195	535	444	343	291	236	179
	5	624	514	397	334	271	194	528	438	339	287	234	177
	6	617	508	392	331	268	193	519	431	334	283	230	174
	7	608	501	387	326	265	191	510	423	328	278	227	172
	8	598	494	381	322	261	189	499	415	322	273	222	168
	9	587	485	375	316	257	187	487	405	315	267	217	165
	10	575	475	368	310	252	184	473	394	307	260	212	161
	11	562	465	360	304	247	181	459	383	298	253	207	157
	12	549	454	352	297	241	178	444	371	289	246	201	152
	13	534	442	343	290	235	175	428	358	280	238	194	148
	14	519	430	334	282	229	172	412	345	270	230	188	143
	15	503	417	324	274	223	168	395	331	260	221	181	137
	16	486	404	314	266	216	164	377	317	249	212	174	132
	17	469	390	304	257	209	159	359	303	238	203	167	127
	18	451	376	293	249	202	154	342	288	227	194	159	121
	19	434	362	283	240	195	149	324	274	216	185	152	116
	20	416	347	272	231	188	143	306	259	205	176	145	110
	21	398	332	261	221	180	138	288	245	194	167	137	105
	22	380	318	250	212	173	132	271	230	183	157	130	99
	23	361	303	239	203	166	126	254	216	173	148	123	94
	24	344	289	228	194	158	121	237	202	162	140	115	88
	25	326	274	217	185	151	115	220	189	152	131	108	83
	26	308	260	206	176	143	110	204	176	142	122	101	78
	27	291	246	195	167	136	104	189	163	132	114	95	73
	28	274	232	185	158	129	99	176	152	123	106	88	68
	29	258	219	174	149	122	94	164	141	114	99	82	63
	30	241	205	164	141	115	89	153	132	107	92	77	59
	31	226	192	154	132	109	84	144	124	100	87	72	55
	32	212	181	145	124	102	79	135	116	94	81	68	52
	33	199	170	136	117	96	74	127	109	88	76	63	49
	34	188	160	128	110	90	70	119	103	83	72	60	46
	35	177	151	121	104	85	66	113	97	79	68	56	43
	36	168	143	114	98	81	62	107	92	74	64	53	41
	37	159	135	108	93	76	59	101	87	70	61	51	39
	38	150	128	103	88	72	56	96	82	67	58	48	37
	39	143	122	97	84	69	53	91	78	63	55	45	35
	40	136	116	93	79	65	50	86	74	60	52	43	33
PROPERTIES													
Area, In. ²	16.4	13.5	10.4	8.76	7.10	5.37	14.0	11.6	8.97	7.59	6.17	4.67	
I, In. ⁴	146	125	99.6	85.6	70.7	54.4	93.3	80.5	64.9	56.1	46.5	36.0	
r, In.	2.99	3.04	3.10	3.13	3.15	3.18	2.58	2.63	2.69	2.72	2.75	2.77	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		6 x 6						5 1/2 x 5 1/2						
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8	
Weight Per Foot		42.30	35.24	27.48	23.34	19.02	14.53	9.86	24.93	21.21	17.32	13.25	9.01	
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174	0.116*	0.349	0.291	0.233	0.174	0.116*	
F_y = 46 ksi														
Effective length KL in feet	0	457	381	296	251	205	156	93	269	229	187	142	89	
	2	454	378	294	250	203	155	93	267	227	185	141	89	
	3	449	374	291	247	202	153	92	264	224	183	139	88	
	4	443	369	288	244	199	151	92	260	221	180	137	87	
	5	435	363	283	240	196	149	91	254	217	177	135	86	
	6	425	355	277	236	192	146	90	248	212	173	132	85	
	7	414	346	271	230	188	143	88	241	206	168	128	83	
	8	401	336	263	224	183	139	87	233	199	163	124	81	
	9	387	325	255	217	178	135	85	224	192	157	120	79	
	10	372	313	246	210	172	131	83	215	184	151	115	77	
	11	357	301	237	202	165	126	81	205	176	144	110	74	
	12	340	288	227	194	159	121	79	195	167	137	105	72	
	13	323	274	216	185	152	116	76	184	158	130	100	68	
	14	306	260	206	176	145	111	73	173	149	123	94	65	
	15	288	246	195	167	138	106	71	163	140	115	89	61	
	16	270	231	184	158	130	100	68	152	131	108	83	57	
	17	252	217	173	149	123	95	65	141	122	101	78	54	
	18	235	203	162	140	116	89	61	130	113	93	72	50	
	19	218	189	151	131	108	83	57	120	104	86	67	46	
	20	201	175	141	122	101	78	54	110	96	79	62	43	
	21	185	161	130	113	94	73	50	100	88	73	57	39	
	22	169	148	120	104	87	68	46	91	80	66	52	36	
	23	154	136	110	96	80	62	43	83	73	61	47	33	
	24	142	125	101	88	74	58	40	77	67	56	44	30	
	25	131	115	93	81	68	53	37	71	62	51	40	28	
	26	121	106	86	75	63	49	34	65	57	47	37	26	
	27	112	98	80	70	58	45	31	60	53	44	34	24	
	28	104	92	74	65	54	42	29	56	49	41	32	22	
	29	97	85	69	60	51	39	27	52	46	38	30	21	
	30	91	80	65	56	47	37	25	49	43	36	28	19	
	31	85	75	61	53	44	34	24	46	40	33	26	18	
	32	80	70	57	50	42	32	22	43	38	31	25	17	
	33	75	66	54	47	39	30	21	40	35	29	23	16	
	34	71	62	51	44	37	29	20	38	33	28	22	15	
	35	67	59	48	42	35	27	19	<u>36</u>	<u>32</u>	<u>26</u>	20	14	
	36	<u>63</u>	55	45	39	33	26	18				<u>19</u>	<u>13</u>	
	37		<u>52</u>	43	37	31	24	17					<u>13</u>	
	38			<u>40</u>	35	29	23	16						
	39				<u>35</u>	29	23	16						
	40					<u>28</u>	22	15						
PROPERTIES														
Area, In. ²		11.7	9.74	7.58	6.43	5.24	3.98	2.70	6.88	5.85	4.77	3.63	2.46	
I, In. ⁴		55.1	48.2	39.4	34.3	28.6	22.3	15.5	29.7	25.9	21.7	17.0	11.8	
r, In.		2.17	2.23	2.28	2.31	2.34	2.37	2.39	2.08	2.11	2.13	2.16	2.19	

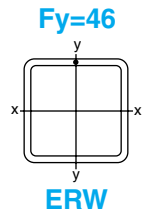
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		5 x 5						4 1/2 x 4 1/2					
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		28.43	22.37	19.08	15.62	11.97	8.16	25.03	19.82	16.96	13.91	10.70	7.31
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.116*	0.465	0.349	0.291	0.233	0.174	0.116*
F_y = 46 ksi													
Effective length KL in feet	0	308	242	206	168	128	85	272	214	183	150	115	78
	2	305	239	203	166	127	84	268	211	181	148	113	77
	3	300	236	201	164	125	83	263	208	178	146	111	76
	4	294	231	197	161	123	82	256	203	173	143	109	74
	5	286	225	192	158	120	81	248	196	168	138	106	72
	6	277	219	187	153	117	79	238	189	162	134	102	70
	7	267	211	180	148	113	77	226	181	155	128	98	67
	8	256	202	173	142	109	75	214	172	148	122	94	64
	9	243	193	165	136	105	72	201	162	139	116	89	61
	10	230	183	157	130	100	68	187	151	131	109	83	58
	11	216	173	149	123	95	65	173	141	122	101	78	54
	12	202	162	140	116	89	61	159	130	113	94	73	50
	13	188	151	131	108	84	58	145	119	104	87	67	47
	14	174	140	122	101	78	54	131	108	95	80	62	43
	15	160	130	112	94	73	50	117	98	86	72	56	39
	16	146	119	103	86	67	47	104	88	78	66	51	36
	17	132	109	95	79	62	43	92	78	69	59	46	32
	18	119	98	86	72	57	39	82	70	62	53	41	29
	19	107	89	78	66	52	36	74	63	56	47	37	26
	20	97	80	70	59	47	33	67	57	50	43	33	23
	21	88	73	64	54	42	30	61	51	45	39	30	21
	22	80	66	58	49	39	27	55	47	41	35	27	19
	23	73	61	53	45	35	25	50	43	38	32	25	18
	24	67	56	49	41	32	23	46	39	35	30	23	16
	25	62	51	45	38	30	21	43	36	32	27	21	15
	26	57	47	42	35	28	19	<u>39</u>	33	30	25	20	14
	27	53	44	39	33	26	18	<u>31</u>	<u>31</u>	27	23	18	13
	28	49	41	36	30	24	17	<u>26</u>	<u>26</u>	<u>26</u>	<u>22</u>	17	12
	29	46	38	33	28	22	16	<u>21</u>	<u>21</u>	<u>21</u>	<u>16</u>	<u>16</u>	<u>11</u>
	30	<u>43</u>	36	31	26	21	15	<u>15</u>	<u>15</u>	<u>15</u>	<u>11</u>	<u>11</u>	<u>11</u>
	31		<u>33</u>	<u>29</u>	<u>25</u>	<u>19</u>	14						
	32		<u>33</u>	<u>29</u>	<u>23</u>	<u>18</u>	13						
	33				<u>23</u>	<u>18</u>	12						
	34												
	35												
	36												
	37												
	38												
	39												
	40												
PROPERTIES													
Area, in. ²	7.88	6.18	5.26	4.30	3.28	2.23	6.95	5.48	4.68	3.84	2.93	2.00	
I, in. ⁴	26.0	21.7	19.0	16.0	12.6	8.80	18.0	15.3	13.5	11.4	9.02	6.35	
r, in.	1.82	1.87	1.90	1.93	1.96	1.99	1.61	1.67	1.70	1.73	1.75	1.78	

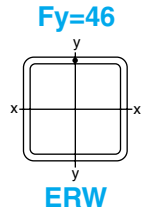
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



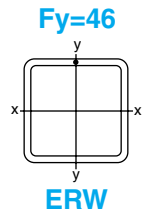
Nominal Size		4 x 4						3 1/2 x 3 1/2				
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		21.63	17.27	14.83	12.21	9.42	6.46	14.72	12.70	10.51	8.15	5.61
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.116	0.349	0.291	0.233	0.174	0.116
F_y = 46 ksi												
Effective length KL in feet	0	235	187	160	132	101	69	160	138	114	88	60
	2	231	184	158	130	99	68	156	134	111	86	59
	3	225	179	154	127	97	67	151	131	108	83	57
	4	218	174	150	123	95	65	145	125	104	80	55
	5	208	167	144	119	91	63	137	119	99	77	53
	6	198	159	137	113	87	60	128	112	93	72	50
	7	185	150	129	107	83	57	119	103	87	68	47
	8	172	140	121	101	78	54	108	95	80	62	43
	9	159	129	113	94	73	51	98	86	73	57	40
	10	145	119	104	87	67	47	87	77	65	51	36
	11	131	108	95	79	62	43	76	68	58	46	32
	12	117	97	86	72	56	40	66	60	51	41	29
	13	103	87	77	65	51	36	57	51	44	36	25
	14	90	77	68	58	46	32	49	44	38	31	22
	15	79	67	60	51	41	29	43	39	33	27	19
	16	69	59	53	45	36	26	38	34	29	24	17
	17	61	52	47	40	32	23	33	30	26	21	15
	18	55	47	42	36	28	20	30	27	23	19	13
	19	49	42	37	32	25	18	27	24	21	17	12
	20	44	38	34	29	23	16	24	22	19	15	11
	21	40	34	31	26	21	15	<u>22</u>	<u>20</u>	17	14	10
	22	37	31	28	24	19	14			<u>16</u>	<u>12</u>	<u>9</u>
	23	<u>34</u>	29	25	22	17	12					
	24		<u>26</u>	<u>23</u>	20	16	11					
	25			<u>18</u>	15	10						
	26						<u>10</u>					
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	38											
	39											
	40											
PROPERTIES												
Area, in. ²	6.02	4.78	4.10	3.37	2.58	1.77	4.09	3.52	2.91	2.24	1.54	
I, in. ⁴	11.9	10.3	9.14	7.80	6.21	4.40	6.48	5.84	5.04	4.05	2.90	
r, in.	1.41	1.46	1.49	1.52	1.55	1.58	1.26	1.29	1.32	1.35	1.37	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



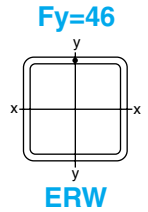
Nominal Size		3 x 3					2 1/2 x 2 1/2				2 1/4 x 2 1/4		
Wall Thickness	3/8	5/16	1/4	3/16	1/8	5/16	1/4	3/16	1/8	1/4	3/16	1/8	
Weight Per Foot	12.17	10.58	8.81	6.87	4.75	8.45	7.11	5.59	3.90	6.26	4.96	3.48	
Design Wall Thickness	0.349	0.291	0.233	0.174	0.116	0.291	0.233	0.174	0.116	0.233	0.174	0.116	
F_y = 46 ksi													
Effective length KL in feet	0	133	115	95	74	51	92	77	60	42	68	54	38
	2	128	111	92	72	49	87	73	58	40	64	51	36
	3	122	107	89	69	48	82	69	55	38	59	47	33
	4	115	101	84	66	45	75	64	50	35	54	43	30
	5	106	93	78	61	43	67	57	46	32	47	38	27
	6	97	85	72	57	39	59	50	40	29	40	32	24
	7	86	77	65	51	36	50	43	35	25	33	27	20
	8	76	68	58	46	32	41	36	30	22	26	22	16
	9	65	59	50	40	29	33	30	25	18	21	17	13
	10	55	50	43	35	25	27	24	20	15	17	14	11
	11	46	42	37	30	22	22	20	17	12	14	12	9
	12	38	35	31	25	18	19	17	14	10	12	10	7
	13	33	30	26	22	16	16	14	12	9	10	8	6
	14	28	26	23	19	13	14	12	10	8	8	8	5
	15	25	23	20	16	12	11	11	9	7	7	7	5
	16	22	20	17	14	10	10	10	8	6	6	6	5
	17	19	18	15	13	9	9	9	7	6	6	6	5
	18	16	16	14	11	8	8	8	6	5	5	5	4
	19	14	14	12	10	7	7	7	5	4	4	4	3
	20	12	12	10	8	6	6	6	4	3	3	3	2
	21	10	10	8	6	5	5	5	3	2	2	2	1
	22	8	8	6	5	4	4	4	2	1	1	1	1
	23	7	7	5	4	3	3	3	1	1	1	1	1
	24	6	6	4	3	2	2	2	1	1	1	1	1
	25	5	5	3	2	1	1	1	1	1	1	1	1
	26	4	4	2	1	1	1	1	1	1	1	1	1
	27	3	3	1	1	1	1	1	1	1	1	1	1
	28	2	2	1	1	1	1	1	1	1	1	1	1
	29	1	1	1	1	1	1	1	1	1	1	1	1
	30	1	1	1	1	1	1	1	1	1	1	1	1
	31	1	1	1	1	1	1	1	1	1	1	1	1
	32	1	1	1	1	1	1	1	1	1	1	1	1
	33	1	1	1	1	1	1	1	1	1	1	1	1
	34	1	1	1	1	1	1	1	1	1	1	1	1
	35	1	1	1	1	1	1	1	1	1	1	1	1
	36	1	1	1	1	1	1	1	1	1	1	1	1
	37	1	1	1	1	1	1	1	1	1	1	1	1
	38	1	1	1	1	1	1	1	1	1	1	1	1
	39	1	1	1	1	1	1	1	1	1	1	1	1
	40	1	1	1	1	1	1	1	1	1	1	1	1
PROPERTIES													
Area, in. ²	3.39	2.94	2.44	1.89	1.30	2.35	1.97	1.54	1.07	1.74	1.37	0.96	
I, in. ⁴	3.77	3.45	3.02	2.46	1.78	1.82	1.63	1.35	0.998	1.13	0.952	0.712	
r, in.	1.05	1.08	1.11	1.14	1.17	0.879	0.908	0.937	0.965	0.805	0.835	0.863	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)

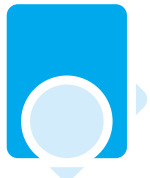


Nominal Size	2 x 2			1 3/4 x 1 3/4	1 5/8 x 1 5/8		1 1/2 x 1 1/2		1 1/4 x 1 1/4	
Wall Thickness	1/4	3/16	1/8	3/16	3/16	1/8	3/16	1/8	3/16	1/8
Weight Per Foot	5.41	4.32	3.05	3.68	3.36	2.42	3.04	2.20	2.40	1.78
Design Wall Thickness	0.233	0.174	0.116	0.174	0.174	0.116	0.174	0.116	0.174	0.116

		$F_y = 46$ ksi									
Effective length KL in feet	0	59	47	33	40	36	26	33	24	26	19
	2	55	43	31	36	32	24	29	21	21	16
	3	49	40	28	32	28	21	24	18	16	13
	4	43	35	25	27	23	17	19	14	11	9
	5	36	30	22	22	18	14	14	11	7	6
	6	29	24	18	17	13	10	10	8	5	4
	7	23	19	14	12	9	7	7	6	4	3
	8	17	15	11	9	7	6	5	4	<u>4</u>	<u>3</u>
	9	14	12	9	7	6	5	<u>5</u>	<u>3</u>		
	10	11	9	7	<u>6</u>		<u>4</u>				
	11	<u>9</u>	8	6							
	12		<u>7</u>	<u>5</u>							
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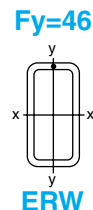
PROPERTIES										
Area, in. ²	1.51	1.19	0.84	1.02	0.93	0.67	0.84	0.61	0.67	0.49
I, in. ⁴	0.745	0.640	0.486	0.405	0.312	0.246	0.235	0.188	0.121	0.101
r, in.	0.703	0.732	0.761	0.630	0.579	0.608	0.528	0.556	0.425	0.454

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

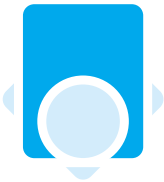
Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		20 x 12			20 x 8			20 x 4			
Wall Thickness		1/2	3/8	5/16	5/8	1/2	3/8	5/16	1/2	3/8	5/16
Weight Per Foot		103.30	78.52	65.87	110.30	89.68	68.31	57.36	76.07	58.10	48.86
Design Wall Thickness		0.465*	0.349*	0.291*	0.581	0.465*	0.349*	0.291*	0.465*	0.349*	0.291*
F_y = 46 ksi											
Effective length KL in feet	0	1090	744	586	1180	942	637	495	798	534	409
	2	1090	743	585	1180	940	636	494	790	530	406
	3	1080	742	585	1180	937	634	493	779	524	403
	4	1080	741	584	1170	932	631	491	765	516	397
	5	1080	739	582	1160	927	628	489	746	506	390
	6	1070	737	581	1150	920	624	486	722	494	382
	7	1070	734	579	1140	912	619	483	691	480	372
	8	1060	731	576	1120	902	614	479	656	463	361
	9	1060	727	574	1100	892	608	475	619	445	348
	10	1050	723	571	1090	880	601	470	580	425	335
	11	1050	719	568	1070	867	594	465	539	403	320
	12	1040	714	565	1050	852	586	459	499	380	304
	13	1030	709	561	1020	834	577	453	458	355	286
	14	1020	704	557	999	815	568	446	417	329	268
	15	1010	698	553	974	796	558	439	378	302	249
	16	1000	692	548	949	775	547	432	339	273	229
	17	989	685	543	922	754	536	424	302	246	209
	18	975	679	538	894	732	524	416	270	219	188
	19	962	671	533	866	710	512	407	242	197	168
	20	947	664	527	837	687	499	398	219	177	152
	21	932	656	522	808	663	486	388	198	161	138
	22	917	647	516	778	640	473	379	181	147	126
	23	901	639	509	748	616	458	369	165	134	115
	24	884	630	503	718	592	444	358	152	123	106
	25	868	621	496	689	568	429	347	140	114	97
	26	851	611	489	659	544	414	336	129	105	90
	27	833	601	482	629	520	398	325	120	97	83
	28	816	591	474	600	497	383	314	111	91	78
	29	798	581	467	571	473	366	302	102	85	72
	30	780	570	459	542	450	350	290	94	79	67
	31	761	560	451	514	428	333	278	86	73	62
	32	743	549	443	487	406	316	266	78	68	57
	33	724	537	435	460	384	300	254	71	63	52
	34	706	526	426	433	362	284	241	64	58	47
	35	687	514	418	409	342	268	229	57	53	42
	36	668	502	409	386	323	253	216	50	48	37
	37	650	490	400	366	306	240	205	43	43	32
	38	631	478	391	347	290	227	194	36	38	27
	39	612	466	382	329	275	216	184	29	33	22
	40	594	453	372	313	262	205	175	22	28	17
PROPERTIES											
Area, In. ²	28.3	21.5	18.1	30.3	24.6	18.7	15.7	20.9	16.0	13.4	
I _x , In. ⁴	1550	1200	1010	1440	1190	926	786	838	657	560	
I _y , In. ⁴	705	547	464	338	283	222	189	58.7	47.6	41.2	
Ratio r _x / r _y	1.48	1.48	1.48	2.06	2.05	2.04	2.04	3.78	3.72	3.69	
r _y , In.	4.99	5.04	5.07	3.34	3.39	3.44	3.47	1.68	1.73	1.75	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

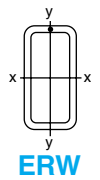
Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

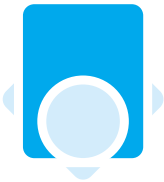
Design Axial Strength in kips ($\phi=0.85$)

F_y=46



Nominal Size		18 x 6					16 x 12			16 x 8			
Wall Thickness		5/8	1/2	3/8	5/16	1/4	1/2	3/8	5/16	5/8	1/2	3/8	5/16
Weight Per Foot		93.34	76.07	58.10	48.86	39.43	89.68	68.31	57.36	93.34	76.07	58.10	48.86
Design Wall Thickness		0.581	0.465*	0.349*	0.291*	0.233*	0.465	0.349*	0.291*	0.581	0.465	0.349*	0.291*
F_y = 46 ksi													
Effective length KL in feet	0	1000	817	567	439	320	962	704	556	1000	817	599	468
	2	999	812	565	437	319	960	703	556	1000	814	598	467
	3	991	806	562	435	318	958	702	555	997	811	596	465
	4	980	798	558	432	316	956	700	554	990	806	593	463
	5	966	787	553	428	314	952	698	552	982	799	589	461
	6	949	774	546	424	311	948	696	550	973	792	585	458
	7	930	759	538	419	307	943	693	548	961	783	580	454
	8	909	742	530	413	303	937	690	546	948	772	574	450
	9	885	723	520	406	299	930	686	543	934	761	567	445
	10	858	702	509	398	294	923	681	540	918	748	560	440
	11	831	680	497	390	289	915	677	536	901	735	552	434
	12	801	657	484	381	283	907	671	532	882	720	543	428
	13	770	633	471	371	277	897	666	528	862	704	533	421
	14	738	607	456	361	270	888	660	524	841	688	523	414
	15	705	581	440	350	263	877	653	519	820	671	512	406
	16	671	555	424	339	255	866	647	514	797	653	501	398
	17	637	528	407	327	247	854	639	509	773	634	489	389
	18	603	500	389	314	239	842	632	503	749	615	475	380
	19	569	473	370	301	230	829	624	498	725	595	460	371
	20	535	446	350	288	221	816	616	491	699	575	445	361
	21	502	419	329	274	212	803	607	485	674	555	429	351
	22	469	393	309	260	203	789	598	478	648	534	414	340
	23	437	367	290	245	193	774	589	472	622	513	398	330
	24	406	342	271	230	183	759	579	464	596	493	383	319
	25	375	317	252	215	173	744	569	457	570	472	367	307
	26	346	293	233	200	162	729	557	450	545	451	351	296
	27	321	272	216	186	152	713	546	442	519	431	336	284
	28	299	253	201	173	141	697	534	434	494	410	321	272
	29	278	236	188	161	132	681	522	426	469	390	305	259
	30	260	220	175	150	123	665	509	417	445	371	290	246
	31	244	206	164	141	115	649	497	409	421	351	276	234
	32	229	194	154	132	108	632	485	400	397	332	261	222
	33	215	182	145	124	102	615	472	391	374	313	247	210
	34	203	171	137	117	96	599	460	382	352	295	233	199
	35	191	162	129	110	90	582	447	373	332	279	220	187
	36	181	153	122	104	85	565	434	363	314	263	208	177
	37	171	145	115	99	81	549	422	354	297	249	197	168
	38	162	137	109	94	77	532	409	345	282	236	186	159
	39	154	130	104	89	73	515	397	335	268	224	177	151
	40	146	124	99	85	69	499	384	325	254	213	168	143
PROPERTIES													
Area, In. ²	25.7	20.9	16.0	13.4	10.8	24.6	18.7	15.7	25.7	20.9	16.0	13.4	
I _x , In. ⁴	923	770	602	513	419	904	702	595	815	679	531	451	
I _y , In. ⁴	158	134	106	91.3	75.1	581	452	384	274	230	181	155	
Ratio r _x / r _y	2.42	2.40	2.38	2.37	2.36	1.25	1.25	1.24	1.72	1.72	1.71	1.71	
r _y , In.	2.48	2.53	2.58	2.61	2.63	4.86	4.91	4.94	3.27	3.32	3.37	3.40	

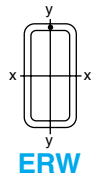
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

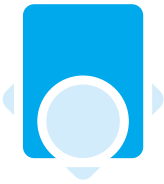
F_y=46



Nominal Size		16 x 4			14 x 10				
Wall Thickness		1/2	3/8	5/16	5/8	1/2	3/8	5/16	1/4
Weight Per Foot		62.46	47.90	40.35	93.34	76.07	58.10	48.86	39.43
Design Wall Thickness		0.465	0.349*	0.291*	0.581	0.465	0.349*	0.291*	0.233*
F_y = 46 ksi									
Effective length KL in feet	0	673	491	380	1000	817	626	496	370
	2	663	486	377	1000	815	624	495	370
	3	651	480	372	999	813	622	494	369
	4	635	471	367	995	809	620	493	368
	5	615	461	359	990	805	617	490	367
	6	592	447	350	983	800	613	488	365
	7	565	432	340	975	794	608	485	363
	8	536	415	328	966	787	603	482	361
	9	504	395	314	956	779	597	478	358
	10	471	371	300	945	770	590	474	355
	11	437	346	284	933	761	583	469	352
	12	403	320	267	920	750	576	464	349
	13	369	295	249	906	739	567	459	345
	14	335	270	230	891	727	558	453	341
	15	302	245	210	876	715	549	447	337
	16	270	221	190	859	702	539	440	332
	17	240	198	170	842	688	529	433	328
	18	214	177	152	824	674	519	426	323
	19	192	158	136	806	660	508	419	317
	20	173	143	123	787	645	496	411	312
	21	157	130	112	767	629	485	403	306
	22	143	118	102	747	613	473	394	300
	23	131	108	93	727	597	461	385	294
	24	120	99	85	707	581	448	376	288
	25	111	92	79	686	564	436	367	282
	26	103	85	73	665	547	423	356	275
	27	<u>95</u>	78	68	643	530	410	346	268
	28		<u>73</u>	<u>63</u>	622	513	397	335	261
	29				601	496	384	324	254
	30				580	479	372	313	247
	31				558	462	359	303	240
	32				537	445	346	292	233
	33				516	428	333	281	225
	34				496	411	320	271	217
	35				475	395	308	260	210
	36				455	379	295	250	202
	37				435	363	283	240	194
	38				416	347	271	230	187
	39				396	331	259	220	179
	40				377	316	248	210	171
PROPERTIES									
Area, In. ²	17.2	13.2	11.1	25.7	20.9	16.0	13.4	10.8	
I _x , In. ⁴	455	360	308	687	573	447	380	310	
I _y , In. ⁴	47.0	38.3	33.2	407	341	267	227	186	
Ratio r _x / r _y	3.11	3.07	3.05	1.30	1.30	1.29	1.29	1.29	
r _y , In.	1.65	1.71	1.73	3.98	4.04	4.09	4.12	4.14	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

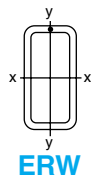
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

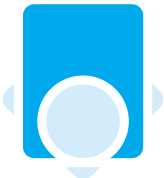
F_y=46



Nominal Size		14 x 6						14 x 4					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		76.33	62.46	47.90	40.35	32.63	24.73	67.82	55.66	42.79	36.10	29.23	22.18
Design Wall Thickness		0.581	0.465	0.349*	0.291*	0.233*	0.174*	0.581	0.465	0.349*	0.291*	0.233*	0.174*
F_y = 46 ksi													
Effective length KL in feet	0	821	673	516	407	300	201	731	598	461	362	265	175
	2	816	668	513	405	299	200	720	590	455	358	263	174
	3	809	663	509	403	297	199	706	579	448	354	260	172
	4	800	656	504	400	295	198	688	565	437	348	256	170
	5	788	647	497	396	293	196	664	547	424	340	251	167
	6	774	635	489	391	289	195	637	525	408	331	245	164
	7	758	623	479	385	286	192	606	501	391	320	238	160
	8	739	608	468	378	281	190	572	475	371	307	230	155
	9	719	592	457	370	276	187	536	447	351	294	221	150
	10	697	575	444	362	271	184	498	417	329	279	211	145
	11	673	556	430	353	265	180	460	387	306	261	201	139
	12	648	536	415	343	258	176	421	356	283	242	189	133
	13	622	515	400	333	251	172	383	325	260	223	177	126
	14	595	494	384	322	244	168	345	295	237	204	165	118
	15	568	472	367	310	236	164	309	266	215	186	152	111
	16	540	449	350	296	228	159	274	238	194	168	138	103
	17	511	427	333	282	219	154	242	211	173	150	125	95
	18	483	404	316	268	210	148	216	188	154	134	111	87
	19	454	381	299	253	201	143	194	169	138	120	100	78
	20	426	358	282	239	192	137	175	152	125	109	90	70
	21	398	336	265	225	182	131	159	138	113	99	82	64
	22	371	314	248	211	172	125	145	126	103	90	74	58
	23	345	292	232	197	162	119	132	115	94	82	68	53
	24	319	271	216	184	152	113	122	106	87	75	63	49
	25	294	251	200	171	141	107	112	98	80	70	58	45
	26	272	232	185	158	131	100	<u>104</u>	90	74	64	53	42
	27	252	215	172	147	121	94	<u>84</u>	<u>84</u>	68	60	49	39
	28	234	200	160	136	113	87	<u>64</u>	<u>64</u>	<u>64</u>	<u>55</u>	46	36
	29	218	186	149	127	105	81	<u>43</u>	<u>43</u>	<u>43</u>	<u>43</u>	<u>43</u>	<u>33</u>
	30	204	174	139	119	98	76						
	31	191	163	130	111	92	71						
	32	179	153	122	104	86	67						
	33	169	144	115	98	81	63						
	34	159	136	108	93	76	59						
	35	150	128	102	87	72	56						
	36	142	121	97	83	68	53						
	37	134	114	91	78	65	50						
	38	127	109	87	74	61	47						
	39	121	103	82	70	58	45						
	40	115	98	78	67	55	43						
PROPERTIES													
Area, In. ²	21.0	17.2	13.2	11.1	8.96	6.76	18.7	15.3	11.8	9.92	8.03	6.06	
I _x , In. ⁴	478	402	317	271	222	170	373	317	252	216	178	137	
I _y , In. ⁴	124	105	84.1	72.3	59.6	45.9	47.1	41.1	33.6	29.2	24.4	19.0	
Ratio r _x / r _y	1.96	1.96	1.94	1.94	1.93	1.92	2.81	2.78	2.74	2.72	2.70	2.69	
r _y , In.	2.43	2.48	2.53	2.55	2.58	2.61	1.59	1.64	1.69	1.72	1.74	1.77	

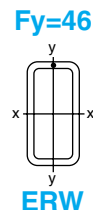
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates K/l/r limit of 200.



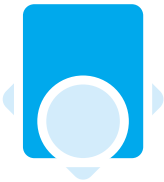
LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		12 x 10				12 x 8					
Wall Thickness		1/2	3/8	5/16	1/4	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		69.27	53.00	44.60	36.03	76.33	62.46	47.90	40.35	32.63	24.73
Design Wall Thickness		0.465	0.349	0.291*	0.233*	0.581	0.465	0.349	0.291*	0.233*	0.174*
F_y = 46 ksi											
Effective length KL in feet	0	743	571	476	358	821	673	516	433	323	218
	2	741	569	475	358	818	670	514	431	323	218
	3	739	568	473	357	814	667	512	430	322	217
	4	736	565	472	356	808	662	509	427	320	217
	5	732	562	470	355	801	657	505	424	318	216
	6	727	559	467	353	793	650	500	420	316	214
	7	721	554	463	351	783	642	494	415	313	213
	8	714	549	459	349	772	633	487	410	310	211
	9	707	544	455	347	759	623	480	404	306	209
	10	698	537	450	343	745	612	471	397	302	207
	11	689	531	444	340	730	600	463	389	298	204
	12	680	523	438	336	714	587	453	382	293	202
	13	669	516	431	332	697	574	443	373	288	199
	14	658	507	425	328	679	559	432	364	282	195
	15	647	499	417	324	660	544	421	355	276	192
	16	634	489	410	319	641	529	409	345	270	188
	17	621	480	402	314	620	513	397	335	264	184
	18	608	470	394	308	600	496	385	325	257	180
	19	594	459	385	303	579	479	372	314	250	176
	20	580	449	376	297	557	462	359	303	243	171
	21	566	438	367	291	535	444	346	292	235	167
	22	551	426	358	285	513	427	333	281	227	162
	23	536	415	348	279	492	409	320	270	219	157
	24	520	403	339	272	470	391	306	259	211	152
	25	505	392	329	265	448	374	293	248	202	147
	26	489	380	319	258	426	356	280	237	193	141
	27	474	368	309	251	405	339	267	226	185	136
	28	458	356	300	244	384	322	254	215	176	131
	29	442	344	290	237	363	305	241	204	167	125
	30	426	332	280	229	343	289	228	194	159	120
	31	410	320	270	221	323	272	216	184	151	114
	32	395	308	260	213	303	256	204	174	142	109
	33	379	296	250	205	285	241	192	163	134	103
	34	364	285	240	197	269	227	181	154	127	97
	35	349	273	231	189	254	214	171	145	119	92
	36	334	262	221	181	240	203	161	137	113	87
	37	319	250	212	174	227	192	153	130	107	82
	38	304	239	202	166	215	182	145	123	101	78
	39	290	228	193	159	204	173	137	117	96	74
	40	276	217	184	152	194	164	131	111	91	70
PROPERTIES											
Area, In. ²	19.0	14.6	12.2	9.90	21.0	17.2	13.2	11.1	8.96	6.76	
I _x , In. ⁴	395	310	264	216	396	333	262	224	184	140	
I _y , In. ⁴	298	234	200	164	210	177	140	120	98.8	75.7	
Ratio r _x / r _y	1.15	1.15	1.15	1.15	1.37	1.37	1.37	1.37	1.36	1.36	
r _y , In.	3.96	4.01	4.04	4.07	3.16	3.21	3.27	3.29	3.32	3.35	

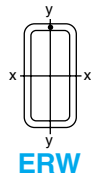
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

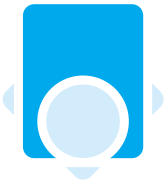
F_y=46



Nominal Size		12 x 6						12 x 4					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		67.82	55.66	42.79	36.10	29.23	22.18	59.32	48.85	37.69	31.84	25.82	19.63
Design Wall Thickness		0.581	0.465	0.349	0.291*	0.233*	0.174*	0.581	0.465	0.349	0.291*	0.233*	0.174*
F_y = 46 ksi													
Effective length KL in feet	0	731	598	461	386	288	194	641	528	407	341	252	168
	2	726	594	459	385	286	193	631	520	401	337	249	166
	3	720	590	455	382	285	192	619	511	394	332	247	165
	4	712	583	450	379	282	191	602	498	385	325	242	162
	5	701	574	444	373	280	189	581	481	373	315	237	159
	6	688	564	436	367	276	187	557	462	359	304	231	156
	7	673	552	427	360	272	184	529	441	343	291	223	152
	8	656	539	417	352	267	182	499	417	326	276	215	147
	9	637	524	407	343	262	179	466	391	307	261	206	142
	10	617	508	395	333	256	175	433	365	287	245	195	136
	11	596	491	382	323	250	171	399	338	267	228	184	129
	12	573	473	368	311	243	167	364	310	247	211	173	123
	13	549	454	354	300	236	163	330	283	226	194	160	115
	14	524	435	340	288	228	158	297	256	206	178	146	108
	15	499	415	325	275	220	154	265	230	186	161	133	100
	16	474	394	309	262	211	148	234	205	167	145	120	92
	17	448	374	294	250	202	143	207	182	149	130	108	84
	18	422	353	278	237	193	138	185	162	133	116	96	75
	19	396	332	262	224	183	132	166	145	119	104	86	67
	20	371	312	247	211	172	126	150	131	107	94	78	61
	21	346	292	232	198	162	120	136	119	97	85	71	55
	22	322	272	217	185	152	114	124	108	89	78	64	50
	23	298	253	202	173	142	107	113	99	81	71	59	46
	24	275	234	188	161	132	101	104	91	75	65	54	42
	25	253	216	173	149	123	94	96	84	69	60	50	39
	26	234	200	160	138	114	88	<u>89</u>	78	64	55	46	36
	27	217	185	149	128	105	81		<u>72</u>	<u>59</u>	51	43	33
	28	202	172	138	119	98	76				<u>48</u>	<u>40</u>	31
	29	188	160	129	111	91	71						<u>29</u>
	30	176	150	120	104	85	66						
	31	165	140	113	97	80	62						
	32	155	132	106	91	75	58						
	33	145	124	100	86	70	54						
	34	137	117	94	81	66	51						
	35	129	110	88	76	63	48						
	36	122	104	84	72	59	46						
	37	116	99	79	68	56	43						
	38	110	93	75	65	53	41						
	39	<u>104</u>	89	71	61	50	39						
	40		84	68	58	48	37						
PROPERTIES													
Area, In. ²	18.7	15.3	11.8	9.92	8.03	6.06	16.4	13.5	10.4	8.76	7.10	5.37	
I _x , In. ⁴	321	271	215	184	151	116	245	209	168	144	119	91.8	
I _y , In. ⁴	106	91.1	72.9	62.8	51.9	40.0	40.3	35.3	28.9	25.2	21.0	16.4	
Ratio r _x / r _y	1.74	1.72	1.72	1.71	1.71	1.70	2.47	2.43	2.41	2.39	2.38	2.37	
r _y , In.	2.39	2.44	2.49	2.52	2.54	2.57	1.57	1.62	1.67	1.70	1.72	1.75	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

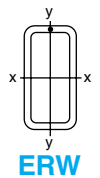
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

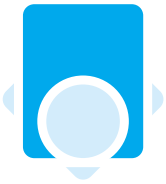
F_y=46



Nominal Size		12 x 3 1/2		12 x 3			12 x 2		10 x 8				
Wall Thickness		3/8	5/16	5/16	1/4	3/16	1/4	3/16	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		36.41	24.97	29.72	24.12	18.35	22.42	17.08	55.66	42.79	36.10	29.23	22.18
Design Wall Thickness		0.349	0.291*	0.291*	0.233*	0.174*	0.233*	0.174*	0.465	0.349	0.291	0.233*	0.174*
F_y = 46 ksi													
Effective length KL in feet	0	391	329	318	234	155	216	142	598	461	388	309	209
	2	384	325	312	230	152	208	137	596	460	386	308	208
	3	375	318	303	225	150	198	132	593	457	385	307	208
	4	364	308	290	219	146	185	125	589	454	382	305	207
	5	349	296	275	210	142	168	116	584	451	379	303	206
	6	332	282	257	200	136	148	105	577	446	375	301	204
	7	313	266	238	189	130	124	93	570	440	371	298	203
	8	292	249	218	176	122	101	79	562	434	365	294	201
	9	271	231	196	161	114	81	65	552	427	360	290	199
	10	248	213	175	145	106	65	53	542	419	353	286	196
	11	226	194	154	128	96	54	43	531	411	346	281	194
	12	203	175	135	112	87	45	37	519	402	339	275	191
	13	181	157	116	97	76	39	31	507	393	331	269	188
	14	160	139	100	83	66	33	27	493	383	323	262	185
	15	140	122	87	73	58			480	372	314	255	181
	16	123	107	76	64	51			465	362	305	248	177
	17	109	95	68	57	45			450	350	296	241	173
	18	97	85	60	50	40			435	339	287	233	169
	19	87	76	54	45	36			420	327	277	225	164
	20	79	69	49	41	32			404	315	267	218	159
	21	72	62	<u>44</u>	<u>37</u>	29			388	303	257	210	154
	22	65	57			<u>27</u>			372	291	247	201	149
	23	60	52						356	279	237	193	144
	24	<u>55</u>	<u>48</u>						340	267	226	185	139
	25								324	254	216	177	133
	26								308	242	206	169	128
	27								292	231	196	161	122
	28								277	219	186	153	117
	29								262	207	177	145	111
	30								247	196	167	138	105
	31								233	185	158	130	100
	32								218	174	149	123	94
	33								205	163	140	115	89
	34								193	154	132	109	84
	35								182	145	124	103	79
	36								172	137	118	97	75
	37								163	130	111	92	71
	38								155	123	106	87	67
	39								147	117	100	83	64
	40								140	111	95	79	60
PROPERTIES													
Area, In. ²	10.0	8.46	8.17	6.63	5.02	6.17	4.67	15.3	11.8	9.92	8.03	6.06	
I _x , In. ⁴	156	134	124	103	79.6	86.9	67.4	214	169	145	119	91.4	
I _y , In. ⁴	21.3	18.6	13.1	11.1	8.72	4.40	3.55	151	120	103	84.7	65.1	
Ratio r _x / r _y	2.71	2.68	3.08	3.05	3.02	4.44	4.36	1.19	1.19	1.19	1.19	1.18	
r _y , In.	1.46	1.48	1.27	1.29	1.32	0.845	0.872	3.14	3.19	3.22	3.25	3.28	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

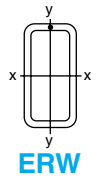
Note: Double Horizontal Line indicates KL/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

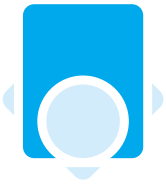
F_y=46



Nominal Size		10 x 6					10 x 5				
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	3/8	5/16	1/4	3/16
Weight Per Foot		59.32	48.85	37.69	31.84	25.82	19.63	35.13	29.72	24.12	18.35
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233*	0.174*	0.349	0.291	0.233*	0.174*
F_y = 46 ksi											
Effective length KL in feet	0	641	528	407	343	273	186	378	319	255	172
	2	637	524	404	340	271	185	375	317	253	171
	3	631	520	401	338	270	184	370	313	250	170
	4	623	514	396	334	267	182	364	308	247	168
	5	613	506	390	329	264	181	357	302	243	166
	6	602	497	384	323	260	178	348	294	238	163
	7	588	486	375	317	256	176	338	286	233	160
	8	573	474	366	309	251	173	326	276	225	156
	9	556	460	356	301	245	169	314	266	217	152
	10	537	446	346	292	237	166	300	255	208	147
	11	518	430	334	283	230	162	286	243	199	142
	12	497	413	322	273	222	157	271	231	189	137
	13	476	396	309	262	213	153	256	218	179	131
	14	453	379	296	251	204	148	241	205	169	125
	15	431	360	282	240	195	142	225	192	158	118
	16	408	342	268	228	186	137	210	179	148	112
	17	385	323	254	216	177	131	194	166	137	105
	18	361	305	240	205	167	125	179	154	127	98
	19	339	286	226	193	158	119	165	141	117	91
	20	316	268	212	181	149	113	150	129	108	84
	21	294	250	198	170	139	107	137	118	98	77
	22	272	232	185	159	130	100	124	107	90	70
	23	252	215	172	148	121	94	114	98	82	64
	24	231	198	159	137	113	87	105	90	75	59
	25	213	183	147	127	104	81	96	83	69	54
	26	197	169	136	117	96	75	89	77	64	50
	27	183	157	126	109	89	69	83	71	59	46
	28	170	146	117	101	83	64	77	66	55	43
	29	158	136	109	94	78	60	72	62	52	40
	30	148	127	102	88	72	56	67	58	48	37
	31	138	119	95	82	68	53	63	54	45	35
	32	130	112	90	77	64	49	59	51	42	33
	33	122	105	84	73	60	46	55	48	40	31
	34	115	99	79	69	56	44	52	45	37	29
	35	109	93	75	65	53	41	<u>52</u>	<u>45</u>	<u>35</u>	<u>28</u>
	36	103	88	71	61	50	39				
	37	97	83	67	58	48	37				
	38	92	79	64	55	45	35				
	39	<u>87</u>	<u>75</u>	60	52	43	33				
	40			57	49	41	32				
PROPERTIES											
Area, In. ²	16.4	13.5	10.4	8.76	7.10	5.37	9.67	8.17	6.63	5.02	
I _x , In. ⁴	201	171	137	118	96.9	74.6	120	104	85.8	66.2	
I _y , In. ⁴	89.4	76.8	61.8	53.3	44.1	34.1	40.6	35.2	29.3	22.7	
Ratio r _x / r _y	1.50	1.49	1.49	1.49	1.48	1.48	1.72	1.72	1.71	1.71	
r _y , In.	2.34	2.39	2.44	2.47	2.49	2.52	2.05	2.07	2.10	2.13	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

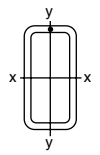
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=46

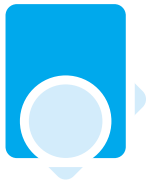


ERW

Nominal Size		10 x 4					10 x 3 1/2	10 x 3					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	3/16	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		50.81	42.05	32.58	27.59	22.42	17.08	16.44	30.03	25.46	20.72	15.80	10.71
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233*	0.174*	0.174*	0.349	0.291	0.233*	0.174*	0.116*
F_y = 46 ksi													
Effective length KL in feet	0	547	454	351	297	237	159	152	323	274	218	146	82
	2	539	447	346	293	234	157	151	315	267	214	143	81
	3	528	438	340	288	231	156	148	305	259	209	141	80
	4	513	427	331	281	227	153	145	291	248	202	137	78
	5	494	412	321	272	221	150	141	275	235	192	132	76
	6	473	395	308	262	214	146	137	256	219	180	126	73
	7	448	376	294	250	205	142	131	235	202	167	119	70
	8	421	355	279	238	195	136	125	213	184	153	111	67
	9	393	333	262	224	184	131	118	191	166	138	103	63
	10	364	309	245	210	173	125	111	169	147	123	94	59
	11	334	285	227	195	161	118	103	147	129	109	84	54
	12	304	261	209	180	149	111	94	127	112	95	74	49
	13	274	237	191	165	137	103	86	108	96	82	64	44
	14	246	214	173	150	125	95	77	93	83	71	55	39
	15	218	192	156	136	113	87	68	81	72	61	48	34
	16	192	170	139	122	102	79	59	71	63	54	42	30
	17	170	150	124	109	91	71	53	63	56	48	37	27
	18	152	134	110	97	82	63	47	56	50	43	33	24
	19	136	120	99	87	73	57	42	51	45	38	30	21
	20	123	109	89	78	66	51	38	<u>46</u>	<u>41</u>	35	27	19
	21	112	99	81	71	60	46	34			<u>31</u>	<u>25</u>	<u>17</u>
	22	102	90	74	65	55	42	31					<u>16</u>
	23	93	82	68	59	50	39	29					
	24	85	75	62	54	46	36	26					
	25	<u>79</u>	70	57	50	42	33	<u>24</u>					
	26		<u>64</u>	53	46	39	30						
	27			<u>49</u>	<u>43</u>	36	28						
	28					<u>34</u>	<u>26</u>						
	29												
	30												
	31												
	32												
	33												
	34												
	35												
	36												
	37												
	38												
	39												
	40												
PROPERTIES													
Area, In. ²	14.0	11.6	8.97	7.59	6.17	4.67	4.50	8.27	7.01	5.70	4.32	2.93	
I _x , In. ⁴	149	129	104	90.1	74.7	57.8	53.6	88.0	76.3	63.6	49.4	34.2	
I _y , In. ⁴	33.4	29.4	24.3	21.2	17.7	13.9	10.3	12.4	11.0	9.28	7.33	5.16	
Ratio r _x / r _y	2.11	2.09	2.07	2.06	2.05	2.04	2.28	2.66	2.63	2.62	2.60	2.57	
r _y , In.	1.54	1.59	1.64	1.67	1.70	1.72	1.51	1.22	1.25	1.28	1.30	1.33	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

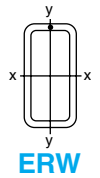
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

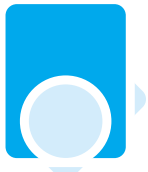
F_y=46



Nominal Size		10 x 2				9 x 7					
Wall Thickness		3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		27.48	23.34	19.02	14.53	59.32	48.85	37.69	31.84	25.82	19.63
Design Wall Thickness		0.349	0.291	0.233*	0.174*	0.581	0.465	0.349	0.291	0.233*	0.174*
F_y = 46 ksi											
Effective length KL in feet	0	296	251	200	133	641	528	407	343	278	194
	2	278	237	192	128	638	525	405	341	276	194
	3	257	220	181	123	634	522	402	339	275	193
	4	231	199	164	115	628	517	399	336	272	192
	5	200	174	145	106	620	511	394	332	269	190
	6	169	148	125	94	611	504	389	328	266	188
	7	137	122	104	82	600	495	382	323	262	186
	8	108	98	85	68	588	486	375	317	257	183
	9	86	78	67	54	575	475	367	310	252	180
	10	69	63	54	44	560	464	359	303	246	177
	11	57	52	45	36	545	451	349	295	240	174
	12	48	44	38	31	528	438	339	287	234	170
	13	41	37	32	26	511	424	329	278	227	166
	14	<u>41</u>	<u>37</u>	<u>32</u>	<u>22</u>	492	409	318	269	219	161
	15					473	394	307	260	212	157
	16					454	378	295	250	204	152
	17					434	363	283	240	196	147
	18					414	346	271	230	188	142
	19					394	330	259	220	180	136
	20					374	314	246	210	172	131
	21					354	298	234	199	163	125
	22					334	281	222	189	155	119
	23					314	265	210	179	147	113
	24					295	250	198	169	139	107
	25					276	234	186	159	131	101
	26					258	219	174	149	123	95
	27					239	204	163	140	116	89
	28					223	190	152	131	108	84
	29					208	177	142	122	101	78
	30					194	166	132	114	94	73
	31					182	155	124	107	88	68
	32					170	146	116	100	83	64
	33					160	137	109	94	78	60
	34					151	129	103	89	73	57
	35					142	122	97	84	69	54
	36					135	115	92	79	65	51
	37					127	109	87	75	62	48
	38					121	103	82	71	59	45
	39					115	98	78	67	56	43
	40					109	93	74	64	53	41
PROPERTIES											
Area, In. ²	7.58	6.43	5.24	3.98	16.4	13.5	10.4	8.76	7.10	5.37	
I _x , In. ⁴	71.7	62.6	52.5	41.0	174	149	119	102	84.1	64.7	
I _y , In. ⁴	4.69	4.24	3.67	2.97	117	100	80.4	69.2	57.2	44.1	
Ratio r _x / r _y	3.91	3.84	3.78	3.72	1.22	1.22	1.22	1.21	1.21	1.21	
r _y , In.	0.786	0.812	0.837	0.864	2.68	2.73	2.78	2.81	2.84	2.87	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

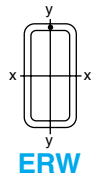
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

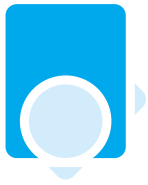
F_y=46



Nominal Size		9 x 5						9 x 3				
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		50.81	42.05	32.58	27.59	22.42	17.08	35.24	27.48	23.34	19.02	14.53
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233*	0.174*	0.465	0.349	0.291	0.233*	0.174*
F_y = 46 ksi												
Effective length KL in feet	0	547	454	351	297	241	167	381	296	251	205	141
	2	542	449	347	294	239	166	370	289	245	200	139
	3	535	443	343	291	236	165	357	279	238	194	136
	4	525	436	338	286	233	163	339	267	227	186	132
	5	513	426	331	280	228	161	318	251	215	176	126
	6	498	415	322	273	223	158	294	234	200	165	120
	7	481	401	313	265	216	154	268	214	185	153	113
	8	463	387	302	256	209	150	240	194	168	140	105
	9	442	371	290	246	201	146	213	173	151	126	97
	10	421	353	277	236	193	141	185	153	134	112	87
	11	398	335	264	225	184	136	159	133	117	99	77
	12	375	317	250	213	175	130	135	114	101	86	67
	13	351	297	236	201	165	124	115	97	87	74	58
	14	327	278	221	189	156	118	99	84	75	64	50
	15	303	259	207	177	146	111	86	73	65	56	44
	16	279	239	192	164	136	104	76	64	57	49	38
	17	256	220	178	152	126	97	67	57	51	43	34
	18	234	202	164	141	117	90	60	51	45	39	30
	19	212	184	150	129	108	83	54	46	41	35	27
	20	191	167	137	118	99	76	<u>54</u>	<u>41</u>	<u>37</u>	31	25
	21	173	151	124	107	90	69				<u>28</u>	<u>22</u>
	22	158	138	113	98	82	63					
	23	145	126	104	89	75	58					
	24	133	116	95	82	69	53					
	25	122	107	88	76	63	49					
	26	113	99	81	70	59	45					
	27	105	91	75	65	54	42					
	28	98	85	70	60	50	39					
	29	91	79	65	56	47	36					
	30	85	74	61	53	44	34					
	31	80	69	57	49	41	32					
	32	<u>75</u>	<u>65</u>	53	46	39	30					
	33			<u>50</u>	43	36	28					
	34				<u>41</u>	<u>34</u>	26					
	35					<u>25</u>	25					
	36											
	37											
	38											
	39											
	40											
PROPERTIES												
Area, In. ²	14.0	11.6	8.97	7.59	6.17	4.67	9.74	7.58	6.43	5.24	3.98	
I _x , In. ⁴	133	115	92.5	79.8	66.1	51.1	80.8	66.3	57.7	48.2	37.6	
I _y , In. ⁴	51.9	45.2	36.8	32.0	26.6	20.7	13.2	11.2	9.88	8.38	6.63	
Ratio I _x / I _y	1.60	1.60	1.59	1.58	1.58	1.57	2.47	2.43	2.42	2.40	2.38	
r _y , In.	1.92	1.97	2.03	2.05	2.08	2.10	1.16	1.21	1.24	1.27	1.29	

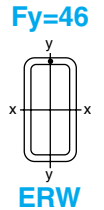
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

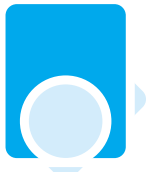
Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		8 x 6						8 x 4						
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		50.81	42.05	32.58	27.59	22.42	17.08	42.30	35.24	27.48	23.34	19.02	14.53	9.86
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174*	0.581	0.465	0.349	0.291	0.233	0.174*	0.116*
F_y = 46 ksi														
Effective length KL in feet	0	547	454	351	297	241	176	457	381	296	251	205	149	86
	2	543	450	348	295	240	175	450	375	292	248	202	147	86
	3	538	446	345	292	238	174	440	367	287	243	199	145	85
	4	531	441	341	289	235	172	427	357	279	237	194	143	83
	5	522	434	336	285	232	170	411	345	270	230	188	139	82
	6	512	425	330	279	227	168	393	330	259	220	181	135	80
	7	499	415	323	273	223	165	371	313	247	210	172	130	77
	8	485	404	314	266	217	161	349	295	233	199	164	125	75
	9	470	392	305	259	211	158	324	276	219	187	154	118	72
	10	454	379	296	251	205	154	299	256	204	175	144	111	68
	11	436	365	285	242	198	149	274	235	189	162	134	103	65
	12	418	350	274	233	190	145	248	215	173	149	124	95	61
	13	398	335	263	223	183	139	223	194	158	136	113	88	57
	14	379	319	251	213	175	133	199	175	142	123	103	80	53
	15	359	303	239	203	167	127	176	156	128	111	93	73	49
	16	338	286	226	193	159	121	154	137	114	99	83	65	45
	17	318	270	214	183	150	115	137	122	101	88	74	58	40
	18	298	253	202	172	142	109	122	108	90	78	66	52	36
	19	278	237	189	162	133	102	109	97	81	70	59	47	32
	20	258	221	177	151	125	96	99	88	73	63	53	42	29
	21	239	205	165	141	117	90	90	80	66	57	49	38	27
	22	220	190	153	132	109	84	82	73	60	52	44	35	24
	23	202	175	142	122	101	78	75	66	55	48	40	32	22
	24	186	161	131	112	94	73	69	61	51	44	37	29	20
	25	171	148	120	104	86	67	63	56	47	41	34	27	19
	26	158	137	111	96	80	62		52	43	37	32	25	17
	27	147	127	103	89	74	57				35	29	23	16
	28	136	118	96	83	69	53						21	15
	29	127	110	90	77	64	50							
	30	119	103	84	72	60	47							
	31	111	96	78	67	56	44							
	32	104	90	74	63	53	41							
	33	98	85	69	59	50	38							
	34	92	80	65	56	47	36							
	35	87	76	61	53	44	34							
	36	82	71	58	50	42	32							
	37	78	68	55	47	39	31							
	38		64	52	45	37	29							
	39			49	43	35	28							
	40			40	40	34	26							
PROPERTIES														
Area, In. ²	14.0	11.6	8.97	7.59	6.17	4.67	11.7	9.74	7.58	6.43	5.24	3.98	2.70	
I _x , In. ⁴	114	98.2	79.1	68.3	56.6	43.7	81.9	71.7	58.7	51.0	42.5	33.1	22.9	
I _y , In. ⁴	72.2	62.5	50.6	43.8	36.4	28.2	26.6	23.6	19.6	17.2	14.4	11.3	7.90	
Ratio r _x / r _y	1.26	1.25	1.25	1.25	1.25	1.24	1.75	1.74	1.73	1.72	1.72	1.71	1.70	
r _y , In.	2.27	2.32	2.38	2.40	2.43	2.46	1.51	1.56	1.61	1.63	1.66	1.69	1.71	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

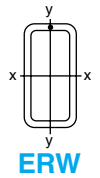
Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=46



Nominal Size		8 x 3						8 x 2					
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8	
Weight Per Foot		31.84	24.93	21.21	17.32	13.25	9.01	22.37	19.08	15.62	11.97	8.16	
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174*	0.116*	0.349	0.291	0.233	0.174*	0.116*	
F_y = 46 ksi													
Effective length KL in feet	0	344	269	229	187	135	77	242	206	168	122	69	
	2	335	262	223	182	133	76	227	194	159	117	67	
	3	322	253	216	176	130	75	209	180	148	111	64	
	4	306	242	206	169	126	73	187	162	134	103	60	
	5	287	227	195	160	120	70	162	141	118	92	56	
	6	265	211	182	149	114	68	135	119	101	79	51	
	7	241	193	167	138	106	64	110	98	84	67	45	
	8	216	175	152	125	97	60	86	78	68	55	38	
	9	190	156	136	113	88	56	68	62	54	44	32	
	10	166	137	121	100	79	52	55	50	44	35	26	
	11	142	119	105	88	69	47	46	41	36	29	21	
	12	120	102	91	76	61	42	<u>38</u>	35	30	25	18	
	13	102	87	78	65	52	37	<u>30</u>	<u>30</u>	<u>26</u>	21	15	
	14	88	75	67	56	45	32	<u>32</u>	<u>30</u>	<u>26</u>	18	13	
	15	77	65	58	49	39	28	<u>32</u>	<u>30</u>	<u>26</u>	18	13	
	16	67	57	51	43	34	24	<u>32</u>	<u>30</u>	<u>26</u>	18	13	
	17	60	51	45	38	30	22	<u>32</u>	<u>30</u>	<u>26</u>	18	13	
	18	53	45	40	34	27	19	<u>32</u>	<u>30</u>	<u>26</u>	18	13	
	19	<u>48</u>	41	36	31	24	17	<u>32</u>	<u>30</u>	<u>26</u>	18	13	
	20	<u>48</u>	<u>37</u>	<u>33</u>	<u>28</u>	22	16	<u>32</u>	<u>30</u>	<u>26</u>	18	13	
	21					<u>20</u>	<u>14</u>						
	22					<u>20</u>	<u>14</u>						
	23					<u>20</u>	<u>14</u>						
	24					<u>20</u>	<u>14</u>						
	25					<u>20</u>	<u>14</u>						
	26					<u>20</u>	<u>14</u>						
	27					<u>20</u>	<u>14</u>						
	28					<u>20</u>	<u>14</u>						
	29					<u>20</u>	<u>14</u>						
	30					<u>20</u>	<u>14</u>						
	31					<u>20</u>	<u>14</u>						
	32					<u>20</u>	<u>14</u>						
	33					<u>20</u>	<u>14</u>						
	34					<u>20</u>	<u>14</u>						
	35					<u>20</u>	<u>14</u>						
	36					<u>20</u>	<u>14</u>						
	37					<u>20</u>	<u>14</u>						
	38					<u>20</u>	<u>14</u>						
	39					<u>20</u>	<u>14</u>						
	40					<u>20</u>	<u>14</u>						
PROPERTIES													
Area, In. ²	8.81	6.88	5.85	4.77	3.63	2.46	6.18	5.26	4.30	3.28	2.23		
I _x , In. ⁴	58.5	48.5	42.4	35.5	27.8	19.3	38.2	33.7	28.5	22.4	15.7		
I _y , In. ⁴	11.7	9.94	8.81	7.49	5.94	4.20	3.72	3.38	2.94	2.39	1.72		
Ratio r _x / r _y	2.24	2.21	2.19	2.18	2.16	2.14	3.20	3.16	3.11	3.06	3.02		
r _y , In.	1.15	1.20	1.23	1.25	1.28	1.31	0.776	0.801	0.827	0.853	0.879		

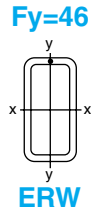
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

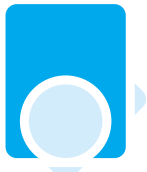
Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		7 x 5						7 x 4						
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		42.30	35.24	27.48	23.34	19.02	14.53	9.86	31.84	24.93	21.21	17.32	13.25	9.01
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174*	0.116*	0.465	0.349	0.291	0.233	0.174*	0.116*
F_y = 46 ksi														
Effective length KL in feet	0	457	381	296	251	205	156	93	344	269	229	187	142	83
	2	452	377	293	249	203	154	92	339	265	225	184	140	83
	3	446	372	290	246	201	152	91	332	260	221	181	137	82
	4	437	365	285	242	197	150	90	322	253	215	176	134	80
	5	427	356	278	236	193	147	89	311	244	208	170	130	78
	6	414	346	271	230	188	143	87	297	234	200	164	125	76
	7	399	334	262	223	182	139	85	281	222	190	156	119	74
	8	382	321	252	215	176	134	83	264	210	180	148	113	71
	9	365	307	242	206	169	129	81	246	196	169	139	106	68
	10	346	292	230	197	162	124	78	228	182	157	130	100	65
	11	326	276	218	187	154	118	75	209	168	146	121	93	61
	12	306	260	206	177	146	112	72	190	154	134	111	85	57
	13	285	243	194	166	137	105	69	171	140	122	101	78	53
	14	264	226	181	156	129	99	65	153	126	110	92	71	49
	15	244	210	168	145	120	93	62	136	112	99	83	64	45
	16	223	193	155	134	112	86	58	119	99	88	74	58	40
	17	204	177	143	124	103	80	54	106	88	78	66	51	36
	18	185	161	131	114	95	74	51	94	79	69	59	46	32
	19	166	146	119	104	87	68	47	85	70	62	53	41	29
	20	150	132	108	94	79	62	43	76	64	56	48	37	26
	21	136	119	98	86	72	56	39	69	58	51	43	34	24
	22	124	109	89	78	65	51	35	63	53	46	39	31	22
	23	113	100	82	71	60	47	32	58	48	42	36	28	20
	24	104	91	75	66	55	43	30	53	44	39	33	26	18
	25	96	84	69	60	51	40	27	<u>49</u>	41	36	30	24	17
	26	89	78	64	56	47	37	25		<u>38</u>	<u>33</u>	28	22	15
	27	82	72	59	52	43	34	24				<u>26</u>	<u>20</u>	14
	28	76	67	55	48	40	32	22						<u>13</u>
	29	71	63	51	45	38	29	20						
	30	67	58	48	42	35	28	19						
	31	<u>62</u>	<u>55</u>	45	39	33	26	18						
	32			<u>42</u>	37	31	24	17						
	33				<u>35</u>	<u>29</u>	23	16						
	34					<u>21</u>	<u>15</u>							
	35													
	36													
	37													
	38													
	39													
	40													
PROPERTIES														
Area, In. ²	11.7	9.74	7.58	6.43	5.24	3.98	2.70	8.81	6.88	5.85	4.77	3.63	2.46	
I _x , In. ⁴	69.3	60.6	49.5	43.0	35.8	27.9	19.3	50.6	41.8	36.4	30.5	23.8	16.6	
I _y , In. ⁴	40.5	35.6	29.2	25.5	21.3	16.6	11.6	20.7	17.3	15.2	12.8	10.0	7.03	
Ratio r _x / r _y	1.31	1.30	1.30	1.30	1.30	1.30	1.29	1.56	1.55	1.55	1.54	1.54	1.54	
r _y , In.	1.86	1.91	1.96	1.99	2.02	2.05	2.07	1.53	1.58	1.61	1.64	1.66	1.69	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

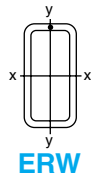
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=46



Nominal Size		7 x 3					6 x 5				
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16
Weight Per Foot		28.43	22.37	19.08	15.62	11.97	8.16	24.93	21.21	17.32	13.25
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174*	0.116*	0.349	0.291	0.233	0.174
F_y = 46 ksi											
Effective length KL in feet	0	308	242	206	168	128	75	269	229	187	142
	2	299	235	200	164	125	73	266	226	185	141
	3	288	227	194	159	121	72	263	224	182	139
	4	273	217	185	152	116	70	258	220	179	137
	5	256	204	174	144	110	67	252	215	175	134
	6	236	189	162	134	103	64	245	209	171	130
	7	214	173	149	123	95	61	237	202	165	126
	8	191	156	135	112	87	57	227	194	159	122
	9	168	139	120	101	78	52	217	186	153	117
	10	146	122	106	90	70	48	207	177	146	112
	11	125	106	92	78	61	43	196	168	138	106
	12	105	90	79	68	53	38	184	158	131	100
	13	90	77	68	58	46	33	173	149	123	95
	14	77	66	58	50	39	28	161	139	115	89
	15	67	58	51	44	34	24	149	129	107	83
	16	59	51	45	38	30	21	137	119	99	77
	17	53	45	39	34	27	19	126	110	91	71
	18	47	40	35	30	24	17	115	100	84	65
	19	<u>42</u>	<u>36</u>	<u>32</u>	<u>27</u>	<u>21</u>	<u>15</u>	104	91	76	60
	20			<u>29</u>	<u>24</u>	<u>19</u>	<u>14</u>	94	82	69	54
	21					<u>17</u>	<u>12</u>	85	75	63	49
	22							78	68	57	45
	23							71	62	52	41
	24							65	57	48	38
	25							60	53	44	35
	26							56	49	41	32
	27							52	45	38	30
	28							48	42	35	28
	29							45	39	33	26
	30							42	37	31	24
	31							39	34	29	23
	32							<u>37</u>	<u>32</u>	<u>27</u>	<u>21</u>
	33									<u>25</u>	<u>20</u>
	34										
	35										
	36										
	37										
	38										
	39										
	40										
PROPERTIES											
Area, In. ²	7.88	6.18	5.26	4.30	3.28	2.23	6.88	5.85	4.77	3.63	
I _x , In. ⁴	40.7	34.0	29.9	25.2	19.8	13.8	33.9	29.6	24.7	19.3	
I _y , In. ⁴	10.2	8.70	7.74	6.59	5.24	3.71	25.5	22.3	18.7	14.6	
Ratio r _x / r _y	2.00	1.98	1.97	1.96	1.94	1.93	1.15	1.15	1.15	1.15	
r _y , In.	1.14	1.19	1.21	1.24	1.26	1.29	1.92	1.95	1.98	2.01	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

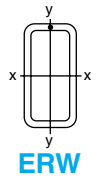
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

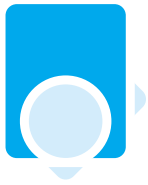
F_y=46



Nominal Size		6 x 4						6 x 3					
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		28.43	22.37	19.08	15.62	11.97	8.16	25.03	19.82	16.96	13.91	10.70	7.31
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.116*	0.465	0.349	0.291	0.233	0.174	0.116*
F_y = 46 ksi													
Effective length KL in feet	0	308	242	206	168	128	80	272	214	183	150	115	72
	2	303	238	202	166	126	80	263	208	178	146	112	70
	3	296	233	199	163	124	78	254	201	172	142	108	69
	4	288	227	193	158	121	77	240	191	164	135	104	66
	5	277	218	187	153	117	75	224	180	154	128	98	64
	6	264	209	179	147	112	73	206	166	143	119	92	60
	7	250	198	170	140	107	70	186	151	131	109	85	57
	8	234	187	160	132	102	67	166	136	118	99	77	53
	9	217	174	150	124	95	64	145	121	105	89	69	48
	10	200	161	140	116	89	60	126	106	92	78	62	43
	11	183	148	129	107	83	57	107	91	80	68	54	38
	12	166	135	118	98	76	53	90	77	68	59	47	33
	13	149	122	107	89	69	48	76	66	58	50	40	28
	14	133	110	96	81	63	44	66	57	50	43	35	24
	15	117	98	86	73	56	40	57	49	44	38	30	21
	16	103	86	76	65	50	35	50	43	38	33	26	19
	17	91	76	67	57	45	32	45	38	34	29	23	17
	18	81	68	60	51	40	28	<u>40</u>	34	30	26	21	15
	19	73	61	54	46	36	25	<u>40</u>	<u>31</u>	<u>27</u>	23	19	13
	20	66	55	49	41	32	23				<u>21</u>	<u>17</u>	12
	21	60	50	44	37	29	21						<u>11</u>
	22	54	45	40	34	27	19						
	23	50	42	37	31	24	17						
	24	46	38	34	29	22	16						
	25	<u>42</u>	<u>35</u>	31	26	21	15						
	26			<u>29</u>	<u>24</u>	19	13						
	27					<u>18</u>	<u>12</u>						
	28												
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	36												
	37												
	38												
	39												
	40												
PROPERTIES													
Area, In. ²	7.88	6.18	5.26	4.30	3.28	2.23	6.95	5.48	4.68	3.84	2.93	2.00	
I _x , In. ⁴	33.9	28.3	24.8	20.9	16.4	11.4	26.8	22.7	20.1	17.0	13.4	9.43	
I _y , In. ⁴	17.7	14.9	13.1	11.1	8.76	6.15	8.65	7.47	6.66	5.70	4.55	3.23	
Ratio r _x / r _y	1.38	1.38	1.38	1.37	1.37	1.36	1.76	1.74	1.74	1.73	1.72	1.71	
r _y , In.	1.50	1.55	1.58	1.61	1.63	1.66	1.12	1.17	1.19	1.22	1.25	1.27	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

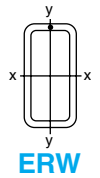
Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

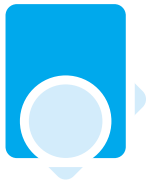
F_y=46



Nominal Size		6 x 2					5 x 4				
Wall Thickness		3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		17.27	14.83	12.21	9.42	6.46	25.03	19.82	16.96	13.91	10.70
Design Wall Thickness		0.349	0.291	0.233	0.174	0.116*	0.465	0.349	0.291	0.233	0.174
F_y = 46 ksi											
Effective length KL in feet	0	187	160	132	101	63	272	214	183	150	115
	2	175	151	124	95	60	267	211	180	148	113
	3	161	139	115	89	57	261	206	176	145	111
	4	143	125	104	81	54	253	200	171	141	108
	5	123	108	91	71	49	243	193	165	136	104
	6	102	91	77	61	43	231	184	158	130	100
	7	82	74	64	51	36	217	174	150	124	95
	8	64	58	51	41	30	203	164	141	117	90
	9	50	46	40	33	24	188	153	131	109	84
	10	41	37	33	27	19	173	141	122	101	78
	11	34	31	27	22	16	157	129	112	93	72
	12	<u>28</u>	26	23	19	14	141	117	102	85	66
	13		<u>22</u>	<u>19</u>	<u>16</u>	<u>12</u>	126	105	92	77	60
	14					<u>10</u>	112	94	82	70	55
	15						98	83	73	62	49
	16						86	73	64	55	43
	17						76	65	57	49	38
	18						68	58	51	43	34
	19						61	52	46	39	31
	20						55	47	41	35	28
	21						50	43	37	32	25
	22						45	39	34	29	23
	23						41	35	31	27	21
	24						<u>38</u>	33	29	24	19
	25							<u>30</u>	<u>26</u>	22	18
	26									<u>21</u>	<u>16</u>
	27										
	28										
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	36										
	37										
	38										
	39										
	40										
PROPERTIES											
Area, In. ²	4.78	4.10	3.37	2.58	1.77	6.95	5.48	4.68	3.84	2.93	
I _x , In. ⁴	17.1	15.3	13.1	10.5	7.42	21.2	17.9	15.8	13.4	10.6	
I _y , In. ⁴	2.75	2.52	2.21	1.80	1.31	14.8	12.6	11.1	9.46	7.48	
Ratio r _x / r _y	2.49	2.46	2.43	2.42	2.38	1.20	1.19	1.19	1.19	1.19	
r _y , In.	0.759	0.784	0.809	0.835	0.861	1.46	1.52	1.54	1.57	1.60	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

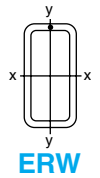
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

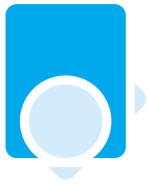
F_y=46



Nominal Size		5 x 3					5 x 2 1/2			
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	1/4	3/16	1/8
Weight Per Foot		21.63	17.27	14.83	12.21	9.42	6.46	11.36	8.78	6.03
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.116*	0.233	0.174	0.116*
F_y = 46 ksi										
Effective length KL in feet	0	235	187	160	132	101	68	123	94	63
	2	228	181	156	128	98	67	118	91	61
	3	219	175	150	124	95	65	112	87	59
	4	207	166	143	118	91	63	105	81	56
	5	192	155	134	111	86	59	96	75	52
	6	176	143	124	103	80	55	87	67	47
	7	158	130	113	94	73	51	76	60	42
	8	140	116	102	85	67	47	66	52	37
	9	122	102	90	76	60	42	56	44	32
	10	104	89	79	66	53	37	46	37	27
	11	88	76	68	58	46	33	38	31	22
	12	74	64	58	49	40	28	32	26	19
	13	63	54	49	42	34	24	27	22	16
	14	54	47	42	36	29	21	24	19	14
	15	47	41	37	31	25	18	21	17	12
	16	41	36	32	28	22	16	<u>18</u>	15	11
	17	37	32	29	24	20	14		<u>13</u>	9
	18	<u>33</u>	28	26	22	18	13			<u>9</u>
	19		<u>25</u>	<u>23</u>	<u>20</u>	16	11			
	20					<u>14</u>	<u>10</u>			
	21									
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PROPERTIES										
Area, In. ²		6.02	4.78	4.10	3.37	2.58	1.77	3.14	2.41	1.65
I _x , In. ⁴		16.4	14.1	12.6	10.7	8.53	6.03	9.40	7.51	5.34
I _y , In. ⁴		7.14	6.23	5.59	4.81	3.85	2.75	3.13	2.53	1.82
Ratio r _x / r _y		1.52	1.50	1.50	1.49	1.49	1.48	1.73	1.72	1.71
r _y , In.		1.09	1.14	1.17	1.19	1.22	1.25	0.998	1.02	1.05

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

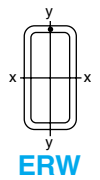
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

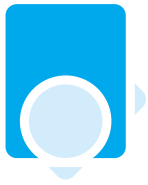
F_y=46



Nominal Size		5 x 2					4 x 3					4 x 2 1/2		
Wall Thickness		3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8	5/16	1/4	3/16
Weight Per Foot		14.72	12.70	10.51	8.15	5.61	14.72	12.70	10.51	8.15	5.61	11.64	9.66	7.51
Design Wall Thickness		0.349	0.291	0.233	0.174	0.116*	0.349	0.291	0.233	0.174	0.116	0.291	0.233	0.174
F_y = 46 ksi														
Effective length KL in feet	0	160	138	114	88	59	160	138	114	88	60	126	104	81
	2	149	129	107	83	56	155	134	111	85	59	121	100	77
	3	137	119	99	77	53	149	129	107	82	57	115	95	74
	4	121	106	89	70	49	141	122	101	79	54	106	89	69
	5	103	92	78	61	43	131	114	95	74	51	96	81	63
	6	85	77	66	52	37	120	105	88	68	47	86	72	57
	7	68	62	54	43	31	109	95	80	63	44	74	63	50
	8	53	48	43	35	25	97	85	72	57	39	63	54	43
	9	42	38	34	28	20	85	74	64	50	35	53	46	37
	10	34	31	27	22	16	73	64	55	44	31	43	37	30
	11	28	26	23	19	14	62	55	48	38	27	35	31	25
	12	<u>23</u>	<u>22</u>	19	16	11	52	46	40	33	23	30	26	21
	13			<u>16</u>	<u>13</u>	10	44	39	34	28	20	25	22	18
	14					<u>8</u>	38	34	30	24	17	22	19	16
	15						33	30	26	21	15	<u>19</u>	17	14
	16						29	26	23	18	13		<u>15</u>	<u>12</u>
	17						26	23	20	16	12			
	18						<u>23</u>	<u>21</u>	18	15	10			
	19								<u>16</u>	<u>13</u>	9			
	20										<u>8</u>			
	21													
	22													
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	37													
	38													
	39													
	40													
PROPERTIES														
Area, In. ²	4.09	3.52	2.91	2.24	1.54	4.09	3.52	2.91	2.24	1.54	3.23	2.67	2.06	
I _x , In. ⁴	10.3	9.34	8.08	6.50	4.65	7.92	7.13	6.15	4.93	3.52	6.13	5.32	4.30	
I _y , In. ⁴	2.27	2.09	1.84	1.51	1.10	5.00	4.52	3.91	3.16	2.27	2.89	2.53	2.06	
Ratio r _x / r _y	2.13	2.11	2.10	2.07	2.06	1.26	1.26	1.25	1.25	1.25	1.46	1.45	1.44	
r _y , In.	0.746	0.771	0.796	0.822	0.848	1.11	1.13	1.16	1.19	1.21	0.946	0.973	0.999	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

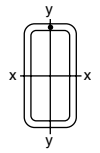
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

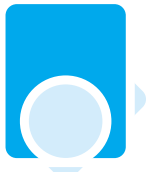
F_y=46



ERW

Nominal Size		4 x 2					3 1/2 x 2 1/2				
Wall Thickness		3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		12.17	10.58	8.81	6.87	4.75	12.17	10.58	8.81	6.87	4.75
Design Wall Thickness		0.349	0.291	0.233	0.174	0.116	0.349	0.291	0.233	0.174	0.116
F_y = 46 ksi											
Effective length KL in feet	0	133	115	95	74	51	133	115	95	74	51
	2	123	107	89	70	48	126	110	91	71	49
	3	112	99	83	65	45	119	104	87	68	47
	4	99	87	74	58	41	110	96	81	63	44
	5	84	75	64	51	36	98	87	73	58	40
	6	69	62	54	43	31	86	77	65	52	36
	7	54	50	44	35	26	74	66	57	45	32
	8	41	38	34	28	21	62	56	48	39	28
	9	33	30	27	22	16	50	46	40	33	24
	10	27	25	22	18	13	41	38	33	27	20
	11	22	20	18	15	11	34	31	27	22	16
	12	<u>18</u>	<u>17</u>	<u>15</u>	13	9	28	26	23	19	14
	13			<u>11</u>	<u>11</u>	<u>8</u>	24	22	20	16	12
	14						21	19	17	14	10
	15						<u>18</u>	<u>17</u>	<u>15</u>	12	9
	16									<u>11</u>	<u>8</u>
	17										
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	40										
PROPERTIES											
Area, In. ²	3.39	2.94	2.44	1.89	1.30	3.39	2.94	2.44	1.89	1.30	
I _x , In. ⁴	5.59	5.12	4.49	3.66	2.65	4.74	4.34	3.79	3.09	2.23	
I _y , In. ⁴	1.79	1.66	1.48	1.22	0.898	2.75	2.53	2.23	1.82	1.33	
Ratio r _x / r _y	1.77	1.76	1.74	1.73	1.72	1.31	1.31	1.30	1.30	1.29	
r _y , In.	0.727	0.752	0.778	0.804	0.830	0.902	0.929	0.956	0.983	1.01	

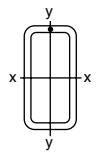
Note: Double Horizontal Line indicates KL/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

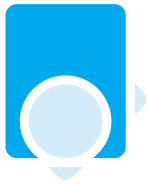
F_y=46



ERW

Nominal Size		3 x 2 1/2				3 x 2				3 x 1 1/2		
Wall Thickness	5/16	1/4	3/16	1/8	5/16	1/4	3/16	1/8	1/4	3/16	1/8	
Weight Per Foot	9.51	7.96	6.23	4.33	8.45	7.11	5.59	3.90	6.26	4.96	3.48	
Design Wall Thickness	0.291	0.233	0.174	0.116	0.291	0.233	0.174	0.116	0.233	0.174	0.116	
F_y = 46 ksi												
Effective length K _L in feet	0	103	86	67	47	92	77	60	42	68	54	38
	2	98	83	64	45	85	72	56	39	60	48	34
	3	93	78	61	43	78	66	52	37	51	41	30
	4	85	72	57	40	68	58	47	33	41	34	25
	5	77	66	51	36	58	50	40	29	31	26	20
	6	68	58	46	33	47	41	34	24	22	19	15
	7	58	50	40	29	37	33	27	20	16	14	11
	8	49	43	34	25	29	26	22	16	13	11	8
	9	40	35	29	21	23	20	17	13	<u>10</u>	<u>9</u>	7
	10	32	29	23	17	18	16	14	10			<u>5</u>
	11	27	24	19	14	15	14	11	8			
	12	22	20	16	12	<u>13</u>	<u>11</u>	<u>10</u>	7			
	13	19	17	14	10				<u>6</u>			
	14	16	15	12	9							
	15	<u>14</u>	<u>13</u>	10	8							
	16			<u>9</u>	<u>7</u>							
	17											
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	36											
	37											
	38											
	39											
	40											
PROPERTIES												
Area, In. ²	2.64	2.21	1.71	1.19	2.35	1.97	1.54	1.07	1.74	1.37	0.96	
I _x , In. ⁴	2.91	2.57	2.11	1.54	2.38	2.12	1.76	1.30	1.68	1.42	1.06	
I _y , In. ⁴	2.17	1.93	1.59	1.16	1.23	1.11	0.931	0.692	0.541	0.466	0.355	
Ratio r _x /r _y	1.16	1.15	1.15	1.15	1.39	1.38	1.37	1.37	1.76	1.75	1.73	
r _y , In.	0.907	0.935	0.962	0.990	0.724	0.750	0.777	0.804	0.558	0.584	0.610	

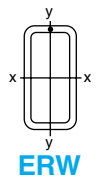
Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=46



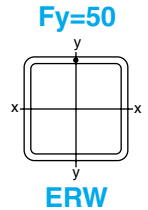
Nominal Size		3 x 1		2 1/2 x 1 1/2			2 x 1 1/2		2 x 1	
Wall Thickness	3/16	1/8	1/4	3/16	1/8	3/16	1/8	3/16	1/8	
Weight Per Foot	6.32	3.05	5.41	4.32	3.05	3.68	2.63	3.04	2.20	
Design Wall Thickness	0.174	0.116	0.233	0.174	0.116	0.174	0.116	0.174	0.116	
F_y = 46 ksi										
Effective length K _L in feet	0	47	33	59	47	33	40	28	33	24
	2	36	26	52	41	29	35	25	25	18
	3	25	19	44	36	26	30	22	17	13
	4	16	13	35	29	21	24	18	10	9
	5	10	8	26	22	17	18	14	7	5
	6	<u>7</u>	<u>6</u>	18	16	12	13	10	<u>5</u>	<u>4</u>
	7			14	12	9	9	7		
	8			10	9	7	7	6		
	9			<u>8</u>	<u>7</u>	<u>5</u>	<u>6</u>	<u>4</u>		
	10									
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PROPERTIES										
Area, In. ²	1.19	0.84	1.51	1.19	0.84	1.02	0.72	0.84	0.61	
I _x , In. ⁴	1.07	0.817	1.03	0.881	0.668	0.494	0.383	0.349	0.280	
I _y , In. ⁴	0.172	0.138	0.447	0.389	0.299	0.312	0.244	0.112	0.092	
Ratio r _x / r _y	2.49	2.43	1.52	1.50	1.49	1.26	1.25	1.77	1.74	
r _y , In.	0.380	0.405	0.544	0.571	0.597	0.553	0.580	0.364	0.389	

Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



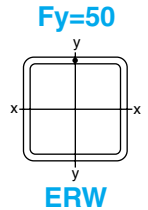
Nominal Size		16 x 16				14 x 14				12 x 12				
Wall Thickness		5/8	1/2	3/8	5/16	5/8	1/2	3/8	5/16	5/8	1/2	3/8	5/16	1/4
Weight Per Foot		127.37	103.30	78.52	65.87	110.36	89.68	68.31	57.36	93.34	76.07	58.10	48.86	39.43
Design Wall Thickness		0.581	0.465	0.349*	0.291*	0.581	0.465	0.349*	0.291*	0.581	0.465	0.349	0.291*	0.233*
F_y = 50 ksi														
Effective length KL in feet	0	1490	1200	844	643	1290	1050	786	600	1090	888	680	556	398
	2	1490	1200	843	643	1290	1040	786	600	1090	887	679	555	397
	3	1480	1200	842	642	1280	1040	785	599	1090	884	677	554	397
	4	1480	1200	841	642	1280	1040	783	598	1080	881	675	553	396
	5	1480	1190	840	641	1280	1040	781	597	1080	878	672	551	395
	6	1470	1190	838	640	1270	1030	779	595	1070	873	669	549	394
	7	1470	1190	836	638	1270	1030	776	594	1070	868	664	546	392
	8	1460	1180	834	637	1260	1020	773	592	1060	861	660	543	390
	9	1460	1180	831	635	1250	1020	770	589	1050	854	655	540	388
	10	1450	1170	828	633	1240	1010	766	587	1040	847	649	537	386
	11	1440	1160	825	631	1230	1000	762	584	1030	838	642	533	384
	12	1430	1160	822	629	1220	994	757	581	1020	829	635	528	381
	13	1420	1150	818	626	1210	986	750	577	1000	819	628	523	378
	14	1410	1140	814	623	1200	976	743	574	992	808	620	518	375
	15	1400	1130	810	620	1190	966	736	570	978	797	612	513	372
	16	1390	1120	805	617	1180	956	728	566	963	785	603	506	368
	17	1380	1110	800	614	1160	945	720	561	947	773	594	498	364
	18	1360	1100	795	610	1150	934	711	556	931	760	584	490	360
	19	1350	1090	789	607	1130	922	702	552	914	747	574	482	356
	20	1340	1080	783	603	1120	909	693	546	897	733	563	473	352
	21	1320	1070	777	599	1100	896	684	541	879	719	553	464	347
	22	1310	1060	771	594	1080	883	674	535	860	704	541	455	342
	23	1290	1050	764	590	1070	869	663	529	841	689	530	445	337
	24	1270	1030	757	585	1050	855	653	523	822	673	519	436	332
	25	1260	1020	750	580	1030	840	642	517	802	658	507	426	326
	26	1240	1010	743	575	1010	826	631	510	783	642	495	416	320
	27	1220	992	735	570	994	810	619	503	762	626	483	406	315
	28	1200	978	727	564	974	795	608	496	742	609	470	396	309
	29	1190	963	719	559	955	779	596	488	721	593	458	385	302
	30	1170	948	710	553	935	763	584	481	701	576	445	375	296
	31	1150	933	701	547	915	747	572	473	680	560	433	364	289
	32	1130	917	692	541	895	731	560	465	659	543	420	354	282
	33	1110	902	683	534	874	715	548	457	638	526	407	343	275
	34	1090	886	673	528	854	698	535	448	618	510	395	333	268
	35	1070	870	663	521	833	682	523	440	597	493	382	322	261
	36	1050	854	653	514	812	665	510	430	576	476	370	312	253
	37	1030	837	641	507	791	648	498	420	556	460	357	301	245
	38	1010	821	628	500	770	631	485	409	536	444	345	291	237
	39	987	804	616	492	750	615	473	399	516	428	332	281	228
	40	966	788	603	485	729	598	460	388	496	412	320	271	220
PROPERTIES														
Area, In. ²	35.0	28.3	21.5	18.1	30.3	24.6	18.7	15.7	25.7	20.9	16.0	13.4	10.8	
I, In. ⁴	1370	1130	873	739	896	743	577	490	548	457	357	304	248	
r, In.	6.25	6.31	6.37	6.39	5.44	5.49	5.55	5.58	4.62	4.68	4.73	4.76	4.79	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



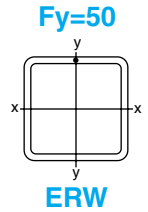
Nominal Size		10 x 10					9 x 9					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		76.33	62.46	47.90	40.35	32.63	24.73	55.66	42.79	36.10	29.23	22.18
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233*	0.174*	0.465	0.349	0.291	0.233*	0.174*
F_y = 50 ksi												
Effective length KL in feet	0	893	731	561	472	364	234	650	502	422	341	223
	2	890	729	559	470	363	234	648	500	420	340	222
	3	887	726	558	469	362	233	645	498	418	339	222
	4	882	723	555	467	361	233	641	495	416	337	221
	5	876	718	551	464	360	232	636	491	413	334	220
	6	869	713	547	460	358	231	630	486	409	331	219
	7	861	706	542	456	355	230	623	481	405	328	217
	8	852	699	537	452	353	228	614	475	400	324	215
	9	841	690	531	447	350	227	605	468	394	319	213
	10	830	681	524	441	346	225	595	460	388	314	211
	11	817	671	516	435	343	223	584	452	381	309	209
	12	804	660	508	428	339	221	572	443	374	303	206
	13	789	649	500	421	335	219	560	434	366	297	203
	14	774	636	490	413	330	216	547	424	358	290	200
	15	757	624	481	405	325	214	533	414	349	283	197
	16	741	610	471	397	320	211	518	403	340	276	193
	17	723	596	460	388	314	208	504	392	331	268	190
	18	705	581	449	379	307	205	488	380	321	261	186
	19	686	566	438	369	299	202	472	368	311	253	182
	20	667	551	427	360	292	198	456	356	301	245	177
	21	647	535	415	350	284	194	440	344	291	237	173
	22	627	519	403	340	276	191	424	332	281	228	168
	23	607	503	390	330	267	187	407	319	270	220	163
	24	586	487	378	319	259	183	391	307	260	211	158
	25	566	470	366	309	251	178	374	294	249	203	153
	26	545	453	353	298	242	174	358	281	239	195	148
	27	525	437	340	288	234	169	341	269	229	186	142
	28	504	420	328	277	226	165	325	257	218	178	136
	29	483	403	315	267	217	160	309	244	208	170	130
	30	463	387	303	256	209	155	293	232	198	162	123
	31	443	371	290	246	200	150	278	221	188	154	117
	32	423	355	278	236	192	145	263	209	178	146	112
	33	403	339	266	225	184	139	248	198	169	138	106
	34	384	323	254	215	176	134	233	186	159	130	100
	35	365	308	242	206	168	128	220	176	150	123	94
	36	347	293	231	196	160	122	208	166	142	116	89
	37	328	277	220	186	153	117	197	157	135	110	85
	38	311	263	208	177	145	111	187	149	128	104	80
	39	295	250	198	168	138	105	177	142	121	99	76
	40	281	237	188	160	131	100	169	135	115	94	72
PROPERTIES												
Area, In. ²	21.0	17.2	13.2	11.1	8.96	6.76	15.3	11.8	9.92	8.03	6.06	
I, In. ⁴	304	256	202	172	141	108	182	145	124	102	78.2	
r, In.	3.80	3.86	3.92	3.94	3.97	4.00	3.45	3.51	3.54	3.56	3.59	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



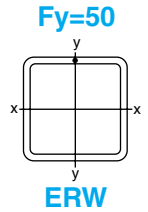
Nominal Size		8 x 8						7 x 7					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		59.32	48.85	37.69	31.84	25.82	19.63	50.81	42.05	32.58	27.59	22.42	17.08
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174*	0.581	0.465	0.349	0.291	0.233	0.174*
F_y = 50 ksi													
Effective length KL in feet	0	697	574	442	372	302	210	595	493	381	323	262	196
	2	694	571	440	371	300	210	591	490	379	321	261	195
	3	690	568	438	369	299	209	587	486	376	318	259	194
	4	684	563	434	366	297	208	580	481	372	315	256	193
	5	677	558	430	362	294	207	572	475	368	311	253	191
	6	668	551	425	358	290	205	562	467	362	306	249	189
	7	658	543	419	353	286	203	551	458	355	301	245	186
	8	646	533	412	348	282	201	538	447	347	294	240	182
	9	634	523	404	341	277	198	523	436	339	287	234	178
	10	620	512	396	334	271	195	508	423	330	280	228	173
	11	604	500	387	327	265	192	491	410	320	272	222	168
	12	588	487	377	319	259	189	474	396	309	263	215	163
	13	571	473	367	310	252	185	455	381	298	254	207	157
	14	553	459	357	302	245	181	436	366	287	244	200	152
	15	535	444	345	292	238	177	417	350	275	234	192	146
	16	516	429	334	283	230	173	397	334	263	224	184	140
	17	496	413	322	273	222	168	377	318	250	214	175	133
	18	476	397	310	263	214	163	356	301	238	203	167	127
	19	456	380	298	253	206	157	336	285	225	193	159	121
	20	435	364	285	242	197	150	316	268	213	183	150	115
	21	415	347	273	232	189	144	296	252	201	172	142	108
	22	394	331	260	221	181	138	277	236	189	162	134	102
	23	374	314	248	211	172	132	258	220	177	152	126	96
	24	354	298	235	200	164	125	239	205	165	142	118	90
	25	334	282	223	190	155	119	221	190	154	133	110	84
	26	314	266	211	180	147	113	204	176	142	123	102	78
	27	295	250	199	170	139	107	189	163	132	114	95	73
	28	277	235	187	160	131	101	176	152	123	106	88	68
	29	258	220	176	151	124	95	164	141	114	99	82	63
	30	241	205	165	141	116	89	153	132	107	92	77	59
	31	226	192	154	132	109	84	144	124	100	87	72	55
	32	212	181	145	124	102	79	135	116	94	81	68	52
	33	199	170	136	117	96	74	127	109	88	76	63	49
	34	188	160	128	110	90	70	119	103	83	72	60	46
	35	177	151	121	104	85	66	113	97	79	68	56	43
	36	168	143	114	98	81	62	107	92	74	64	53	41
	37	159	135	108	93	76	59	101	87	70	61	51	39
	38	150	128	103	88	72	56	96	82	67	58	48	37
	39	143	122	97	84	69	53	91	78	63	55	45	35
	40	136	116	93	79	65	50	86	74	60	52	43	33
PROPERTIES													
Area, In. ²	16.4	13.5	10.4	8.76	7.10	5.37	14.0	11.6	8.97	7.59	6.17	4.67	
I, In. ⁴	146	125	99.6	85.6	70.7	54.4	93.3	80.5	64.9	56.1	46.5	36.0	
r, In.	2.99	3.04	3.10	3.13	3.15	3.18	2.58	2.63	2.69	2.72	2.75	2.77	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		6 x 6						5 1/2 x 5 1/2					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		42.30	35.24	27.48	23.34	19.02	14.53	9.86	24.93	21.21	17.32	13.25	9.01
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174	0.116*	0.349	0.291	0.233	0.174	0.116*
F_y = 50 ksi													
Effective length KL in feet	0	497	414	322	273	223	169	99	292	249	203	154	95
	2	493	410	320	271	221	168	99	290	246	201	153	94
	3	487	406	316	268	219	166	98	286	243	199	151	94
	4	480	400	312	265	216	164	97	281	239	195	149	93
	5	470	393	306	260	212	161	96	275	234	191	146	91
	6	459	384	299	255	208	158	95	268	228	186	142	90
	7	446	373	292	248	203	154	94	260	221	181	138	88
	8	431	361	283	241	197	150	92	250	214	175	134	86
	9	415	349	273	233	191	145	90	240	205	168	129	84
	10	398	335	263	224	184	140	88	229	196	161	123	81
	11	379	320	252	215	176	135	85	218	187	153	117	78
	12	360	305	241	206	169	129	83	206	177	145	111	75
	13	341	289	229	196	161	123	80	194	167	137	105	72
	14	321	273	217	186	153	117	77	181	156	129	99	68
	15	301	257	204	175	144	111	74	169	146	120	93	64
	16	281	241	192	165	136	105	70	157	136	112	87	60
	17	261	224	179	155	128	98	67	145	126	104	80	55
	18	241	208	167	144	119	92	63	133	116	96	74	51
	19	222	193	155	134	111	86	59	121	106	88	68	47
	20	203	177	143	124	103	80	55	110	96	80	63	43
	21	185	163	132	114	95	74	51	100	88	73	57	40
	22	169	148	121	105	88	68	47	91	80	66	52	36
	23	154	136	110	96	80	63	43	83	73	61	47	33
	24	142	125	101	88	74	58	40	77	67	56	44	30
	25	131	115	93	81	68	53	37	71	62	51	40	28
	26	121	106	86	75	63	49	34	65	57	47	37	26
	27	112	98	80	70	58	45	31	60	53	44	34	24
	28	104	92	74	65	54	42	29	56	49	41	32	22
	29	97	85	69	60	51	39	27	52	46	38	30	21
	30	91	80	65	56	47	37	25	49	43	36	28	19
	31	85	75	61	53	44	34	24	46	40	33	26	18
	32	80	70	57	50	42	32	22	43	38	31	25	17
	33	75	66	54	47	39	30	21	40	35	29	23	16
	34	71	62	51	44	37	29	20	<u>38</u>	<u>33</u>	<u>28</u>	22	15
	35	67	59	48	42	35	27	19	<u>32</u>	<u>26</u>	<u>22</u>	20	14
	36	<u>63</u>	55	45	39	33	26	18				<u>19</u>	<u>13</u>
	37		<u>52</u>	43	37	31	24	17					
	38			<u>40</u>	<u>35</u>	29	23	16					
	39				<u>28</u>	<u>22</u>	22	15					
	40												
PROPERTIES													
Area, In. ²		11.7	9.74	7.58	6.43	5.24	3.98	2.70	6.88	5.85	4.77	3.63	2.46
I, In. ⁴		55.1	48.2	39.4	34.3	28.6	22.3	15.5	29.7	25.9	21.7	17.0	11.8
r, In.		2.17	2.23	2.28	2.31	2.34	2.37	2.39	2.08	2.11	2.13	2.16	2.19

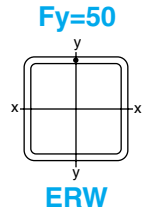
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

Note: Double Horizontal Line indicates KL/r limit of 200.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size	5 x 5						4 1/2 x 4 1/2					
	1/2	3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16	1/8
Wall Thickness	1/2	3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16	1/8
Weight Per Foot	28.43	22.37	19.08	15.62	11.97	8.16	25.03	19.82	16.96	13.91	10.70	7.31
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.116*	0.465	0.349	0.291	0.233	0.174	0.116*

$F_y = 50$ ksi

Effective length KL in feet	$F_y = 50$ ksi																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	335	263	224	183	139	90	295	233	199	163	125	85	331	260	221	181	138	90	291	229	196	161	123	84	325	256	218	178	136	89	285	225	192	158	121	82	318	250	213	175	133	88	277	219	188	154	118	81	309	244	208	170	130	86	267	212	182	149	114	78	299	236	201	165	126	84	255	203	174	144	110	75	287	227	194	159	122	82	242	194	166	137	105	72	273	217	185	153	117	79	228	183	158	130	100	69	259	206	177	145	112	76	213	172	148	123	94	65	244	194	167	138	106	73	197	160	138	115	88	61	228	182	157	130	100	69	181	147	128	107	82	57	212	170	147	122	94	65	165	135	118	98	76	53	196	158	137	113	88	60	149	123	107	90	70	48	180	146	126	105	81	56	133	111	97	82	63	44	164	133	116	97	75	52	118	100	88	74	57	40	148	122	106	89	69	48	104	88	78	66	52	36	134	110	96	81	63	44	92	78	69	59	46	32	119	99	87	73	57	40	82	70	62	53	41	29	107	89	78	66	52	36	74	63	56	47	37	26	97	80	70	59	47	33	67	57	50	43	33	23	88	73	64	54	42	30	61	51	45	39	30	21	80	66	58	49	39	27	55	47	41	35	27	19	73	61	53	45	35	25	50	43	38	32	25	18	67	56	49	41	32	23	46	39	35	30	23	16	62	51	45	38	30	21	43	36	32	27	21	15	57	47	42	35	28	19	<u>39</u>	33	30	25	20	14	53	44	39	33	26	18	<u>31</u>	27	27	23	18	13	49	41	36	30	24	17	<u>26</u>	26	26	22	17	12	46	38	33	28	22	16	<u>22</u>	26	26	22	17	12	43	36	31	26	21	15	<u>16</u>	26	26	22	17	12	33	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	33	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	32	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	31	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	30	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	29	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	28	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	27	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	26	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	25	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	24	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	23	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	22	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	21	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	20	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	19	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	18	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	17	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	16	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	15	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	14	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	13	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	12	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	11	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	10	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	9	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	8	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	7	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	6	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	5	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	4	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	3	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	2	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12	1	<u>33</u>	<u>29</u>	25	19	14	<u>12</u>	26	26	22	17	12

PROPERTIES

Area, In. ²	7.88	6.18	5.26	4.30	3.28	2.23	6.95	5.48	4.68	3.84	2.93	2.00
I, In. ⁴	26.0	21.7	19.0	16.0	12.6	8.80	18.0	15.3	13.5	11.4	9.02	6.35
r, In.	1.82	1.87	1.90	1.93	1.96	1.99	1.61	1.67	1.70	1.73	1.75	1.78

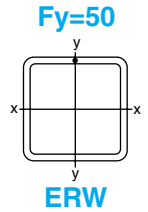
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



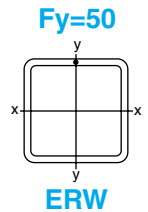
Nominal Size		4 x 4					3 1/2 x 3 1/2					
Wall Thickness	1/2	3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8	
Weight Per Foot	21.63	17.27	14.83	12.21	9.42	6.46	14.72	12.70	10.51	8.15	5.61	
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.116	0.349	0.291	0.233	0.174	0.116	
F_y = 50 ksi												
Effective length KL in feet	0	256	203	174	143	110	75	174	150	124	95	65
	2	250	199	171	141	108	74	169	146	121	93	64
	3	244	194	167	137	105	72	164	141	117	90	62
	4	235	188	162	133	102	70	156	135	112	87	60
	5	224	180	155	128	98	68	147	128	106	82	57
	6	211	170	147	122	94	65	137	119	99	77	53
	7	197	159	138	115	88	61	126	110	92	72	50
	8	182	148	129	107	83	57	114	100	84	66	46
	9	167	136	119	99	77	53	102	90	76	60	42
	10	151	124	108	91	71	49	90	79	68	53	37
	11	135	112	98	83	65	45	78	70	60	47	33
	12	119	100	88	74	58	41	67	60	52	41	29
	13	105	88	78	66	52	37	57	51	44	36	25
	14	90	77	69	59	46	33	49	44	38	31	22
	15	79	67	60	51	41	29	43	39	33	27	19
	16	69	59	53	45	36	26	38	34	29	24	17
	17	61	52	47	40	32	23	33	30	26	21	15
	18	55	47	42	36	28	20	30	27	23	19	13
	19	49	42	37	32	25	18	27	24	21	17	12
	20	44	38	34	29	23	16	24	22	19	15	11
	21	40	34	31	26	21	15	<u>22</u>	<u>20</u>	17	14	10
	22	37	31	28	24	19	14	14	12	<u>16</u>	<u>12</u>	<u>9</u>
	23	<u>34</u>	29	25	22	17	12	12	11	11	11	11
	24	<u>34</u>	<u>26</u>	<u>23</u>	20	16	11	11	10	10	10	10
	25		<u>26</u>	<u>23</u>	<u>18</u>	<u>15</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	26							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	27							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	28							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	29							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	30							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	31							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	32							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	33							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	34							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	35							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	36							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	37							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	38							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	39							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
	40							<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>
PROPERTIES												
Area, in. ²	6.02	4.78	4.10	3.37	2.58	1.77	4.09	3.52	2.91	2.24	1.54	
I, in. ⁴	11.9	10.3	9.14	7.80	6.21	4.40	6.48	5.84	5.04	4.05	2.90	
r, in.	1.41	1.46	1.49	1.52	1.55	1.58	1.26	1.29	1.32	1.35	1.37	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



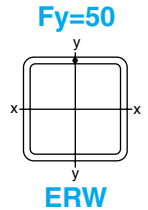
Nominal Size		3 x 3					2 1/2 x 2 1/2				2 1/4 x 2 1/4		
Wall Thickness	3/8	5/16	1/4	3/16	1/8	5/16	1/4	3/16	1/8	1/4	3/16	1/8	
Weight Per Foot	12.17	10.58	8.81	6.87	4.75	8.45	7.11	5.59	3.90	6.26	4.96	3.48	
Design Wall Thickness	0.349	0.291	0.233	0.174	0.116	0.291	0.233	0.174	0.116	0.233	0.174	0.116	
F_y = 50 ksi													
Effective length KL in feet	0	144	125	104	80	55	100	84	65	45	74	58	41
	2	139	121	100	78	54	95	80	62	43	69	55	39
	3	132	115	96	75	52	88	75	59	41	64	51	36
	4	124	108	90	71	49	80	68	54	38	57	46	33
	5	113	100	84	66	46	71	61	48	34	49	40	29
	6	102	90	76	60	42	61	53	43	30	41	34	25
	7	90	80	68	54	38	51	45	36	26	33	28	20
	8	78	70	60	48	34	42	37	30	22	26	22	17
	9	66	60	52	42	30	33	30	25	18	21	17	13
	10	55	51	44	36	26	27	24	20	15	17	14	11
	11	46	42	37	30	22	22	20	17	12	14	12	9
	12	38	35	31	25	18	19	17	14	10	12	10	7
	13	33	30	26	22	16	16	14	12	9	10	8	6
	14	28	26	23	19	13	14	12	10	8	10	8	5
	15	25	23	20	16	12	12	11	9	7	7	7	5
	16	22	20	17	14	10	10	9	7	6	6	6	5
	17	19	18	15	13	9	9	8	7	6	6	6	5
	18	16	16	14	11	8	8	7	6	5	5	5	4
	19	14	14	12	10	7	7	6	5	4	4	4	3
	20	12	12	10	8	6	6	5	4	3	3	3	2
	21	10	10	8	6	5	5	4	3	2	2	2	1
	22	8	8	6	5	4	4	3	2	1	1	1	1
	23	7	7	5	4	3	3	2	1	1	1	1	1
	24	6	6	4	3	2	2	1	1	1	1	1	1
	25	5	5	3	2	1	1	1	1	1	1	1	1
	26	4	4	2	1	1	1	1	1	1	1	1	1
	27	3	3	1	1	1	1	1	1	1	1	1	1
	28	2	2	1	1	1	1	1	1	1	1	1	1
	29	1	1	1	1	1	1	1	1	1	1	1	1
	30	1	1	1	1	1	1	1	1	1	1	1	1
	31	1	1	1	1	1	1	1	1	1	1	1	1
	32	1	1	1	1	1	1	1	1	1	1	1	1
	33	1	1	1	1	1	1	1	1	1	1	1	1
	34	1	1	1	1	1	1	1	1	1	1	1	1
	35	1	1	1	1	1	1	1	1	1	1	1	1
	36	1	1	1	1	1	1	1	1	1	1	1	1
	37	1	1	1	1	1	1	1	1	1	1	1	1
	38	1	1	1	1	1	1	1	1	1	1	1	1
	39	1	1	1	1	1	1	1	1	1	1	1	1
	40	1	1	1	1	1	1	1	1	1	1	1	1
PROPERTIES													
Area, in. ²	3.39	2.94	2.44	1.89	1.30	2.35	1.97	1.54	1.07	1.74	1.37	0.96	
I, in. ⁴	3.77	3.45	3.02	2.46	1.78	1.82	1.63	1.35	0.998	1.13	0.952	0.712	
r, in.	1.05	1.08	1.11	1.14	1.17	0.879	0.908	0.937	0.965	0.805	0.835	0.863	

Note: Double Horizontal Line indicates K/r limit of 200.



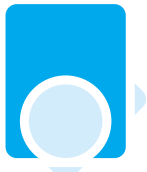
LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)



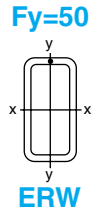
Nominal Size		2 x 2			1 3/4 x 1 3/4	1 5/8 x 1 5/8		1 1/2 x 1 1/2		1 1/4 x 1 1/4	
Wall Thickness	1/4	3/16	1/8	3/16	3/16	1/8	3/16	1/8	3/16	1/8	
Weight Per Foot	5.41	4.32	3.05	3.68	3.36	2.42	3.04	2.20	2.40	1.78	
Design Wall Thickness	0.233	0.174	0.116	0.174	0.174	0.116	0.174	0.116	0.174	0.116	
F_y = 50 ksi											
Effective length K _L in feet	0	64	51	36	43	40	28	36	26	28	21
	2	59	47	33	39	35	25	31	23	23	17
	3	53	42	30	34	30	22	25	19	17	13
	4	46	37	27	28	24	18	20	15	11	9
	5	38	31	23	22	18	14	14	11	7	6
	6	30	25	19	17	13	10	10	8	5	4
	7	23	19	15	12	9	7	7	6	4	<u>3</u>
	8	17	15	11	9	7	6	5	4	<u>4</u>	<u>3</u>
	9	14	12	9	7	6	5	<u>5</u>	<u>3</u>		
	10	11	9	7	<u>6</u>	<u>6</u>	<u>4</u>				
	11	<u>9</u>	8	6							
	12		<u>7</u>	<u>5</u>							
	13										
	14										
	15										
	16										
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	35										
	36										
	37										
	38										
	39										
	40										
PROPERTIES											
Area, in. ²	1.51	1.19	0.84	1.02	0.93	0.67	0.84	0.61	0.67	0.49	
I, in. ⁴	0.745	0.640	0.486	0.405	0.312	0.246	0.235	0.188	0.121	0.101	
r, in.	0.703	0.732	0.761	0.630	0.579	0.608	0.528	0.556	0.425	0.454	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		20 x 12			20 x 8			20 x 4			
Wall Thickness		1/2	3/8	5/16	5/8	1/2	3/8	5/16	1/2	3/8	5/16
Weight Per Foot		103.30	78.52	65.87	110.36	89.68	68.31	57.36	76.07	58.10	48.86
Design Wall Thickness		0.465*	0.349*	0.291*	0.581	0.465*	0.349*	0.291*	0.465*	0.349*	0.291*
F_y = 50 ksi											
Effective length KL in feet	0	1170	797	628	1290	1010	681	529	853	570	436
	2	1160	796	627	1280	1010	679	528	843	565	433
	3	1160	795	626	1280	1000	677	527	831	558	429
	4	1160	793	625	1270	1000	674	525	815	549	422
	5	1160	791	623	1260	990	671	522	793	538	415
	6	1150	788	622	1240	980	666	519	768	524	405
	7	1150	785	619	1230	974	661	515	738	508	394
	8	1140	782	617	1210	963	655	511	700	489	382
	9	1130	778	614	1190	951	648	506	657	469	367
	10	1130	773	611	1170	938	640	501	612	446	352
	11	1120	769	607	1150	923	632	495	566	421	335
	12	1110	763	603	1120	907	622	488	519	395	317
	13	1100	757	599	1100	890	612	481	473	367	297
	14	1090	751	594	1070	872	602	474	428	338	277
	15	1080	745	589	1040	851	591	465	384	308	255
	16	1070	737	584	1010	827	579	457	341	276	233
	17	1050	730	579	980	802	566	448	302	246	210
	18	1040	722	573	948	777	553	439	270	219	188
	19	1030	714	567	916	751	539	429	242	197	168
	20	1010	705	561	883	725	524	418	219	177	152
	21	997	696	554	849	698	510	408	198	161	138
	22	980	687	547	816	671	494	397	181	147	126
	23	962	677	540	782	644	478	385	165	134	115
	24	943	667	533	748	617	462	374	152	123	106
	25	923	656	525	714	590	445	361	140	114	97
	26	904	645	517	680	563	428	349	129	105	90
	27	884	634	509	647	536	411	336	120	97	83
	28	863	623	500	614	510	393	324	111	91	78
	29	843	611	492	582	484	375	311	102	84	72
	30	822	599	483	551	458	357	297	93	77	67
	31	801	587	474	520	433	338	284	84	70	62
	32	780	574	465	489	409	320	270	75	63	57
	33	759	561	455	460	385	301	256	66	56	52
	34	738	548	446	433	362	284	242	57	49	47
	35	717	535	436	409	342	268	229	48	42	42
	36	695	522	426	386	323	253	216	39	35	37
	37	674	508	416	366	306	240	205	30	28	32
	38	653	494	405	347	290	227	194	21	21	27
	39	632	481	395	329	275	216	184	12	14	22
	40	611	467	385	313	262	205	175	3	5	17
PROPERTIES											
Area, In. ²	28.3	21.5	18.1	30.3	24.6	18.7	15.7	20.9	16.0	13.4	
I _x , In. ⁴	1550	1200	1010	1440	1190	926	786	838	657	560	
I _y , In. ⁴	705	547	464	338	283	222	189	58.7	47.6	41.2	
Ratio r _x / r _y	1.48	1.48	1.48	2.06	2.05	2.04	2.04	3.78	3.72	3.69	
r _y , In.	4.99	5.04	5.07	3.34	3.39	3.44	3.47	1.68	1.73	1.75	

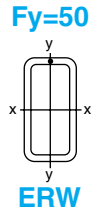
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

Note: Double Horizontal Line indicates Kl/r limit of 200.



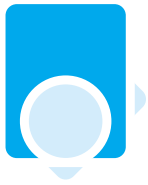
LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		18 x 6					16 x 12			16 x 8			
Wall Thickness		5/8	1/2	3/8	5/16	1/4	1/2	3/8	5/16	5/8	1/2	3/8	5/16
Weight Per Foot		93.34	76.07	58.10	48.86	39.43	89.68	68.31	57.36	93.34	76.07	58.10	48.86
Design Wall Thickness		0.581	0.465*	0.349*	0.291*	0.233*	0.465	0.349*	0.291*	0.581	0.465	0.349*	0.291*
F_y = 50 ksi													
Effective length KL in feet	0	1090	888	606	469	342	1050	756	597	1090	888	642	501
	2	1080	882	604	467	341	1040	755	596	1090	885	640	499
	3	1080	875	600	464	339	1040	753	595	1080	881	638	498
	4	1060	865	596	461	337	1040	751	594	1080	875	634	496
	5	1050	852	589	457	335	1030	749	592	1070	867	630	493
	6	1030	837	582	452	331	1030	746	590	1050	858	625	489
	7	1000	819	573	446	327	1020	743	587	1040	848	619	485
	8	979	799	563	439	323	1020	739	584	1030	836	613	480
	9	951	777	552	431	318	1010	734	581	1010	822	605	475
	10	920	754	540	423	312	1000	729	577	990	807	597	469
	11	888	728	527	413	306	991	724	574	970	791	587	462
	12	854	701	512	403	299	980	718	569	948	774	577	455
	13	818	673	496	392	292	970	712	564	925	756	566	447
	14	781	643	480	380	285	958	705	559	901	737	555	439
	15	743	613	462	368	276	946	697	554	875	716	542	430
	16	705	583	444	355	268	933	690	548	849	696	529	421
	17	666	552	424	342	259	919	681	542	822	674	516	411
	18	627	521	404	327	250	905	673	536	794	652	502	401
	19	589	491	384	313	240	890	664	529	766	629	487	390
	20	551	460	361	297	230	875	654	522	737	606	469	379
	21	513	430	339	282	219	859	644	515	708	583	452	368
	22	477	401	316	266	209	843	634	507	678	559	434	356
	23	442	372	295	250	198	826	623	500	649	536	416	344
	24	407	344	273	233	187	809	612	491	619	512	399	331
	25	375	317	252	216	175	791	601	483	590	489	381	318
	26	346	293	233	200	164	773	589	474	561	466	363	305
	27	321	272	216	186	152	755	577	466	533	443	346	292
	28	299	253	201	173	141	737	564	457	505	420	329	279
	29	278	236	188	161	132	719	550	447	477	398	312	265
	30	260	220	175	150	123	700	536	438	450	376	295	251
	31	244	206	164	141	115	681	522	428	424	355	279	237
	32	229	194	154	132	108	662	508	418	398	333	263	224
	33	215	182	145	124	102	643	494	408	374	313	247	211
	34	203	171	137	117	96	624	480	398	352	295	233	199
	35	191	162	129	110	90	606	465	387	332	279	220	187
	36	181	153	122	104	85	587	451	377	314	263	208	177
	37	171	145	115	99	81	568	437	366	297	249	197	168
	38	162	137	109	94	77	549	423	356	282	236	186	159
	39	154	130	104	89	73	531	409	345	268	224	177	151
	40	146	124	99	85	69	512	395	334	254	213	168	143
PROPERTIES													
Area, In. ²	25.7	20.9	16.0	13.4	10.8	24.6	18.7	15.7	25.7	20.9	16.0	13.4	
I _x , In. ⁴	923	770	602	513	419	904	702	595	815	679	531	451	
I _y , In. ⁴	158	134	106	91.3	75.1	581	452	384	274	230	181	155	
Ratio r _x / r _y	2.42	2.40	2.38	2.37	2.36	1.25	1.25	1.24	1.72	1.72	1.71	1.71	
r _y , In.	2.48	2.53	2.58	2.61	2.63	4.86	4.91	4.94	3.27	3.32	3.37	3.40	

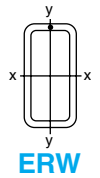
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

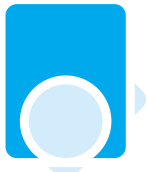
F_y=50



Nominal Size		16 x 4			14 x 10				
Wall Thickness		1/2	3/8	5/16	5/8	1/2	3/8	5/16	1/4
Weight Per Foot		62.46	47.90	40.35	93.34	76.07	58.10	48.86	39.43
Design Wall Thickness		0.465	0.349*	0.291*	0.581	0.465	0.349*	0.291*	0.233*
F_y = 50 ksi									
Effective length KL in feet	0	731	524	406	1090	888	675	532	395
	2	720	519	402	1090	886	674	531	395
	3	706	512	397	1090	883	672	530	394
	4	687	502	390	1080	879	670	528	393
	5	664	490	382	1070	874	666	526	391
	6	636	475	372	1070	868	663	523	390
	7	605	458	360	1060	861	658	520	388
	8	571	438	346	1050	852	653	516	385
	9	534	417	331	1030	843	646	511	383
	10	497	391	315	1020	833	639	507	380
	11	458	363	297	1010	822	630	501	376
	12	419	334	277	993	809	621	496	372
	13	380	305	257	976	797	611	489	368
	14	343	277	236	959	783	601	483	363
	15	306	250	214	941	768	590	476	359
	16	271	223	192	921	753	579	468	353
	17	240	198	170	901	737	567	460	348
	18	214	177	152	881	721	555	452	342
	19	192	158	136	859	704	542	443	336
	20	173	143	123	837	686	529	434	330
	21	157	130	112	815	668	515	425	324
	22	143	118	102	792	650	501	415	317
	23	131	108	93	768	631	487	405	310
	24	120	99	85	745	613	473	395	303
	25	111	92	79	721	594	459	385	296
	26	103	85	73	697	574	444	374	288
	27	<u>95</u>	78	68	673	555	430	362	281
	28		<u>73</u>	<u>63</u>	649	536	415	350	273
	29				625	516	401	338	265
	30				601	497	386	326	257
	31				577	478	371	314	249
	32				553	459	357	302	240
	33				530	440	343	290	232
	34				507	421	328	278	223
	35				484	403	315	266	215
	36				462	385	301	255	206
	37				440	367	287	244	198
	38				418	350	274	233	189
	39				397	332	261	222	180
	40				377	316	248	211	171
PROPERTIES									
Area, In. ²	17.2	13.2	11.1	25.7	20.9	16.0	13.4	10.8	
I _x , In. ⁴	455	360	308	687	573	447	380	310	
I _y , In. ⁴	47.0	38.3	33.2	407	341	267	227	186	
Ratio r _x / r _y	3.11	3.07	3.05	1.30	1.30	1.29	1.29	1.29	
r _y , In.	1.65	1.71	1.73	3.98	4.04	4.09	4.12	4.14	

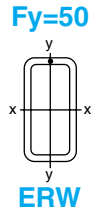
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

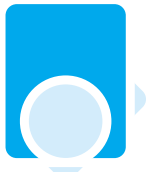
Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		14 x 6						14 x 4					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		76.33	62.46	47.90	40.35	32.63	24.73	67.82	55.66	42.79	36.10	29.23	22.18
Design Wall Thickness		0.581	0.465	0.349*	0.291*	0.233*	0.174*	0.581	0.465	0.349*	0.291*	0.233*	0.174*
F_y = 50 ksi													
Effective length KL in feet	0	893	731	557	436	321	215	795	650	497	386	283	187
	2	886	726	554	433	320	214	782	640	491	382	280	185
	3	878	720	550	431	318	213	766	628	484	377	277	183
	4	867	711	545	427	315	212	744	611	473	370	273	181
	5	854	700	538	422	312	210	716	590	457	362	267	178
	6	837	687	529	417	309	208	684	565	439	351	260	174
	7	818	672	518	410	304	205	648	537	419	339	252	170
	8	796	655	505	402	299	202	609	506	396	325	243	165
	9	772	636	491	394	294	199	567	474	372	309	233	159
	10	747	616	476	384	287	195	524	440	347	292	222	153
	11	719	594	460	374	281	191	480	405	321	274	210	146
	12	690	571	443	363	273	187	436	370	295	253	197	139
	13	660	547	425	351	265	182	393	336	269	231	184	131
	14	629	523	406	338	257	177	351	302	243	210	170	123
	15	598	497	387	325	248	172	311	269	219	189	155	114
	16	565	472	368	311	239	167	274	238	195	170	140	105
	17	533	446	349	295	229	161	242	211	173	150	125	96
	18	501	420	329	279	219	155	216	188	154	134	111	87
	19	469	394	310	263	209	149	194	169	138	120	100	78
	20	437	369	291	247	198	142	175	152	125	109	90	70
	21	407	344	272	231	187	136	159	138	113	99	82	64
	22	377	319	253	215	176	129	145	126	103	90	74	58
	23	347	296	235	200	165	122	132	115	94	82	68	53
	24	319	272	217	186	153	115	122	106	87	75	63	49
	25	294	251	200	171	141	108	112	98	80	70	58	45
	26	272	232	185	158	131	101	<u>104</u>	90	74	64	53	42
	27	252	215	172	147	121	94	<u>84</u>	<u>84</u>	68	60	49	39
	28	234	200	160	136	113	87	<u>64</u>	<u>64</u>	55	55	46	36
	29	218	186	149	127	105	81	<u>43</u>	<u>43</u>	<u>43</u>	<u>43</u>	<u>43</u>	<u>33</u>
	30	204	174	139	119	98	76						
	31	191	163	130	111	92	71						
	32	179	153	122	104	86	67						
	33	169	144	115	98	81	63						
	34	159	136	108	93	76	59						
	35	150	128	102	87	72	56						
	36	142	121	97	83	68	53						
	37	134	114	91	78	65	50						
	38	127	109	87	74	61	47						
	39	121	103	82	70	58	45						
	40	115	98	78	67	55	43						
PROPERTIES													
Area, In. ²	21.0	17.2	13.2	11.1	8.96	6.76	18.7	15.3	11.8	9.92	8.03	6.06	
I _x , In. ⁴	478	402	317	271	222	170	373	317	252	216	178	137	
I _y , In. ⁴	124	105	84.1	72.3	59.6	45.9	47.1	41.1	33.6	29.2	24.4	19.0	
Ratio r _x / r _y	1.96	1.96	1.94	1.94	1.93	1.92	2.81	2.78	2.74	2.72	2.70	2.69	
r _y , In.	2.43	2.48	2.53	2.55	2.58	2.61	1.59	1.64	1.69	1.72	1.74	1.77	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

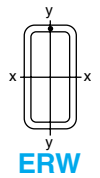
Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

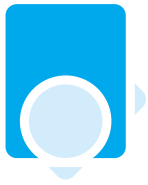
Design Axial Strength in kips ($\phi=0.85$)

F_y=50



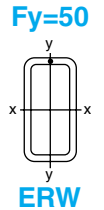
Nominal Size		12 x 10				12 x 8					
Wall Thickness		1/2	3/8	5/16	1/4	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		69.27	53.00	44.60	36.03	76.33	62.46	47.90	40.35	32.63	24.73
Design Wall Thickness		0.465	0.349	0.291*	0.233*	0.581	0.465	0.349	0.291*	0.233*	0.174*
F_y = 50 ksi											
Effective length KL in feet	0	808	621	511	382	893	731	561	464	347	232
	2	805	619	510	381	889	728	559	463	346	232
	3	803	617	508	380	884	724	556	461	345	231
	4	799	614	506	379	878	719	552	458	343	230
	5	794	610	504	378	869	713	547	455	341	229
	6	788	606	501	376	859	705	541	451	338	228
	7	781	601	497	374	848	695	535	446	335	226
	8	774	595	493	371	834	685	527	441	331	224
	9	765	588	489	368	819	673	518	434	327	222
	10	755	581	483	365	803	660	508	428	322	219
	11	744	573	478	362	786	646	498	419	317	217
	12	733	565	472	358	767	631	487	410	312	214
	13	721	555	465	354	747	615	475	400	306	211
	14	708	546	457	350	726	598	463	390	300	207
	15	694	535	448	345	704	581	450	379	293	203
	16	680	525	440	339	681	563	436	368	286	199
	17	665	514	430	333	658	544	422	356	278	195
	18	650	502	421	327	634	525	408	344	271	190
	19	634	490	411	321	610	505	393	332	263	185
	20	617	478	401	314	585	486	378	320	255	180
	21	601	465	390	308	561	466	363	307	246	175
	22	583	452	379	300	536	446	348	295	237	169
	23	566	439	369	293	511	426	333	282	228	164
	24	549	426	358	286	486	406	318	269	219	158
	25	531	412	346	278	462	386	303	257	210	152
	26	513	399	335	270	438	366	288	244	200	146
	27	495	385	324	262	414	347	274	232	190	140
	28	477	371	313	254	390	328	259	220	180	134
	29	459	358	301	246	368	310	245	208	171	128
	30	441	344	290	237	345	291	231	197	161	122
	31	424	331	279	228	323	273	218	185	152	116
	32	406	317	268	219	303	256	204	174	143	110
	33	389	304	257	211	285	241	192	163	134	103
	34	372	291	246	202	269	227	181	154	127	97
	35	355	278	235	193	254	214	171	145	119	92
	36	338	266	225	185	240	203	161	137	113	87
	37	322	253	214	176	227	192	153	130	107	82
	38	306	241	204	168	215	182	145	123	101	78
	39	290	229	194	160	204	173	137	117	96	74
	40	276	217	184	152	194	164	131	111	91	70
PROPERTIES											
Area, In. ²	19.0	14.6	12.2	9.90	21.0	17.2	13.2	11.1	8.96	6.76	
I _x , In. ⁴	395	310	264	216	396	333	262	224	184	140	
I _y , In. ⁴	298	234	200	164	210	177	140	120	98.8	75.7	
Ratio r _x / r _y	1.15	1.15	1.15	1.15	1.37	1.37	1.37	1.37	1.36	1.36	
r _y , In.	3.96	4.01	4.04	4.07	3.16	3.21	3.27	3.29	3.32	3.35	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Rectangular HSS

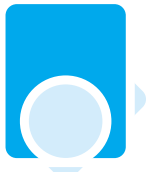
Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		12 x 6						12 x 4					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		67.82	55.66	42.79	36.10	29.23	22.18	59.32	48.85	37.69	31.84	25.82	19.63
Design Wall Thickness		0.581	0.465	0.349	0.291*	0.233*	0.174*	0.581	0.465	0.349	0.291*	0.233*	0.174*
F_y = 50 ksi													
Effective length KL in feet	0	795	650	502	414	308	207	697	574	442	365	269	179
	2	789	646	498	412	306	206	685	565	435	361	266	177
	3	782	640	494	409	305	205	671	553	427	356	263	176
	4	772	632	488	405	302	204	651	538	416	348	258	173
	5	759	622	481	400	299	202	626	519	402	339	252	170
	6	744	610	472	394	295	199	598	497	386	327	245	166
	7	726	596	461	387	290	197	565	471	367	311	237	161
	8	706	581	450	379	285	194	530	444	347	295	227	155
	9	685	563	437	369	279	190	493	415	326	277	217	149
	10	661	545	423	357	272	186	455	384	303	259	205	143
	11	636	525	408	345	265	182	416	353	280	240	193	136
	12	609	504	393	332	257	177	377	322	257	220	179	128
	13	582	482	376	319	249	172	339	291	234	201	165	120
	14	554	460	360	305	240	167	302	261	211	182	150	111
	15	525	437	342	290	231	162	266	233	189	164	135	103
	16	496	413	325	276	221	156	234	205	168	147	121	94
	17	467	390	307	261	211	150	207	182	149	130	108	84
	18	437	367	289	246	200	143	185	162	133	116	96	75
	19	409	343	272	232	189	137	166	145	119	104	86	67
	20	380	321	254	217	178	130	150	131	107	94	78	61
	21	353	298	237	203	166	123	136	119	97	85	71	55
	22	326	276	220	189	155	116	124	108	89	78	64	50
	23	299	255	204	175	144	109	113	99	81	71	59	46
	24	275	234	188	162	133	102	104	91	75	65	54	42
	25	253	216	173	149	123	95	96	84	69	60	50	39
	26	234	200	160	138	114	88	<u>89</u>	78	64	55	46	36
	27	217	185	149	128	105	81	<u>72</u>	<u>72</u>	<u>59</u>	51	43	33
	28	202	172	138	119	98	76				<u>48</u>	<u>40</u>	31
	29	188	160	129	111	91	71						<u>29</u>
	30	176	150	120	104	85	66						
	31	165	140	113	97	80	62						
	32	155	132	106	91	75	58						
	33	145	124	100	86	70	54						
	34	137	117	94	81	66	51						
	35	129	110	88	76	63	48						
	36	122	104	84	72	59	46						
	37	116	99	79	68	56	43						
	38	110	93	75	65	53	41						
	39	<u>104</u>	89	71	61	50	39						
	40		84	68	58	48	37						
PROPERTIES													
Area, In. ²	18.7	15.3	11.8	9.92	8.03	6.06	16.4	13.5	10.4	8.76	7.10	5.37	
I _x , In. ⁴	321	271	215	184	151	116	245	209	168	144	119	91.8	
I _y , In. ⁴	106	91.1	72.9	62.8	51.9	40.0	40.3	35.3	28.9	25.2	21.0	16.4	
Ratio r _x / r _y	1.74	1.72	1.72	1.71	1.71	1.70	2.47	2.43	2.41	2.39	2.38	2.37	
r _y , In.	2.39	2.44	2.49	2.52	2.54	2.57	1.57	1.62	1.67	1.70	1.72	1.75	

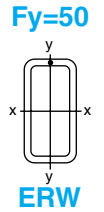
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

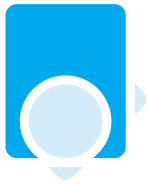
Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		12 x 3 1/2		12 x 3			12 x 2		10 x 8				
Wall Thickness		3/8	5/16	5/16	1/4	3/16	1/4	3/16	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		36.41	24.97	29.72	24.12	18.35	22.42	17.08	55.66	42.79	36.10	29.23	22.18
Design Wall Thickness		0.349	0.291*	0.291*	0.233*	0.174*	0.233*	0.174*	0.465	0.349	0.291	0.233*	0.174*
F_y = 50 ksi													
Effective length KL in feet	0	425	352	340	250	165	231	151	650	502	422	332	222
	2	417	347	333	245	162	221	146	647	499	420	331	222
	3	407	340	325	240	160	210	140	644	497	418	329	221
	4	393	331	313	232	155	195	132	639	493	415	328	220
	5	376	319	295	223	150	176	122	633	489	411	325	219
	6	356	302	275	211	144	153	110	626	483	406	322	217
	7	334	284	252	198	137	127	96	617	477	401	319	215
	8	310	264	229	184	129	102	81	607	469	395	315	213
	9	285	244	205	168	119	81	65	596	461	388	310	211
	10	259	222	181	150	110	65	53	584	452	381	305	208
	11	234	201	158	131	99	54	43	571	442	373	300	205
	12	209	180	136	113	88	45	37	558	432	364	294	202
	13	184	160	116	97	77	39	31	543	421	355	288	199
	14	161	140	100	83	66	33	27	527	409	346	281	195
	15	140	122	87	73	58	<u>33</u>	<u>27</u>	511	397	335	273	191
	16	123	107	76	64	51			495	385	325	264	187
	17	109	95	68	57	45			478	372	314	256	183
	18	97	85	60	50	40			460	359	303	247	178
	19	87	76	54	45	36			442	345	292	238	172
	20	79	69	49	41	32			424	332	281	229	167
	21	72	62	<u>44</u>	<u>37</u>	29			406	318	269	220	161
	22	65	57		<u>37</u>	<u>27</u>			388	304	258	211	156
	23	60	52			<u>27</u>			370	290	246	201	150
	24	<u>55</u>	<u>48</u>						352	276	235	192	144
	25								334	263	223	183	138
	26								316	249	212	174	132
	27								299	236	201	165	126
	28								282	223	190	156	119
	29								265	210	179	148	113
	30								248	198	169	139	107
	31								233	185	159	131	101
	32								218	174	149	123	94
	33								205	163	140	115	89
	34								193	154	132	109	84
	35								182	145	124	103	79
	36								172	137	118	97	75
	37								163	130	111	92	71
	38								155	123	106	87	67
	39								147	117	100	83	64
	40								140	111	95	79	60
PROPERTIES													
Area, In. ²	10.0	8.46	8.17	6.63	5.02	6.17	4.67	15.3	11.8	9.92	8.03	6.06	
I _x , In. ⁴	156	134	124	103	79.6	86.9	67.4	214	169	145	119	91.4	
I _y , In. ⁴	21.3	18.6	13.1	11.1	8.72	4.40	3.55	151	120	103	84.7	65.1	
Ratio r _x / r _y	2.71	2.68	3.08	3.05	3.02	4.44	4.36	1.19	1.19	1.19	1.19	1.18	
r _y , In.	1.46	1.48	1.27	1.29	1.32	0.845	0.872	3.14	3.19	3.22	3.25	3.28	

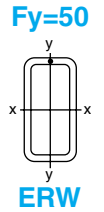
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		10 x 6					10 x 5				
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	3/8	5/16	1/4	3/16
Weight Per Foot		59.32	48.85	37.69	31.84	25.82	19.63	35.13	29.72	24.12	18.35
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233*	0.174*	0.349	0.291	0.233*	0.174*
F_y = 50 ksi											
Effective length KL in feet	0	697	574	442	372	293	199	411	347	273	184
	2	692	570	439	370	291	198	407	344	271	183
	3	685	564	435	367	289	197	402	340	268	182
	4	676	557	430	362	286	195	395	334	264	180
	5	664	548	423	357	283	193	386	327	260	177
	6	650	537	415	350	278	190	376	318	254	174
	7	634	524	405	342	273	187	363	308	248	170
	8	616	510	395	333	267	184	350	297	240	166
	9	596	494	383	324	261	180	335	285	232	161
	10	575	477	370	313	254	176	320	272	222	156
	11	552	459	357	302	246	171	303	258	211	150
	12	528	440	343	290	236	166	287	244	200	144
	13	504	420	328	278	226	161	269	229	188	137
	14	478	400	313	265	216	155	252	215	176	130
	15	452	379	297	252	206	150	234	200	165	123
	16	426	358	281	239	195	143	216	185	153	116
	17	400	337	265	226	185	137	199	171	141	108
	18	374	316	249	213	174	130	183	157	130	100
	19	348	295	233	200	163	123	166	143	119	92
	20	323	274	218	187	153	116	151	130	108	84
	21	299	255	203	174	143	109	137	118	98	77
	22	275	235	188	161	133	102	124	107	90	70
	23	252	216	173	149	123	95	114	98	82	64
	24	231	198	159	137	113	88	105	90	75	59
	25	213	183	147	127	104	81	96	83	69	54
	26	197	169	136	117	96	75	89	77	64	50
	27	183	157	126	109	89	69	83	71	59	46
	28	170	146	117	101	83	64	77	66	55	43
	29	158	136	109	94	78	60	72	62	52	40
	30	148	127	102	88	72	56	67	58	48	37
	31	138	119	95	82	68	53	63	54	45	35
	32	130	112	90	77	64	49	59	51	42	33
	33	122	105	84	73	60	46	55	48	40	31
	34	115	99	79	69	56	44	<u>52</u>	<u>45</u>	37	29
	35	109	93	75	65	53	41	<u>52</u>	<u>45</u>	<u>35</u>	<u>28</u>
	36	103	88	71	61	50	39				
	37	97	83	67	58	48	37				
	38	92	79	64	55	45	35				
	39	<u>87</u>	<u>75</u>	60	52	43	33				
	40		<u>75</u>	57	49	41	32				
PROPERTIES											
Area, In. ²	16.4	13.5	10.4	8.76	7.10	5.37	9.67	8.17	6.63	5.02	
I _x , In. ⁴	201	171	137	118	96.9	74.6	120	104	85.8	66.2	
I _y , In. ⁴	89.4	76.8	61.8	53.3	44.1	34.1	40.6	35.2	29.3	22.7	
Ratio r _x / r _y	1.50	1.49	1.49	1.49	1.48	1.48	1.72	1.72	1.71	1.71	
r _y , In.	2.34	2.39	2.44	2.47	2.49	2.52	2.05	2.07	2.10	2.13	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

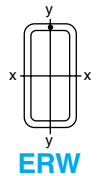
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50



Nominal Size		10 x 4					10 x 3 1/2	10 x 3					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	3/16	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		50.81	42.05	32.58	27.59	22.42	17.08	16.44	30.03	25.46	20.72	15.80	10.71
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233*	0.174*	0.174*	0.349	0.291	0.233*	0.174*	0.116*
F_y = 50 ksi													
Effective length KL in feet	0	595	493	381	323	253	170	163	351	298	233	155	88
	2	585	485	375	318	250	168	161	342	290	229	153	87
	3	572	475	368	312	247	166	158	330	280	223	150	85
	4	554	461	358	304	242	163	155	314	267	215	145	83
	5	532	444	346	294	235	160	150	295	252	205	140	81
	6	507	424	331	282	228	155	145	272	234	192	133	78
	7	479	402	315	268	219	150	139	249	214	177	125	74
	8	448	378	297	253	208	144	132	223	194	161	117	70
	9	415	352	278	238	195	138	124	198	173	144	107	66
	10	382	325	258	221	182	131	116	173	152	127	97	61
	11	348	298	237	204	169	123	107	149	132	111	86	56
	12	314	271	217	187	155	115	97	127	113	96	75	51
	13	281	244	197	170	142	107	87	108	96	82	64	45
	14	249	218	177	154	128	98	77	93	83	71	55	39
	15	219	193	158	138	116	89	68	81	72	61	48	34
	16	192	170	140	123	103	80	59	71	63	54	42	30
	17	170	150	124	109	91	71	53	63	56	48	37	27
	18	152	134	110	97	82	63	47	56	50	43	33	24
	19	136	120	99	87	73	57	42	51	45	38	30	21
	20	123	109	89	78	66	51	38	46	41	35	27	19
	21	112	99	81	71	60	46	34			31	25	17
	22	102	90	74	65	55	42	31					16
	23	93	82	68	59	50	39	29					
	24	85	75	62	54	46	36	26					
	25	79	70	57	50	42	33	24					
	26		64	53	46	39	30						
	27			49	43	36	28						
	28				43	36	28						
	29					34	26						
	30												
	31												
	32												
	33												
	34												
	35												
	36												
	37												
	38												
	39												
	40												
PROPERTIES													
Area, In. ²	14.0	11.6	8.97	7.59	6.17	4.67	4.50	8.27	7.01	5.70	4.32	2.93	
I _x , In. ⁴	149	129	104	90.1	74.7	57.8	53.6	88.0	76.3	63.6	49.4	34.2	
I _y , In. ⁴	33.4	29.4	24.3	21.2	17.7	13.9	10.3	12.4	11.0	9.28	7.33	5.16	
Ratio r _x / r _y	2.11	2.09	2.07	2.06	2.05	2.04	2.28	2.66	2.63	2.62	2.60	2.57	
r _y , In.	1.54	1.59	1.64	1.67	1.70	1.72	1.51	1.22	1.25	1.28	1.30	1.33	

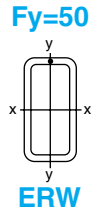
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

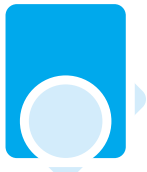
Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		10 x 2				9 x 7					
Wall Thickness		3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		27.48	23.34	19.02	14.53	59.32	48.85	37.69	31.84	25.82	19.63
Design Wall Thickness		0.349	0.291	0.233*	0.174*	0.581	0.465	0.349	0.291	0.233*	0.174*
F_y = 50 ksi											
Effective length KL in feet	0	322	273	214	142	697	574	442	372	302	209
	2	301	256	204	136	693	571	440	370	300	208
	3	276	237	193	130	688	567	437	368	298	207
	4	245	212	175	122	681	561	432	364	296	205
	5	210	183	153	111	672	554	427	360	292	204
	6	174	154	130	98	661	545	421	355	288	201
	7	140	125	107	84	649	535	413	349	283	199
	8	108	98	85	69	635	524	405	342	278	196
	9	86	78	67	54	619	512	396	334	271	192
	10	69	63	54	44	602	498	386	326	265	189
	11	57	52	45	36	584	484	375	317	258	185
	12	48	44	38	31	564	468	363	307	250	180
	13	41	37	32	26	544	452	351	297	242	176
	14	<u>41</u>	<u>37</u>	<u>32</u>	<u>22</u>	523	435	338	287	234	171
	15					501	418	325	276	225	165
	16					479	400	312	265	216	160
	17					456	381	298	253	207	154
	18					433	363	284	242	198	148
	19					411	345	270	230	188	142
	20					388	326	256	218	179	136
	21					365	308	242	207	170	130
	22					343	290	229	195	160	123
	23					321	272	215	184	151	116
	24					300	254	202	173	142	109
	25					279	237	189	162	133	103
	26					258	221	176	151	125	96
	27					239	204	163	141	116	90
	28					223	190	152	131	108	84
	29					208	177	142	122	101	78
	30					194	166	132	114	94	73
	31					182	155	124	107	88	68
	32					170	146	116	100	83	64
	33					160	137	109	94	78	60
	34					151	129	103	89	73	57
	35					142	122	97	84	69	54
	36					135	115	92	79	65	51
	37					127	109	87	75	62	48
	38					121	103	82	71	59	45
	39					115	98	78	67	56	43
	40					109	93	74	64	53	41
PROPERTIES											
Area, In. ²	7.58	6.43	5.24	3.98	16.4	13.5	10.4	8.76	7.10	5.37	
I _x , In. ⁴	71.7	62.6	52.5	41.0	174	149	119	102	84.1	64.7	
I _y , In. ⁴	4.69	4.24	3.67	2.97	117	100	80.4	69.2	57.2	44.1	
Ratio r _x / r _y	3.91	3.84	3.78	3.72	1.22	1.22	1.22	1.21	1.21	1.21	
r _y , In.	0.786	0.812	0.837	0.864	2.68	2.73	2.78	2.81	2.84	2.87	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

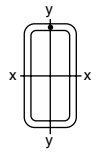
Note: Double Horizontal Line indicates KL/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50



ERW

Nominal Size		9 x 5					9 x 3					
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		50.81	42.05	32.58	27.59	22.42	17.08	35.24	27.48	23.34	19.02	14.53
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233*	0.174*	0.465	0.349	0.291	0.233*	0.174*
F_y = 50 ksi												
Effective length KL in feet	0	595	493	381	323	262	179	414	322	273	223	151
	2	588	488	377	319	260	178	401	313	266	217	148
	3	580	481	373	315	257	177	386	302	257	210	145
	4	568	472	366	310	252	174	365	287	245	201	140
	5	554	461	358	303	247	171	340	269	230	189	134
	6	537	447	348	295	240	168	312	249	214	176	127
	7	517	432	336	285	233	164	282	226	195	162	119
	8	496	414	324	275	224	160	251	203	176	147	110
	9	472	396	310	263	215	155	220	180	157	131	101
	10	447	376	295	251	206	149	189	157	138	116	90
	11	421	355	280	238	195	143	160	135	119	101	79
	12	394	334	264	225	185	137	135	114	102	87	68
	13	367	312	248	211	174	130	115	97	87	74	58
	14	340	290	231	197	163	123	99	84	75	64	50
	15	313	268	215	184	152	115	86	73	65	56	44
	16	286	246	198	170	141	108	76	64	57	49	38
	17	261	225	182	156	130	100	67	57	51	43	34
	18	236	205	167	143	119	92	60	51	45	39	30
	19	212	185	152	131	109	84	<u>54</u>	46	41	35	27
	20	191	167	137	118	99	76	<u>41</u>	<u>37</u>	<u>31</u>	<u>25</u>	<u>22</u>
	21	173	151	124	107	90	69				<u>28</u>	<u>22</u>
	22	158	138	113	98	82	63					
	23	145	126	104	89	75	58					
	24	133	116	95	82	69	53					
	25	122	107	88	76	63	49					
	26	113	99	81	70	59	45					
	27	105	91	75	65	54	42					
	28	98	85	70	60	50	39					
	29	91	79	65	56	47	36					
	30	85	74	61	53	44	34					
	31	80	69	57	49	41	32					
	32	<u>75</u>	<u>65</u>	53	46	39	30					
	33			<u>50</u>	43	36	28					
	34				<u>41</u>	<u>34</u>	<u>26</u>					
	35						<u>25</u>					
	36											
	37											
	38											
	39											
	40											
PROPERTIES												
Area, In. ²	14.0	11.6	8.97	7.59	6.17	4.67	9.74	7.58	6.43	5.24	3.98	
I _x , In. ⁴	133	115	92.5	79.8	66.1	51.1	80.8	66.3	57.7	48.2	37.6	
I _y , In. ⁴	51.9	45.2	36.8	32.0	26.6	20.7	13.2	11.2	9.88	8.38	6.63	
Ratio r _x / r _y	1.60	1.60	1.59	1.58	1.58	1.57	2.47	2.43	2.42	2.40	2.38	
r _y , In.	1.92	1.97	2.03	2.05	2.08	2.10	1.16	1.21	1.24	1.27	1.29	

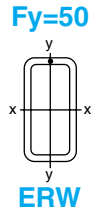
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates KL/r limit of 200.



LRFD Columns Rectangular HSS

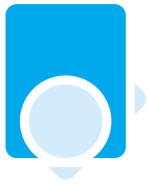
Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		8 x 6						8 x 4						
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	5/8	1/2	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		50.81	42.05	32.58	27.59	22.42	17.08	42.30	35.24	27.48	23.34	19.02	14.53	9.86
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174*	0.581	0.465	0.349	0.291	0.233	0.174*	0.116*
F_y = 50 ksi														
Effective length KL in feet	0	595	493	381	323	262	189	497	414	322	273	223	159	92
	2	590	489	378	320	260	187	488	407	317	269	219	158	91
	3	584	484	375	317	258	186	477	398	311	264	215	155	90
	4	576	478	370	313	255	184	462	386	302	256	209	152	89
	5	565	469	364	308	251	182	443	372	291	247	202	148	87
	6	553	459	357	302	246	179	421	354	278	237	194	144	85
	7	538	448	348	295	240	176	397	335	264	225	185	138	82
	8	522	435	338	287	234	172	370	314	248	212	174	132	79
	9	504	421	328	278	227	168	342	292	232	198	163	125	76
	10	485	405	317	269	219	163	313	269	215	184	152	117	72
	11	465	389	304	259	211	158	284	245	197	169	140	108	68
	12	443	372	292	248	203	153	256	222	179	154	128	99	64
	13	421	354	278	237	194	147	228	199	162	140	117	91	59
	14	399	336	265	225	185	141	201	177	145	126	105	82	55
	15	376	317	251	214	176	134	176	156	129	112	94	74	50
	16	353	299	237	202	166	127	154	137	114	99	84	66	45
	17	330	280	223	190	157	120	137	122	101	88	74	58	40
	18	307	262	209	178	147	113	122	108	90	78	66	52	36
	19	285	243	195	167	138	106	109	97	81	70	59	47	32
	20	263	225	181	155	129	99	99	88	73	63	53	42	29
	21	242	208	168	144	119	92	90	80	66	57	49	38	27
	22	221	191	155	133	111	86	82	73	60	52	44	35	24
	23	202	175	142	122	102	79	75	66	55	48	40	32	22
	24	186	161	131	112	94	73	69	61	51	44	37	29	20
	25	171	148	120	104	86	67	<u>63</u>	56	47	41	34	27	19
	26	158	137	111	96	80	62		<u>52</u>	<u>43</u>	37	32	25	17
	27	147	127	103	89	74	57			<u>35</u>	<u>29</u>	<u>23</u>	<u>16</u>	<u>15</u>
	28	136	118	96	83	69	53							
	29	127	110	90	77	64	50							
	30	119	103	84	72	60	47							
	31	111	96	78	67	56	44							
	32	104	90	74	63	53	41							
	33	98	85	69	59	50	38							
	34	92	80	65	56	47	36							
	35	87	76	61	53	44	34							
	36	82	71	58	50	42	32							
	37	<u>78</u>	68	55	47	39	31							
	38		<u>64</u>	52	45	37	29							
	39			<u>49</u>	43	35	28							
	40			<u>40</u>	40	34	26							
PROPERTIES														
Area, In. ²	14.0	11.6	8.97	7.59	6.17	4.67	11.7	9.74	7.58	6.43	5.24	3.98	2.70	
I _x , In. ⁴	114	98.2	79.1	68.3	56.6	43.7	81.9	71.7	58.7	51.0	42.5	33.1	22.9	
I _y , In. ⁴	72.2	62.5	50.6	43.8	36.4	28.2	26.6	23.6	19.6	17.2	14.4	11.3	7.90	
Ratio r _x /r _y	1.26	1.25	1.25	1.25	1.25	1.24	1.75	1.74	1.73	1.72	1.72	1.71	1.70	
r _y , In.	2.27	2.32	2.38	2.40	2.43	2.46	1.51	1.56	1.61	1.63	1.66	1.69	1.71	

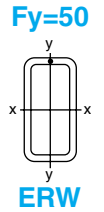
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		8 x 3					8 x 2					
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		31.84	24.93	21.21	17.32	13.25	9.01	22.37	19.08	15.62	11.97	8.16
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174*	0.116*	0.349	0.291	0.233	0.174*	0.116*
F_y = 50 ksi												
Effective length KL in feet	0	374	292	249	203	145	83	263	224	183	130	73
	2	363	284	242	197	142	81	245	209	172	125	71
	3	349	274	234	191	138	80	224	193	159	118	68
	4	330	260	222	182	134	78	199	172	143	109	64
	5	307	244	209	171	128	75	170	148	124	97	59
	6	281	225	194	159	120	71	140	124	105	83	53
	7	253	204	177	146	112	68	112	100	86	69	46
	8	225	183	159	132	102	63	86	78	68	55	39
	9	196	162	141	117	92	59	68	62	54	44	32
	10	169	141	124	103	81	54	55	50	44	35	26
	11	143	121	107	90	71	48	46	41	36	29	21
	12	120	102	91	77	61	43	<u>38</u>	35	30	25	18
	13	102	87	78	65	52	37	<u>30</u>	<u>30</u>	<u>26</u>	21	15
	14	88	75	67	56	45	32				<u>18</u>	<u>13</u>
	15	77	65	58	49	39	28					
	16	67	57	51	43	34	24					
	17	60	51	45	38	30	22					
	18	53	45	40	34	27	19					
	19	<u>48</u>	41	36	31	24	17					
	20		<u>37</u>	<u>33</u>	<u>28</u>	<u>22</u>	16					
	21					<u>20</u>	<u>14</u>					
	22											
	23											
	24											
	25											
	26											
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	31											
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	34											
	35											
	36											
	37											
	38											
	39											
	40											
PROPERTIES												
Area, In. ²	8.81	6.88	5.85	4.77	3.63	2.46	6.18	5.26	4.30	3.28	2.23	
I _x , In. ⁴	58.5	48.5	42.4	35.5	27.8	19.3	38.2	33.7	28.5	22.4	15.7	
I _y , In. ⁴	11.7	9.94	8.81	7.49	5.94	4.20	3.72	3.38	2.94	2.39	1.72	
Ratio r _x /r _y	2.24	2.21	2.19	2.18	2.16	2.14	3.20	3.16	3.11	3.06	3.02	
r _y , In.	1.15	1.20	1.23	1.25	1.28	1.31	0.776	0.801	0.827	0.853	0.879	

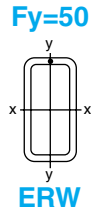
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates Kl/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		7 x 5						7 x 4						
Wall Thickness		5/8	1/2	3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		42.30	35.24	27.48	23.34	19.02	14.53	9.86	31.84	24.93	21.21	17.32	13.25	9.01
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174*	0.116*	0.465	0.349	0.291	0.233	0.174*	0.116*
F_y = 50 ksi														
Effective length KL in feet	0	497	414	322	273	223	168	99	374	292	249	203	153	89
	2	491	409	319	270	220	166	98	368	288	245	200	151	88
	3	484	403	314	267	218	165	97	360	282	240	196	149	87
	4	474	395	308	262	214	162	96	348	273	233	190	145	86
	5	461	385	301	256	209	159	95	335	263	225	184	140	84
	6	446	373	292	248	203	155	93	318	251	215	176	134	81
	7	428	359	282	240	196	150	91	300	238	204	167	128	78
	8	409	344	270	231	189	144	88	281	223	192	158	121	75
	9	389	328	258	220	181	138	86	260	208	179	148	113	72
	10	367	310	245	209	172	132	82	239	192	166	137	105	68
	11	344	292	231	198	163	125	79	217	176	152	126	97	64
	12	321	273	217	186	154	118	76	196	159	139	115	89	59
	13	297	254	203	174	144	111	72	175	143	125	105	81	55
	14	274	235	188	162	134	104	68	155	128	112	94	73	50
	15	251	216	174	150	125	96	64	136	113	100	84	65	45
	16	228	198	160	138	115	89	60	119	99	88	74	58	41
	17	206	180	146	127	106	82	56	106	88	78	66	51	36
	18	185	162	133	115	97	75	52	94	79	69	59	46	32
	19	166	146	120	105	88	68	47	85	70	62	53	41	29
	20	150	132	108	94	79	62	43	76	64	56	48	37	26
	21	136	119	98	86	72	56	39	69	58	51	43	34	24
	22	124	109	89	78	65	51	35	63	53	46	39	31	22
	23	113	100	82	71	60	47	32	58	48	42	36	28	20
	24	104	91	75	66	55	43	30	53	44	39	33	26	18
	25	96	84	69	60	51	40	27	<u>49</u>	41	36	30	24	17
	26	89	78	64	56	47	37	25		<u>38</u>	<u>33</u>	28	22	15
	27	82	72	59	52	43	34	24				<u>26</u>	<u>20</u>	14
	28	76	67	55	48	40	32	22						<u>13</u>
	29	71	63	51	45	38	29	20						
	30	67	58	48	42	35	28	19						
	31	<u>62</u>	<u>55</u>	45	39	33	26	18						
	32			<u>42</u>	37	31	24	17						
	33				<u>35</u>	<u>29</u>	23	16						
	34					<u>21</u>	<u>16</u>	<u>15</u>						
	35													
	36													
	37													
	38													
	39													
	40													
PROPERTIES														
Area, In. ²	11.7	9.74	7.58	6.43	5.24	3.98	2.70	8.81	6.88	5.85	4.77	3.63	2.46	
I _x , In. ⁴	69.3	60.6	49.5	43.0	35.8	27.9	19.3	50.6	41.8	36.4	30.5	23.8	16.6	
I _y , In. ⁴	40.5	35.6	29.2	25.5	21.3	16.6	11.6	20.7	17.3	15.2	12.8	10.0	7.03	
Ratio r _x / r _y	1.31	1.30	1.30	1.30	1.30	1.30	1.29	1.56	1.55	1.55	1.54	1.54	1.54	
r _y , In.	1.86	1.91	1.96	1.99	2.02	2.05	2.07	1.53	1.58	1.61	1.64	1.66	1.69	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

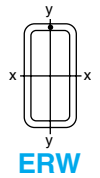
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

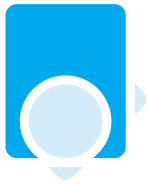
F_y=50



Nominal Size		7 x 3					6 x 5				
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16
Weight Per Foot		28.43	22.37	19.08	15.62	11.97	8.16	24.93	21.21	17.32	13.25
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174*	0.116*	0.349	0.291	0.233	0.174
F_y = 50 ksi											
Effective length KL in feet	0	335	263	224	183	138	80	292	249	203	154
	2	324	255	217	178	135	78	289	246	201	153
	3	311	246	210	172	131	77	285	243	198	151
	4	294	233	199	164	125	74	279	238	194	148
	5	273	218	187	154	118	71	272	232	190	145
	6	250	201	173	143	110	68	264	225	184	140
	7	225	182	157	131	101	64	254	217	178	136
	8	199	163	141	118	91	59	244	208	171	131
	9	174	144	125	105	81	54	232	199	163	125
	10	149	125	109	92	72	49	220	188	155	119
	11	125	107	94	80	62	44	207	178	146	113
	12	105	90	79	68	54	38	194	167	138	106
	13	90	77	68	58	46	33	180	156	129	99
	14	77	66	58	50	39	28	167	144	120	93
	15	67	58	51	44	34	24	154	133	111	86
	16	59	51	45	38	30	21	141	122	102	79
	17	53	45	39	34	27	19	128	112	93	73
	18	47	40	35	30	24	17	116	101	85	66
	19	42	36	32	27	21	15	104	91	77	60
	20	<u>42</u>	<u>36</u>	<u>29</u>	<u>24</u>	19	14	94	82	69	54
	21					<u>17</u>	<u>12</u>	85	75	63	49
	22							78	68	57	45
	23							71	62	52	41
	24							65	57	48	38
	25							60	53	44	35
	26							56	49	41	32
	27							52	45	38	30
	28							48	42	35	28
	29							45	39	33	26
	30							42	37	31	24
	31							39	34	29	23
	32							<u>37</u>	<u>32</u>	27	21
	33									<u>25</u>	<u>20</u>
	34										
	35										
	36										
	37										
	38										
	39										
	40										
PROPERTIES											
Area, In. ²	7.88	6.18	5.26	4.30	3.28	2.23	6.88	5.85	4.77	3.63	
I _x , In. ⁴	40.7	34.0	29.9	25.2	19.8	13.8	33.9	29.6	24.7	19.3	
I _y , In. ⁴	10.2	8.70	7.74	6.59	5.24	3.71	25.5	22.3	18.7	14.6	
Ratio r _x / r _y	2.00	1.98	1.97	1.96	1.94	1.93	1.15	1.15	1.15	1.15	
r _y , In.	1.14	1.19	1.21	1.24	1.26	1.29	1.92	1.95	1.98	2.01	

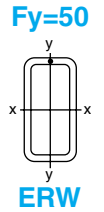
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		6 x 4						6 x 3					
Wall Thickness		1/2	3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		28.43	22.37	19.08	15.62	11.97	8.16	25.03	19.82	16.96	13.91	10.70	7.31
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.116*	0.465	0.349	0.291	0.233	0.174	0.116*
F_y = 50 ksi													
Effective length KL in feet	0	335	263	224	183	139	86	295	233	199	163	125	77
	2	329	258	220	180	137	85	286	226	193	159	121	75
	3	321	252	215	176	135	84	274	217	186	153	117	73
	4	311	245	209	171	131	82	258	206	177	146	112	71
	5	298	235	201	165	126	80	239	192	165	137	105	68
	6	283	224	192	158	121	77	218	177	152	127	98	64
	7	266	212	182	150	115	74	196	160	138	115	90	60
	8	248	198	171	141	108	71	173	142	124	104	81	55
	9	229	184	159	132	101	67	150	125	109	92	72	50
	10	210	169	147	122	94	63	128	108	95	80	63	44
	11	190	155	134	112	86	59	107	92	81	69	55	39
	12	171	140	122	102	79	55	90	77	68	59	47	33
	13	152	125	110	92	71	50	76	66	58	50	40	28
	14	134	111	98	82	64	45	66	57	50	43	35	24
	15	117	98	86	73	57	40	57	49	44	38	30	21
	16	103	86	76	65	50	36	50	43	38	33	26	19
	17	91	76	67	57	45	32	45	38	34	29	23	17
	18	81	68	60	51	40	28	<u>40</u>	34	30	26	21	15
	19	73	61	54	46	36	25	<u>40</u>	<u>31</u>	<u>27</u>	23	19	13
	20	66	55	49	41	32	23				<u>21</u>	<u>17</u>	12
	21	60	50	44	37	29	21						<u>11</u>
	22	54	45	40	34	27	19						
	23	50	42	37	31	24	17						
	24	46	38	34	29	22	16						
	25	<u>42</u>	<u>35</u>	31	26	21	15						
	26			<u>29</u>	<u>24</u>	19	13						
	27					<u>18</u>	<u>12</u>						
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PROPERTIES													
Area, In. ²	7.88	6.18	5.26	4.30	3.28	2.23	6.95	5.48	4.68	3.84	2.93	2.00	
I _x , In. ⁴	33.9	28.3	24.8	20.9	16.4	11.4	26.8	22.7	20.1	17.0	13.4	9.43	
I _y , In. ⁴	17.7	14.9	13.1	11.1	8.76	6.15	8.65	7.47	6.66	5.70	4.55	3.23	
Ratio r _x / r _y	1.38	1.38	1.38	1.37	1.37	1.36	1.76	1.74	1.74	1.73	1.72	1.71	
r _y , In.	1.50	1.55	1.58	1.61	1.63	1.66	1.12	1.17	1.19	1.22	1.25	1.27	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

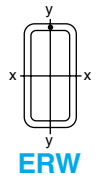
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50



Nominal Size		6 x 2					5 x 4				
Wall Thickness		3/8	5/16	1/4	3/16	1/8	1/2	3/8	5/16	1/4	3/16
Weight Per Foot		17.27	14.83	12.21	9.42	6.46	25.03	19.82	16.96	13.91	10.70
Design Wall Thickness		0.349	0.291	0.233	0.174	0.116*	0.465	0.349	0.291	0.233	0.174
F_y = 50 ksi											
Effective length KL in feet	0	203	174	143	110	67	295	233	199	163	125
	2	189	163	134	103	64	290	229	195	160	122
	3	172	149	124	96	61	283	224	191	157	120
	4	152	132	111	86	57	273	217	185	152	117
	5	129	114	96	75	51	261	208	178	147	112
	6	105	94	80	64	45	247	198	170	140	107
	7	83	75	65	52	38	232	186	160	132	102
	8	64	58	51	42	30	215	174	150	124	96
	9	50	46	40	33	24	198	161	139	115	89
	10	41	37	33	27	19	180	148	128	106	83
	11	34	31	27	22	16	162	134	116	97	76
	12	<u>28</u>	26	23	19	14	145	121	105	88	69
	13		<u>22</u>	<u>19</u>	<u>16</u>	<u>12</u>	128	108	94	79	62
	14					<u>10</u>	112	95	83	71	56
	15						98	83	73	62	49
	16						86	73	64	55	43
	17						76	65	57	49	38
	18						68	58	51	43	34
	19						61	52	46	39	31
	20						55	47	41	35	28
	21						50	43	37	32	25
	22						45	39	34	29	23
	23						41	35	31	27	21
	24						<u>38</u>	33	29	24	19
	25							<u>30</u>	<u>26</u>	22	18
	26									<u>21</u>	<u>16</u>
	27										
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	40										
PROPERTIES											
Area, In. ²	4.78	4.10	3.37	2.58	1.77	6.95	5.48	4.68	3.84	2.93	
I _x , In. ⁴	17.1	15.3	13.1	10.5	7.42	21.2	17.9	15.8	13.4	10.6	
I _y , In. ⁴	2.75	2.52	2.21	1.80	1.31	14.8	12.6	11.1	9.46	7.48	
Ratio r _x / r _y	2.49	2.46	2.43	2.42	2.38	1.20	1.19	1.19	1.19	1.19	
r _y , In.	0.759	0.784	0.809	0.835	0.861	1.46	1.52	1.54	1.57	1.60	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

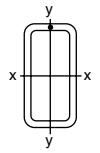
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50

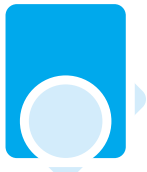


ERW

Nominal Size		5 x 3					5 x 2 1/2			
Wall Thickness	1/2	3/8	5/16	1/4	3/16	1/8	1/4	3/16	1/8	
Weight Per Foot	21.63	17.27	14.83	12.21	9.42	6.46	11.36	8.78	6.03	
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.116*	0.233	0.174	0.116*	
F_y = 50 ksi										
Effective length KL in feet	0	256	203	174	143	110	73	133	102	68
	2	247	197	169	139	107	71	128	98	66
	3	236	189	163	134	103	69	121	94	63
	4	222	178	154	127	98	67	113	87	60
	5	205	166	144	119	92	63	102	80	55
	6	186	152	132	110	85	59	91	71	50
	7	166	137	120	99	78	54	79	62	44
	8	145	121	107	89	70	49	68	54	38
	9	125	105	93	78	62	44	57	45	32
	10	105	90	81	68	54	38	46	37	27
	11	88	76	69	58	47	33	38	31	22
	12	74	64	58	49	40	28	32	26	19
	13	63	54	49	42	34	24	27	22	16
	14	54	47	42	36	29	21	24	19	14
	15	47	41	37	31	25	18	21	17	12
	16	41	36	32	28	22	16	<u>18</u>	15	11
	17	37	32	29	24	20	14	<u>13</u>	<u>13</u>	9
	18	<u>33</u>	28	26	22	18	13			<u>9</u>
	19		<u>25</u>	<u>23</u>	<u>20</u>	16	11			
	20					<u>14</u>	<u>10</u>			
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PROPERTIES										
Area, In. ²	6.02	4.78	4.10	3.37	2.58	1.77	3.14	2.41	1.65	
I _x , In. ⁴	16.4	14.1	12.6	10.7	8.53	6.03	9.40	7.51	5.34	
I _y , In. ⁴	7.14	6.23	5.59	4.81	3.85	2.75	3.13	2.53	1.82	
Ratio r _x / r _y	1.52	1.50	1.50	1.49	1.49	1.48	1.73	1.72	1.71	
r _y , In.	1.09	1.14	1.17	1.19	1.22	1.25	0.998	1.02	1.05	

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.

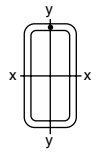
Note: Double Horizontal Line indicates K/l/r limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50

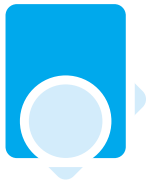


ERW

Nominal Size		5 x 2					4 x 3					4 x 2 1/2		
Wall Thickness		3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8	5/16	1/4	3/16
Weight Per Foot		14.72	12.70	10.51	8.15	5.61	14.72	12.70	10.51	8.15	5.61	11.64	9.66	7.51
Design Wall Thickness		0.349	0.291	0.233	0.174	0.116*	0.349	0.291	0.233	0.174	0.116	0.291	0.233	0.174
F_y = 50 ksi														
Effective length KL in feet	0	174	150	124	95	63	174	150	124	95	65	137	113	88
	2	161	139	116	89	60	168	145	120	92	64	131	109	84
	3	147	128	106	83	57	161	139	115	89	61	123	103	80
	4	128	113	95	74	52	152	131	109	85	58	114	95	74
	5	108	96	82	64	45	140	122	102	79	55	102	86	67
	6	88	79	68	54	39	128	111	93	73	51	90	76	60
	7	69	63	55	44	32	114	100	84	66	46	77	66	52
	8	53	48	43	35	26	101	88	75	59	41	65	56	45
	9	42	38	34	28	20	87	77	66	52	37	53	46	37
	10	34	31	27	22	16	74	66	57	45	32	43	37	30
	11	28	26	23	19	14	62	55	48	39	27	35	31	25
	12	<u>23</u>	<u>22</u>	19	16	11	52	46	40	33	23	30	26	21
	13			<u>16</u>	<u>13</u>	10	44	39	34	28	20	25	22	18
	14					<u>8</u>	38	34	30	24	17	22	19	16
	15						33	30	26	21	15	<u>19</u>	17	14
	16						29	26	23	18	13		<u>15</u>	<u>12</u>
	17						26	23	20	16	12			
	18						<u>23</u>	<u>21</u>	18	15	10			
	19								<u>16</u>	<u>13</u>	9			
	20										<u>8</u>			
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PROPERTIES														
Area, In. ²	4.09	3.52	2.91	2.24	1.54	4.09	3.52	2.91	2.24	1.54	3.23	2.67	2.06	
I _x , In. ⁴	10.3	9.34	8.08	6.50	4.65	7.92	7.13	6.15	4.93	3.52	6.13	5.32	4.30	
I _y , In. ⁴	2.27	2.09	1.84	1.51	1.10	5.00	4.52	3.91	3.16	2.27	2.89	2.53	2.06	
Ratio r _x / r _y	2.13	2.11	2.10	2.07	2.06	1.26	1.26	1.25	1.25	1.25	1.46	1.45	1.44	
r _y , In.	0.746	0.771	0.796	0.822	0.848	1.11	1.13	1.16	1.19	1.21	0.946	0.973	0.999	

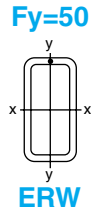
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40\sqrt{E/F_y}$.

Note: Double Horizontal Line indicates Kl/r limit of 200.



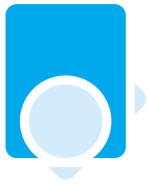
LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



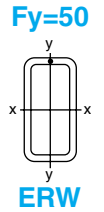
Nominal Size		4 x 2					3 1/2 x 2 1/2				
Wall Thickness		3/8	5/16	1/4	3/16	1/8	3/8	5/16	1/4	3/16	1/8
Weight Per Foot		12.17	10.58	8.81	6.87	4.75	12.17	10.58	8.81	6.87	4.75
Design Wall Thickness		0.349	0.291	0.233	0.174	0.116	0.349	0.291	0.233	0.174	0.116
F_y = 50 ksi											
Effective length KL in feet	0	144	125	104	80	55	144	125	104	80	55
	2	133	116	97	75	52	137	119	99	77	53
	3	120	106	89	69	48	128	112	93	73	50
	4	105	93	79	62	43	117	103	86	67	47
	5	88	78	67	53	38	104	92	78	61	43
	6	70	64	55	45	32	90	81	68	54	38
	7	54	50	44	36	26	76	69	59	47	33
	8	41	38	34	28	21	63	57	50	40	29
	9	33	30	27	22	16	50	46	41	33	24
	10	27	25	22	18	13	41	38	33	27	20
	11	22	20	18	15	11	34	31	27	22	16
	12	<u>18</u>	<u>17</u>	<u>15</u>	13	9	28	26	23	19	14
	13				<u>11</u>	<u>8</u>	24	22	20	16	12
	14						21	19	17	14	10
	15						<u>18</u>	<u>17</u>	<u>15</u>	12	9
	16									<u>11</u>	<u>8</u>
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PROPERTIES											
Area, In. ²	3.39	2.94	2.44	1.89	1.30	3.39	2.94	2.44	1.89	1.30	
I _x , In. ⁴	5.59	5.12	4.49	3.66	2.65	4.74	4.34	3.79	3.09	2.23	
I _y , In. ⁴	1.79	1.66	1.48	1.22	0.898	2.75	2.53	2.23	1.82	1.33	
Ratio r _x / r _y	1.77	1.76	1.74	1.73	1.72	1.31	1.31	1.30	1.30	1.29	
r _y , In.	0.727	0.752	0.778	0.804	0.830	0.902	0.929	0.956	0.983	1.01	

Note: Double Horizontal Line indicates K/l limit of 200.



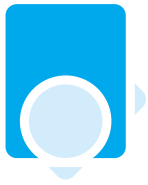
LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)



Nominal Size		3 x 2 1/2				3 x 2				3 x 1 1/2		
Wall Thickness		5/16	1/4	3/16	1/8	5/16	1/4	3/16	1/8	1/4	3/16	1/8
Weight Per Foot		9.51	7.96	6.23	4.33	8.45	7.11	5.59	3.90	6.26	4.96	3.48
Design Wall Thickness		0.291	0.233	0.174	0.116	0.291	0.233	0.174	0.116	0.233	0.174	0.116
F_y = 50 ksi												
Effective length KL in feet	0	112	94	73	51	100	84	65	45	74	58	41
	2	107	90	69	48	92	78	61	43	65	51	36
	3	100	84	66	46	83	71	56	39	55	44	32
	4	91	77	61	43	72	62	50	35	43	36	26
	5	81	70	55	39	60	52	42	30	32	27	20
	6	71	61	48	34	48	43	35	25	22	19	15
	7	60	52	42	30	37	33	28	20	16	14	11
	8	49	43	35	25	29	26	22	16	13	11	8
	9	40	35	29	21	23	20	17	13	<u>10</u>	<u>9</u>	7
	10	32	29	23	17	18	16	14	10			<u>5</u>
	11	27	24	19	14	15	14	11	8			
	12	22	20	16	12	<u>13</u>	<u>11</u>	<u>10</u>	7			
	13	19	17	14	10				<u>6</u>			
	14	16	15	12	9							
	15	<u>14</u>	<u>13</u>	10	8							
	16			<u>9</u>	<u>7</u>							
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PROPERTIES												
Area, In. ²	2.64	2.21	1.71	1.19	2.35	1.97	1.54	1.07	1.74	1.37	0.96	
I _x , In. ⁴	2.91	2.57	2.11	1.54	2.38	2.12	1.76	1.30	1.68	1.42	1.06	
I _y , In. ⁴	2.17	1.93	1.59	1.16	1.23	1.11	0.931	0.692	0.541	0.466	0.355	
Ratio r _x / r _y	1.16	1.15	1.15	1.15	1.39	1.38	1.37	1.37	1.76	1.75	1.73	
r _y , In.	0.907	0.935	0.962	0.990	0.724	0.750	0.777	0.804	0.558	0.584	0.610	

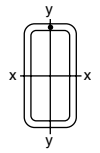
Note: Double Horizontal Line indicates K/L limit of 200.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

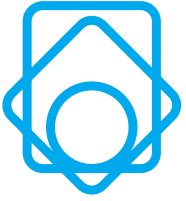
F_y=50



ERW

Nominal Size		3 x 1		2 1/2 x 1 1/2			2 x 1 1/2		2 x 1	
Wall Thickness		3/16	1/8	1/4	3/16	1/8	3/16	1/8	3/16	1/8
Weight Per Foot		6.32	3.05	5.41	4.32	3.05	3.68	2.63	3.04	2.20
Design Wall Thickness		0.174	0.116	0.233	0.174	0.116	0.174	0.116	0.174	0.116
F_y = 50 ksi										
Effective length K _L in feet	0	51	36	64	51	36	43	31	36	26
	2	38	28	56	44	32	38	27	26	20
	3	26	20	47	38	27	32	23	17	14
	4	16	13	36	30	22	25	19	10	9
	5	10	8	26	23	17	18	14	7	5
	6	<u>7</u>	<u>6</u>	18	16	12	13	10	<u>5</u>	<u>4</u>
	7			14	12	9	9	7		
	8			10	9	7	7	6		
	9			<u>8</u>	<u>7</u>	<u>5</u>	<u>6</u>	<u>4</u>		
	10									
	11									
	12									
	13									
	14									
	15									
	16									
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	35									
	36									
	37									
	38									
	39									
	40									
PROPERTIES										
Area, In. ²		1.19	0.84	1.51	1.19	0.84	1.02	0.72	0.84	0.61
I _x , In. ⁴		1.07	0.817	1.03	0.881	0.668	0.494	0.383	0.349	0.280
I _y , In. ⁴		0.172	0.138	0.447	0.389	0.299	0.312	0.244	0.112	0.092
Ratio r _x /r _y		2.49	2.43	1.52	1.50	1.49	1.26	1.25	1.77	1.74
r _y , In.		0.380	0.405	0.544	0.571	0.597	0.553	0.580	0.364	0.389

Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns

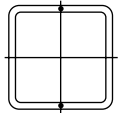
NOTES



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=46



SAW

Nominal Size		32 x 32			30 x 30			28 x 28			26 x 26		
Wall Thickness		5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		259.83	210.72	159.37	242.82	197.11	149.16	225.80	183.50	138.95	208.79	169.89	128.74
Design Wall Thickness		0.625*	0.500*	0.375*	0.625*	0.500*	0.375*	0.625*	0.500*	0.375*	0.625*	0.500*	0.375*
F_y = 46 ksi													
Effective length K _L in feet	0	2650	1900	1210	2570	1840	1180	2480	1780	1140	2380	1720	1110
	2	2650	1900	1210	2570	1840	1180	2470	1780	1140	2380	1720	1100
	3	2650	1900	1210	2560	1840	1180	2470	1780	1140	2380	1720	1100
	4	2650	1890	1210	2560	1840	1180	2470	1780	1140	2380	1720	1100
	5	2650	1890	1210	2560	1840	1180	2470	1780	1140	2370	1710	1100
	6	2650	1890	1210	2560	1840	1180	2470	1780	1140	2370	1710	1100
	7	2650	1890	1210	2560	1840	1180	2470	1780	1140	2370	1710	1100
	8	2640	1890	1210	2560	1840	1170	2470	1770	1140	2370	1710	1100
	9	2640	1890	1210	2560	1830	1170	2460	1770	1140	2360	1710	1100
	10	2640	1890	1210	2550	1830	1170	2460	1770	1140	2360	1710	1100
	11	2640	1890	1210	2550	1830	1170	2460	1770	1140	2360	1710	1100
	12	2640	1890	1210	2550	1830	1170	2450	1770	1140	2350	1700	1100
	13	2630	1880	1200	2550	1830	1170	2450	1770	1130	2350	1700	1100
	14	2630	1880	1200	2540	1830	1170	2450	1760	1130	2350	1700	1090
	15	2630	1880	1200	2540	1820	1170	2440	1760	1130	2340	1690	1090
	16	2620	1880	1200	2530	1820	1170	2440	1760	1130	2340	1690	1090
	17	2620	1880	1200	2530	1820	1170	2430	1760	1130	2330	1690	1090
	18	2620	1870	1200	2530	1820	1160	2430	1750	1130	2330	1680	1090
	19	2610	1870	1200	2520	1810	1160	2420	1750	1130	2320	1680	1090
	20	2610	1870	1200	2520	1810	1160	2420	1750	1120	2310	1680	1080
	21	2600	1870	1200	2510	1810	1160	2410	1740	1120	2310	1670	1080
	22	2600	1860	1190	2510	1800	1160	2410	1740	1120	2300	1670	1080
	23	2600	1860	1190	2500	1800	1160	2400	1740	1120	2290	1660	1080
	24	2590	1860	1190	2500	1800	1160	2390	1730	1120	2280	1660	1070
	25	2590	1860	1190	2490	1790	1150	2390	1730	1110	2270	1650	1070
	26	2580	1850	1190	2480	1790	1150	2380	1720	1110	2260	1650	1070
	27	2570	1850	1190	2480	1790	1150	2370	1720	1110	2250	1640	1070
	28	2570	1850	1180	2470	1780	1150	2370	1710	1110	2230	1640	1060
	29	2560	1840	1180	2460	1780	1150	2360	1710	1100	2220	1630	1060
	30	2560	1840	1180	2460	1770	1140	2350	1700	1100	2210	1630	1060
	31	2550	1830	1180	2450	1770	1140	2340	1700	1100	2200	1620	1050
	32	2540	1830	1180	2440	1760	1140	2330	1690	1100	2190	1620	1050
	33	2540	1830	1170	2440	1760	1140	2320	1690	1090	2170	1610	1050
	34	2530	1820	1170	2430	1760	1130	2310	1680	1090	2160	1600	1040
	35	2520	1820	1170	2420	1750	1130	2310	1680	1090	2150	1600	1040
	36	2520	1810	1170	2410	1740	1130	2300	1670	1080	2130	1590	1040
	37	2510	1810	1170	2400	1740	1120	2290	1660	1080	2120	1580	1030
	38	2500	1800	1160	2390	1730	1120	2280	1660	1080	2100	1570	1030
	39	2490	1800	1160	2380	1730	1120	2260	1650	1070	2090	1570	1020
	40	2480	1790	1160	2370	1720	1120	2250	1640	1070	2070	1560	1020
PROPERTIES													
Area, In. ²	76.4	61.9	46.8	71.4	57.9	43.8	66.4	53.9	40.8	61.4	49.9	37.8	
I, In. ⁴	12300	10100	7750	10100	8320	6370	8140	6730	5150	6460	5350	4110	
r, In.	12.7	12.8	12.9	11.9	12.0	12.1	11.1	11.2	11.2	10.3	10.4	10.4	

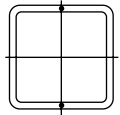
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=46



SAW

Nominal Size		24 x 24			22 x 22			20 x 20			18 x 18		
Wall Thickness		5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		191.78	156.28	118.53	174.76	142.67	108.32	157.75	129.06	98.12	140.73	115.45	87.91
Design Wall Thickness		0.625*	0.500*	0.375*	0.625	0.500*	0.375*	0.625	0.500*	0.375*	0.625	0.500	0.375*
F_y = 46 ksi													
Effective length KL in feet	0	2210	1650	1070	2010	1580	1020	1810	1480	977	1620	1330	927
	2	2200	1650	1070	2010	1580	1020	1810	1480	977	1620	1320	927
	3	2200	1650	1070	2010	1580	1020	1810	1480	977	1620	1320	926
	4	2200	1650	1060	2010	1570	1020	1810	1480	976	1610	1320	925
	5	2200	1650	1060	2000	1570	1020	1810	1480	975	1610	1320	924
	6	2200	1650	1060	2000	1570	1020	1800	1470	974	1610	1320	923
	7	2190	1640	1060	2000	1570	1020	1800	1470	973	1600	1310	921
	8	2190	1640	1060	1990	1570	1020	1800	1470	971	1600	1310	920
	9	2190	1640	1060	1990	1560	1020	1790	1460	970	1590	1300	918
	10	2180	1640	1060	1980	1560	1020	1790	1460	968	1590	1300	915
	11	2180	1640	1060	1980	1560	1010	1780	1450	966	1580	1290	913
	12	2170	1630	1060	1970	1560	1010	1770	1450	964	1570	1290	910
	13	2170	1630	1050	1970	1550	1010	1770	1440	961	1570	1280	907
	14	2160	1630	1050	1960	1550	1010	1760	1440	959	1560	1280	904
	15	2150	1620	1050	1950	1540	1010	1750	1430	956	1550	1270	900
	16	2140	1620	1050	1940	1540	1000	1740	1420	953	1540	1260	896
	17	2140	1610	1050	1940	1530	1000	1730	1420	950	1530	1250	893
	18	2130	1610	1040	1930	1530	998	1720	1410	946	1520	1250	888
	19	2120	1610	1040	1920	1520	995	1710	1400	943	1510	1240	884
	20	2110	1600	1040	1910	1520	992	1700	1390	939	1500	1230	879
	21	2100	1600	1040	1900	1510	989	1690	1380	935	1480	1220	874
	22	2090	1590	1030	1890	1510	986	1680	1370	931	1470	1210	869
	23	2080	1590	1030	1880	1500	982	1670	1370	927	1460	1200	864
	24	2070	1580	1030	1860	1490	979	1660	1360	923	1440	1190	858
	25	2060	1570	1030	1850	1490	975	1640	1340	918	1430	1170	852
	26	2050	1570	1020	1840	1480	971	1630	1330	913	1420	1160	846
	27	2040	1560	1020	1830	1470	967	1620	1320	908	1400	1150	840
	28	2030	1560	1020	1810	1460	963	1600	1310	903	1390	1140	834
	29	2010	1550	1010	1800	1450	958	1590	1300	898	1370	1130	827
	30	2000	1540	1010	1790	1450	954	1570	1290	892	1350	1110	820
	31	1990	1530	1000	1770	1440	949	1560	1280	886	1340	1100	813
	32	1970	1530	1000	1760	1430	944	1540	1260	881	1320	1090	806
	33	1960	1520	997	1740	1420	940	1530	1250	874	1300	1070	798
	34	1940	1510	992	1730	1410	934	1510	1240	868	1290	1060	790
	35	1930	1500	988	1710	1400	929	1490	1230	862	1270	1050	782
	36	1920	1490	984	1700	1390	924	1480	1210	855	1250	1030	774
	37	1900	1490	979	1680	1380	918	1460	1200	848	1230	1020	766
	38	1880	1480	974	1660	1360	913	1440	1180	842	1220	1000	757
	39	1870	1470	969	1650	1350	907	1420	1170	834	1200	988	748
	40	1850	1460	965	1630	1340	901	1410	1160	827	1180	973	739
PROPERTIES													
Area, In. ²	56.4	45.9	34.8	51.4	41.9	31.8	46.4	37.9	28.8	41.4	33.9	25.8	
I, In. ⁴	5030	4170	3210	3820	3190	2460	2830	2370	1830	2020	1700	1320	
r, In.	9.44	9.53	9.60	8.62	8.72	8.78	7.81	7.90	7.97	6.99	7.08	7.15	

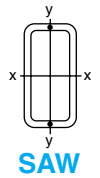
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=46



Nominal Size		32 x 24			30 x 24			28 x 24		
Wall Thickness		5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		225.80	183.50	138.95	217.30	176.70	133.84	208.79	169.89	128.74
Design Wall Thickness		0.625*	0.500*	0.375*	0.625*	0.500*	0.375*	0.625*	0.500*	0.375*
F_y = 46 ksi										
Effective length KL in feet	0	2410	1770	1140	2370	1740	1120	2330	1710	1100
	2	2410	1770	1140	2370	1740	1120	2330	1710	1100
	3	2410	1770	1140	2370	1740	1120	2330	1710	1100
	4	2400	1770	1140	2370	1740	1120	2330	1710	1100
	5	2400	1770	1140	2370	1740	1120	2330	1710	1100
	6	2400	1770	1140	2360	1740	1120	2330	1710	1100
	7	2400	1770	1140	2360	1740	1120	2320	1710	1100
	8	2400	1770	1130	2360	1740	1120	2320	1710	1100
	9	2390	1760	1130	2360	1740	1120	2320	1710	1100
	10	2390	1760	1130	2350	1730	1120	2310	1700	1100
	11	2390	1760	1130	2350	1730	1110	2310	1700	1100
	12	2380	1760	1130	2340	1730	1110	2300	1700	1100
	13	2380	1750	1130	2340	1730	1110	2300	1700	1090
	14	2370	1750	1130	2330	1720	1110	2290	1690	1090
	15	2370	1750	1130	2330	1720	1110	2290	1690	1090
	16	2360	1740	1120	2320	1720	1110	2280	1690	1090
	17	2350	1740	1120	2320	1710	1100	2270	1680	1090
	18	2350	1740	1120	2310	1710	1100	2270	1680	1080
	19	2340	1730	1120	2300	1700	1100	2260	1670	1080
	20	2330	1730	1120	2290	1700	1100	2250	1670	1080
	21	2330	1720	1110	2290	1700	1100	2240	1660	1080
	22	2320	1720	1110	2280	1690	1090	2240	1660	1070
	23	2310	1710	1110	2270	1690	1090	2230	1650	1070
	24	2300	1710	1110	2260	1680	1090	2220	1650	1070
	25	2290	1700	1100	2250	1680	1090	2210	1640	1070
	26	2280	1700	1100	2240	1670	1080	2200	1640	1060
	27	2270	1690	1100	2230	1660	1080	2190	1630	1060
	28	2260	1690	1090	2220	1660	1080	2180	1630	1060
	29	2250	1680	1090	2210	1650	1070	2170	1620	1050
	30	2240	1670	1090	2200	1640	1070	2160	1610	1050
	31	2230	1670	1080	2190	1640	1070	2140	1610	1050
	32	2220	1660	1080	2180	1630	1060	2130	1600	1040
	33	2210	1650	1080	2170	1620	1060	2120	1590	1040
	34	2200	1650	1070	2150	1620	1050	2110	1580	1030
	35	2180	1640	1070	2140	1610	1050	2090	1580	1030
	36	2170	1630	1060	2130	1600	1050	2080	1570	1030
	37	2160	1620	1060	2110	1590	1040	2070	1560	1020
	38	2140	1620	1060	2100	1590	1040	2050	1550	1020
	39	2130	1610	1050	2090	1580	1030	2040	1540	1010
	40	2120	1600	1050	2070	1570	1030	2020	1530	1010
PROPERTIES										
Area, In. ²	66.4	53.9	40.8	63.9	51.9	39.3	61.4	49.9	37.8	
I _x , In. ⁴	9880	8160	6250	8480	7010	5380	7210	5970	4580	
I _y , In. ⁴	6390	5280	4050	6050	5000	3840	5710	4730	3630	
Ratio r _x / r _y	1.24	1.24	1.24	1.18	1.18	1.18	1.12	1.12	1.12	
r _y , In.	9.81	9.89	9.96	9.73	9.82	9.88	9.65	9.73	9.79	

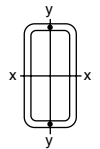
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

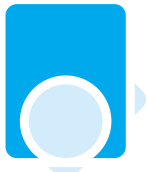
F_y=46



SAW

Nominal Size		26 x 24			24 x 22			22 x 20			20 x 18		
Wall Thickness		5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		200.28	163.08	123.64	183.27	149.47	113.43	166.25	135.86	103.22	149.24	122.25	93.01
Design Wall Thickness		0.625*	0.500*	0.375*	0.625*	0.500*	0.375*	0.625	0.500*	0.375*	0.625	0.500*	0.375*
F_y = 46 ksi													
Effective length KL in feet	0	2290	1680	1090	2110	1610	1040	1910	1530	1000	1720	1400	952
	2	2290	1680	1090	2110	1610	1040	1910	1520	1000	1720	1400	952
	3	2290	1680	1080	2110	1610	1040	1910	1520	999	1710	1400	951
	4	2290	1680	1080	2100	1610	1040	1910	1520	999	1710	1400	950
	5	2290	1680	1080	2100	1610	1040	1900	1520	998	1710	1400	949
	6	2280	1680	1080	2100	1610	1040	1900	1520	997	1700	1390	948
	7	2280	1680	1080	2090	1610	1040	1900	1520	996	1700	1390	947
	8	2280	1680	1080	2090	1600	1040	1890	1510	994	1700	1390	945
	9	2270	1670	1080	2090	1600	1040	1890	1510	993	1690	1380	943
	10	2270	1670	1080	2080	1600	1040	1880	1510	991	1680	1380	941
	11	2270	1670	1080	2080	1600	1040	1880	1500	989	1680	1370	938
	12	2260	1670	1080	2070	1590	1030	1870	1500	987	1670	1370	936
	13	2260	1660	1070	2060	1590	1030	1860	1490	985	1660	1360	933
	14	2250	1660	1070	2060	1590	1030	1850	1490	982	1650	1350	930
	15	2240	1660	1070	2050	1580	1030	1850	1480	980	1640	1350	926
	16	2240	1650	1070	2040	1580	1030	1840	1480	977	1630	1340	923
	17	2230	1650	1070	2030	1570	1020	1830	1470	974	1620	1330	919
	18	2220	1650	1070	2020	1570	1020	1820	1460	970	1610	1320	915
	19	2220	1640	1060	2010	1560	1020	1810	1460	967	1600	1310	910
	20	2210	1640	1060	2000	1560	1010	1800	1450	963	1590	1300	906
	21	2200	1630	1060	1990	1550	1010	1790	1440	960	1580	1290	901
	22	2190	1630	1060	1980	1540	1010	1770	1430	956	1560	1280	896
	23	2180	1620	1050	1970	1540	1000	1760	1430	952	1550	1270	891
	24	2170	1620	1050	1960	1530	1000	1750	1420	947	1540	1260	886
	25	2160	1610	1050	1950	1520	998	1740	1410	943	1520	1250	880
	26	2140	1600	1040	1930	1520	994	1720	1400	938	1510	1240	874
	27	2130	1600	1040	1920	1510	990	1710	1390	933	1490	1220	868
	28	2120	1590	1040	1910	1500	986	1690	1380	928	1480	1210	862
	29	2110	1590	1030	1890	1490	982	1680	1370	923	1460	1200	856
	30	2090	1580	1030	1880	1490	977	1660	1360	918	1440	1190	849
	31	2080	1570	1030	1870	1480	973	1650	1350	912	1430	1170	842
	32	2070	1560	1020	1850	1470	968	1630	1340	907	1410	1160	835
	33	2050	1560	1020	1840	1460	963	1620	1320	901	1390	1140	827
	34	2040	1550	1010	1820	1450	958	1600	1310	895	1370	1130	820
	35	2020	1540	1010	1800	1440	953	1580	1300	888	1360	1120	812
	36	2010	1530	1010	1790	1430	948	1560	1280	882	1340	1100	804
	37	1990	1520	1000	1770	1420	943	1550	1270	875	1320	1090	796
	38	1980	1520	997	1750	1410	937	1530	1250	869	1300	1070	788
	39	1960	1510	992	1740	1390	932	1510	1240	862	1280	1060	779
	40	1940	1500	987	1720	1380	926	1490	1220	855	1260	1040	770
PROPERTIES													
Area, In. ²	58.9	47.9	36.3	53.9	43.9	33.3	48.9	39.9	30.3	43.9	35.9	27.3	
I _x , In. ⁴	6060	5020	3860	4680	3900	3000	3530	2950	2280	2590	2180	1690	
I _y , In. ⁴	5370	4450	3420	4110	3420	2630	3060	2560	1970	2210	1850	1440	
Ratio r _x / r _y	1.06	1.06	1.06	1.07	1.07	1.07	1.07	1.07	1.08	1.08	1.09	1.08	
r _y , In.	9.55	9.64	9.70	8.73	8.82	8.89	7.91	8.00	8.07	7.10	7.19	7.25	

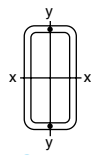
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRF Design Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

$F_y=46$



SAW

Nominal Size		20 x 16			20 x 12	18 x 12			16 x 12	14 x 12	
Wall Thickness		5/8	1/2	3/8	5/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		140.73	115.45	87.91	123.72	115.21	95.03	72.59	106.71	81.42	62.39
Design Wall Thickness		0.625	0.500*	0.375*	0.625	0.625	0.500	0.375*	0.625	0.500	0.375
$F_y = 46$ ksi											
Effective length KL , in feet	0	1620	1330	924	1420	1330	1090	788	1230	934	716
	2	1620	1320	924	1420	1320	1090	787	1230	933	714
	3	1620	1320	923	1420	1320	1090	785	1220	931	713
	4	1610	1320	922	1410	1320	1080	784	1220	928	711
	5	1610	1320	921	1410	1310	1080	782	1210	924	708
	6	1600	1310	919	1400	1310	1080	779	1210	920	705
	7	1600	1310	917	1400	1300	1070	776	1200	915	701
	8	1590	1310	915	1390	1290	1060	772	1190	909	697
	9	1590	1300	912	1380	1280	1060	768	1190	902	692
	10	1580	1300	909	1370	1270	1050	763	1180	895	686
	11	1570	1290	905	1350	1260	1040	758	1170	887	680
	12	1560	1280	902	1340	1250	1030	753	1150	878	673
	13	1550	1270	898	1330	1230	1020	747	1140	869	666
	14	1540	1270	893	1310	1220	1010	740	1130	858	659
	15	1530	1260	889	1300	1210	996	733	1110	848	651
	16	1520	1250	884	1280	1190	983	726	1100	836	643
	17	1510	1240	879	1260	1170	970	718	1080	825	634
	18	1500	1230	873	1250	1160	957	710	1070	812	624
	19	1490	1220	867	1230	1140	942	702	1050	799	615
	20	1470	1210	861	1210	1120	928	693	1030	786	605
	21	1460	1200	855	1190	1100	912	683	1010	772	594
	22	1440	1180	848	1170	1080	897	674	996	758	584
	23	1430	1170	841	1150	1060	880	664	976	743	573
	24	1410	1160	834	1120	1040	864	653	957	728	562
	25	1390	1150	826	1100	1020	847	643	937	713	550
	26	1380	1130	819	1080	999	830	631	916	697	539
	27	1360	1120	811	1060	977	812	620	895	682	527
	28	1340	1100	803	1030	955	794	608	874	666	515
	29	1320	1090	794	1010	932	776	596	853	649	502
	30	1310	1080	785	985	909	758	583	832	633	490
	31	1290	1060	776	961	886	739	570	810	616	478
	32	1270	1050	767	937	863	720	556	788	600	465
	33	1250	1030	758	912	840	702	541	766	583	453
	34	1230	1010	748	888	817	683	527	744	567	440
	35	1210	997	738	863	794	664	513	722	550	428
	36	1190	981	728	838	770	645	499	701	533	415
	37	1170	965	718	814	747	627	485	679	517	402
	38	1150	948	708	789	724	608	471	657	500	390
	39	1130	931	697	765	701	589	456	635	484	377
	40	1100	914	686	740	678	571	442	614	467	365
PROPERTIES											
Area, In. ²	41.4	33.9	25.8	36.4	33.9	27.9	21.3	31.4	23.9	18.3	
I_x , In. ⁴	2360	1990	1540	1890	1450	1240	971	1090	678	534	
I_y , In. ⁴	1680	1410	1100	864	783	668	524	702	536	422	
Ratio r_x / r_y	1.19	1.19	1.18	1.48	1.36	1.36	1.36	1.25	1.12	1.12	
r_y , In.	6.37	6.46	6.52	4.87	4.81	4.89	4.95	4.73	4.73	4.80	

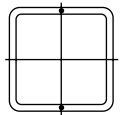
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50



SAW

Nominal Size		32 x 32			30 x 30			28 x 28			26 x 26		
Wall Thickness		5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		259.83	210.72	159.37	242.82	197.11	149.16	225.80	183.50	138.95	208.79	169.89	128.74
Design Wall Thickness		0.625*	0.500*	0.375*	0.625*	0.500*	0.375*	0.625*	0.500*	0.375*	0.625*	0.500*	0.375*
F_y = 50 ksi													
Effective length KL in feet	0	2820	2010	1280	2730	1960	1250	2640	1890	1210	2530	1830	1170
	2	2820	2010	1280	2730	1950	1250	2630	1890	1210	2530	1830	1170
	3	2820	2010	1280	2730	1950	1250	2630	1890	1210	2530	1830	1170
	4	2820	2010	1280	2730	1950	1250	2630	1890	1210	2530	1830	1170
	5	2820	2010	1280	2730	1950	1250	2630	1890	1210	2530	1820	1170
	6	2820	2010	1280	2730	1950	1250	2630	1890	1210	2530	1820	1170
	7	2810	2010	1280	2720	1950	1250	2630	1890	1210	2520	1820	1170
	8	2810	2010	1280	2720	1950	1250	2630	1890	1210	2520	1820	1170
	9	2810	2010	1280	2720	1950	1250	2620	1890	1210	2520	1820	1170
	10	2810	2010	1280	2720	1950	1250	2620	1880	1210	2520	1820	1170
	11	2810	2010	1280	2710	1950	1240	2620	1880	1210	2510	1810	1170
	12	2800	2000	1280	2710	1940	1240	2610	1880	1210	2510	1810	1170
	13	2800	2000	1280	2710	1940	1240	2610	1880	1200	2500	1810	1160
	14	2800	2000	1280	2700	1940	1240	2600	1870	1200	2500	1800	1160
	15	2790	2000	1280	2700	1940	1240	2600	1870	1200	2490	1800	1160
	16	2790	2000	1270	2700	1930	1240	2600	1870	1200	2490	1800	1160
	17	2790	1990	1270	2690	1930	1240	2590	1870	1200	2480	1790	1160
	18	2780	1990	1270	2690	1930	1240	2580	1860	1200	2470	1790	1150
	19	2780	1990	1270	2680	1930	1230	2580	1860	1190	2470	1790	1150
	20	2770	1990	1270	2680	1920	1230	2570	1850	1190	2460	1780	1150
	21	2770	1980	1270	2670	1920	1230	2570	1850	1190	2450	1780	1150
	22	2760	1980	1270	2660	1920	1230	2560	1850	1190	2440	1770	1140
	23	2760	1980	1260	2660	1910	1230	2550	1840	1190	2440	1770	1140
	24	2750	1970	1260	2650	1910	1220	2540	1840	1180	2430	1760	1140
	25	2750	1970	1260	2650	1900	1220	2540	1830	1180	2420	1760	1140
	26	2740	1970	1260	2640	1900	1220	2530	1830	1180	2410	1750	1130
	27	2730	1960	1260	2630	1900	1220	2520	1820	1180	2400	1740	1130
	28	2730	1960	1260	2620	1890	1220	2510	1820	1170	2390	1740	1130
	29	2720	1950	1250	2620	1890	1210	2500	1810	1170	2380	1730	1120
	30	2710	1950	1250	2610	1880	1210	2490	1810	1170	2370	1730	1120
	31	2710	1950	1250	2600	1880	1210	2480	1800	1160	2360	1720	1120
	32	2700	1940	1250	2590	1870	1210	2480	1790	1160	2350	1710	1110
	33	2690	1940	1240	2580	1870	1200	2460	1790	1160	2330	1700	1110
	34	2680	1930	1240	2570	1860	1200	2450	1780	1150	2320	1700	1100
	35	2680	1930	1240	2570	1850	1200	2440	1780	1150	2310	1690	1100
	36	2670	1920	1240	2560	1850	1190	2430	1770	1150	2290	1680	1100
	37	2660	1920	1230	2550	1840	1190	2420	1760	1140	2280	1670	1090
	38	2650	1910	1230	2540	1840	1190	2410	1760	1140	2260	1670	1090
	39	2640	1910	1230	2530	1830	1180	2400	1750	1140	2240	1660	1080
	40	2630	1900	1220	2510	1820	1180	2390	1740	1130	2230	1650	1080
PROPERTIES													
Area, In. ²	76.4	61.9	46.8	71.4	57.9	43.8	66.4	53.9	40.8	61.4	49.9	37.8	
I, In. ⁴	12300	10100	7750	10100	8320	6370	8140	6730	5150	6460	5350	4110	
r, In.	12.7	12.8	12.9	11.9	12.0	12.1	11.1	11.2	11.2	10.3	10.4	10.4	

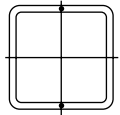
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Square HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50



SAW

Nominal Size		24 x 24			22 x 22			20 x 20			18 x 18		
Wall Thickness		5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		191.78	156.28	118.53	174.76	142.67	108.32	157.75	129.06	98.12	140.73	115.45	87.91
Design Wall Thickness		0.625*	0.500*	0.375*	0.625	0.500*	0.375*	0.625	0.500*	0.375*	0.625	0.500	0.375*
F_y = 50 ksi													
Effective length KL in feet	0	2400	1760	1130	2180	1680	1090	1970	1600	1040	1760	1440	987
	2	2400	1760	1130	2180	1680	1090	1970	1600	1040	1760	1440	986
	3	2390	1750	1130	2180	1680	1090	1970	1590	1040	1760	1440	986
	4	2390	1750	1130	2180	1680	1090	1970	1590	1040	1750	1440	985
	5	2390	1750	1130	2180	1680	1090	1960	1590	1040	1750	1430	983
	6	2390	1750	1130	2170	1670	1080	1960	1590	1040	1750	1430	982
	7	2380	1750	1130	2170	1670	1080	1960	1590	1030	1740	1430	980
	8	2380	1750	1130	2160	1670	1080	1950	1580	1030	1740	1420	978
	9	2370	1740	1130	2160	1670	1080	1940	1580	1030	1730	1420	976
	10	2370	1740	1120	2150	1660	1080	1940	1580	1030	1720	1410	973
	11	2360	1740	1120	2150	1660	1080	1930	1570	1030	1710	1400	970
	12	2360	1740	1120	2140	1660	1080	1920	1570	1020	1710	1400	967
	13	2350	1730	1120	2130	1650	1070	1920	1560	1020	1700	1390	964
	14	2340	1730	1120	2120	1650	1070	1910	1560	1020	1690	1380	960
	15	2330	1730	1120	2120	1640	1070	1900	1550	1020	1680	1370	956
	16	2330	1720	1110	2110	1640	1070	1890	1540	1010	1670	1370	952
	17	2320	1720	1110	2100	1630	1060	1880	1530	1010	1650	1360	948
	18	2310	1710	1110	2090	1630	1060	1860	1530	1000	1640	1350	943
	19	2300	1710	1110	2080	1620	1060	1850	1520	1000	1630	1340	938
	20	2290	1700	1100	2060	1610	1050	1840	1510	997	1610	1320	933
	21	2280	1700	1100	2050	1610	1050	1830	1500	992	1600	1310	927
	22	2260	1690	1100	2040	1600	1050	1810	1480	988	1590	1300	921
	23	2250	1680	1090	2030	1590	1040	1800	1470	983	1570	1290	915
	24	2240	1680	1090	2010	1580	1040	1790	1460	978	1550	1280	909
	25	2230	1670	1090	2000	1580	1030	1770	1450	973	1540	1260	903
	26	2210	1660	1080	1980	1570	1030	1750	1440	967	1520	1250	896
	27	2200	1660	1080	1970	1560	1020	1740	1420	962	1500	1240	889
	28	2180	1650	1080	1950	1550	1020	1720	1410	956	1490	1220	881
	29	2170	1640	1070	1940	1540	1010	1710	1400	950	1470	1210	874
	30	2160	1630	1070	1920	1530	1010	1690	1380	943	1450	1190	866
	31	2140	1630	1060	1910	1520	1000	1670	1370	937	1430	1180	858
	32	2120	1620	1060	1890	1510	999	1650	1360	930	1410	1160	850
	33	2110	1610	1050	1870	1500	993	1630	1340	924	1390	1150	841
	34	2090	1600	1050	1850	1490	988	1620	1330	917	1370	1130	832
	35	2070	1590	1040	1840	1480	982	1600	1310	909	1350	1110	823
	36	2060	1580	1040	1820	1470	976	1580	1290	902	1330	1100	814
	37	2040	1570	1030	1800	1460	969	1560	1280	894	1310	1080	805
	38	2020	1560	1030	1780	1450	963	1540	1260	886	1290	1060	795
	39	2000	1550	1020	1760	1430	957	1520	1250	878	1270	1050	785
	40	1980	1540	1020	1740	1420	950	1500	1230	870	1250	1030	775
PROPERTIES													
Area, in. ²	56.4	45.9	34.8	51.4	41.9	31.8	46.4	37.9	28.8	41.4	33.9	25.8	
I, in. ⁴	5030	4170	3210	3820	3190	2460	2830	2370	1830	2020	1700	1320	
r, in.	9.44	9.53	9.60	8.62	8.72	8.78	7.81	7.90	7.97	6.99	7.08	7.15	

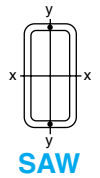
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50



Nominal Size		32 x 24			30 x 24			28 x 24		
Wall Thickness		5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		225.80	183.50	138.95	217.30	176.70	133.84	208.79	169.89	128.74
Design Wall Thickness		0.625*	0.500*	0.375*	0.625*	0.500*	0.375*	0.625*	0.500*	0.375*
F_y = 50 ksi										
Effective length KL in feet	0	2580	1880	1210	2540	1860	1190	2500	1820	1170
	2	2580	1880	1210	2540	1850	1190	2500	1820	1170
	3	2580	1880	1210	2540	1850	1190	2500	1820	1170
	4	2580	1880	1210	2540	1850	1190	2500	1820	1170
	5	2580	1880	1210	2540	1850	1190	2500	1820	1170
	6	2570	1880	1210	2540	1850	1190	2500	1820	1170
	7	2570	1880	1210	2530	1850	1190	2490	1820	1170
	8	2570	1880	1200	2530	1850	1190	2490	1820	1170
	9	2560	1870	1200	2530	1850	1190	2490	1810	1170
	10	2560	1870	1200	2520	1840	1180	2480	1810	1170
	11	2560	1870	1200	2520	1840	1180	2480	1810	1160
	12	2550	1870	1200	2510	1840	1180	2470	1810	1160
	13	2550	1860	1200	2510	1830	1180	2470	1800	1160
	14	2540	1860	1200	2500	1830	1180	2460	1800	1160
	15	2530	1860	1190	2490	1830	1180	2450	1800	1160
	16	2530	1850	1190	2490	1820	1170	2450	1790	1160
	17	2520	1850	1190	2480	1820	1170	2440	1790	1150
	18	2510	1850	1190	2470	1810	1170	2430	1780	1150
	19	2500	1840	1190	2460	1810	1170	2420	1780	1150
	20	2500	1840	1180	2460	1810	1160	2410	1770	1150
	21	2490	1830	1180	2450	1800	1160	2400	1770	1140
	22	2480	1830	1180	2440	1790	1160	2390	1760	1140
	23	2470	1820	1170	2430	1790	1160	2380	1760	1140
	24	2460	1810	1170	2420	1780	1150	2370	1750	1130
	25	2450	1810	1170	2410	1780	1150	2360	1740	1130
	26	2440	1800	1170	2400	1770	1150	2350	1740	1130
	27	2430	1800	1160	2380	1760	1140	2340	1730	1120
	28	2420	1790	1160	2370	1760	1140	2330	1720	1120
	29	2400	1780	1150	2360	1750	1140	2310	1720	1120
	30	2390	1770	1150	2350	1740	1130	2300	1710	1110
	31	2380	1770	1150	2330	1740	1130	2290	1700	1110
	32	2370	1760	1140	2320	1730	1120	2270	1690	1100
	33	2350	1750	1140	2310	1720	1120	2260	1680	1100
	34	2340	1740	1130	2290	1710	1120	2250	1680	1090
	35	2320	1740	1130	2280	1700	1110	2230	1670	1090
	36	2310	1730	1130	2260	1690	1110	2220	1660	1090
	37	2300	1720	1120	2250	1690	1100	2200	1650	1080
	38	2280	1710	1120	2230	1680	1100	2180	1640	1080
	39	2260	1700	1110	2220	1670	1090	2170	1630	1070
	40	2250	1690	1110	2200	1660	1090	2150	1620	1060
PROPERTIES										
Area, In. ²	66.4	53.9	40.8	63.9	51.9	39.3	61.4	49.9	37.8	
I _x , In. ⁴	9880	8160	6250	8480	7010	5380	7210	5970	4580	
I _y , In. ⁴	6390	5280	4050	6050	5000	3840	5710	4730	3630	
Ratio r _x / r _y	1.24	1.24	1.24	1.18	1.18	1.18	1.12	1.12	1.12	
r _y , In.	9.81	9.89	9.96	9.73	9.82	9.88	9.65	9.73	9.79	

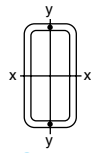
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $1.40 \sqrt{E/F_y}$.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50



SAW

Nominal Size		26 x 24			24 x 22			22 x 20			20 x 18		
Wall Thickness		5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot		200.28	163.08	123.64	183.27	149.47	113.43	166.25	135.86	103.22	149.24	122.25	93.01
Design Wall Thickness		0.625*	0.500*	0.375*	0.625*	0.500*	0.375*	0.625	0.500*	0.375*	0.625	0.500*	0.375*
F_y = 50 ksi													
Effective length KL in feet	0	2460	1790	1150	2290	1720	1110	2080	1640	1060	1870	1520	1010
	2	2460	1790	1150	2290	1720	1110	2080	1640	1060	1860	1520	1010
	3	2460	1790	1150	2290	1720	1110	2080	1640	1060	1860	1520	1010
	4	2460	1790	1150	2290	1720	1110	2070	1630	1060	1860	1510	1010
	5	2450	1790	1150	2280	1710	1110	2070	1630	1060	1860	1510	1010
	6	2450	1790	1150	2280	1710	1110	2070	1630	1060	1850	1510	1010
	7	2450	1780	1150	2280	1710	1110	2060	1630	1060	1850	1500	1010
	8	2450	1780	1150	2270	1710	1100	2060	1620	1060	1840	1500	1000
	9	2440	1780	1150	2270	1700	1100	2050	1620	1060	1830	1500	1000
	10	2440	1780	1150	2260	1700	1100	2040	1620	1050	1830	1490	1000
	11	2430	1780	1140	2250	1700	1100	2040	1610	1050	1820	1490	997
	12	2430	1770	1140	2250	1690	1100	2030	1610	1050	1810	1480	994
	13	2420	1770	1140	2240	1690	1100	2020	1600	1050	1800	1470	991
	14	2410	1770	1140	2230	1690	1090	2010	1600	1040	1790	1470	988
	15	2410	1760	1140	2220	1680	1090	2000	1590	1040	1780	1460	984
	16	2400	1760	1140	2210	1680	1090	1990	1580	1040	1770	1450	980
	17	2390	1750	1130	2200	1670	1090	1980	1570	1030	1760	1440	975
	18	2380	1750	1130	2190	1670	1080	1970	1570	1030	1740	1430	971
	19	2370	1740	1130	2180	1660	1080	1960	1560	1030	1730	1420	966
	20	2370	1740	1130	2170	1650	1080	1940	1550	1020	1720	1410	961
	21	2360	1730	1120	2160	1650	1070	1930	1540	1020	1700	1390	956
	22	2350	1730	1120	2140	1640	1070	1920	1530	1010	1690	1380	950
	23	2340	1720	1120	2130	1630	1070	1900	1520	1010	1670	1370	944
	24	2320	1720	1110	2120	1630	1060	1890	1510	1000	1650	1360	938
	25	2310	1710	1110	2100	1620	1060	1870	1500	999	1640	1340	932
	26	2300	1700	1110	2090	1610	1050	1850	1490	994	1620	1330	925
	27	2290	1700	1100	2070	1600	1050	1840	1480	988	1600	1320	918
	28	2280	1690	1100	2060	1590	1040	1820	1470	983	1580	1300	911
	29	2260	1680	1090	2040	1580	1040	1800	1460	977	1570	1290	904
	30	2250	1670	1090	2020	1570	1030	1790	1450	971	1550	1270	897
	31	2240	1660	1090	2010	1570	1030	1770	1430	964	1530	1250	889
	32	2220	1660	1080	1990	1560	1020	1750	1420	958	1510	1240	881
	33	2210	1650	1080	1970	1550	1020	1730	1410	951	1490	1220	873
	34	2190	1640	1070	1950	1530	1010	1710	1390	945	1470	1210	864
	35	2170	1630	1070	1930	1520	1010	1690	1380	938	1440	1190	855
	36	2160	1620	1060	1920	1510	1000	1670	1370	930	1420	1170	846
	37	2140	1610	1060	1900	1500	996	1650	1350	923	1400	1150	837
	38	2120	1600	1050	1880	1490	989	1630	1340	915	1380	1140	828
	39	2100	1590	1050	1860	1480	983	1610	1320	908	1360	1120	818
	40	2080	1580	1040	1840	1470	977	1590	1300	900	1340	1100	808
PROPERTIES													
Area, In. ²	58.9	47.9	36.3	53.9	43.9	33.3	48.9	39.9	30.3	43.9	35.9	27.3	
I _x , In. ⁴	6060	5020	3860	4680	3900	3000	3530	2950	2280	2590	2180	1690	
I _y , In. ⁴	5370	4450	3420	4110	3420	2630	3060	2560	1970	2210	1850	1440	
Ratio r _x / r _y	1.06	1.06	1.06	1.07	1.07	1.07	1.07	1.07	1.08	1.08	1.09	1.08	
r _y , In.	9.55	9.64	9.70	8.73	8.82	8.89	7.91	8.00	8.07	7.10	7.19	7.25	

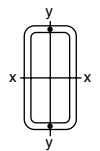
*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r, exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of 1.40 √E/F_y.



LRFD Columns Rectangular HSS

Design Axial Strength in kips ($\phi=0.85$)

F_y=50



SAW

Nominal Size	20 x 16			20 x 12	18 x 12			16 x 12	14 x 12	
Wall Thickness	5/8	1/2	3/8	5/8	5/8	1/2	3/8	5/8	1/2	3/8
Weight Per Foot	140.73	115.45	87.91	123.72	115.21	95.03	72.59	106.71	81.42	62.39
Design Wall Thickness	0.625	0.500*	0.375*	0.625	0.625	0.500	0.375*	0.625	0.500	0.375*

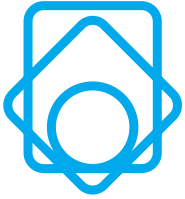
F_y = 50 ksi

Effective length K _L in feet	F _y = 50 ksi																																						
	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
	1760	1430	984	1550	1440	1190	844	1330	1020	778																													
	1760	1430	983	1540	1440	1180	843	1330	1010	776																													
	1760	1430	982	1540	1430	1180	842	1330	1010	775																													
	1750	1430	981	1540	1430	1180	840	1320	1010	772																													
	1750	1420	980	1530	1420	1170	837	1320	1000	769																													
	1740	1420	978	1520	1420	1170	834	1310	999	765																													
	1740	1420	976	1510	1410	1160	831	1300	993	761																													
	1730	1410	973	1500	1400	1150	827	1290	986	755																													
	1720	1410	971	1490	1390	1140	822	1280	978	749																													
	1710	1400	968	1480	1380	1130	817	1270	969	743																													
	1710	1400	964	1470	1360	1120	811	1260	960	736																													
	1690	1390	960	1450	1350	1110	804	1250	949	728																													
	1680	1380	956	1440	1330	1100	798	1230	938	720																													
	1670	1370	952	1420	1320	1090	790	1220	926	711																													
	1660	1360	947	1400	1300	1070	782	1200	914	702																													
	1650	1350	942	1380	1280	1060	774	1180	900	692																													
	1630	1340	937	1360	1260	1040	765	1160	887	682																													
	1620	1330	931	1340	1240	1030	756	1150	872	671																													
	1600	1320	925	1320	1220	1010	746	1130	857	659																													
	1590	1300	919	1300	1200	994	736	1110	841	648																													
	1570	1290	912	1270	1180	976	725	1080	825	636																													
	1550	1280	904	1250	1160	958	714	1060	809	623																													
	1530	1260	896	1220	1130	939	703	1040	792	611																													
	1520	1250	888	1200	1110	920	691	1020	775	598																													
	1500	1230	879	1170	1080	900	679	994	757	585																													
	1480	1210	871	1150	1060	880	666	971	739	571																													
	1460	1200	861	1120	1030	860	653	947	721	557																													
	1440	1180	852	1090	1010	840	640	923	702	544																													
	1410	1170	842	1060	983	819	626	898	684	530																													
	1390	1150	832	1040	957	798	612	874	665	515																													
	1370	1130	822	1010	930	777	598	849	646	501																													
	1350	1110	812	982	904	755	583	824	627	487																													
	1330	1090	801	954	878	734	567	799	608	473																													
	1300	1080	790	926	851	713	551	775	590	459																													
	1280	1060	779	898	825	691	535	750	571	444																													
	1260	1040	767	870	799	670	519	725	552	430																													
	1230	1020	756	842	773	649	503	701	533	416																													
	1210	1000	744	815	747	628	487	676	515	402																													
	1190	982	732	787	721	607	471	652	497	388																													
	1160	962	720	760	696	586	455	629	478	374																													

PROPERTIES

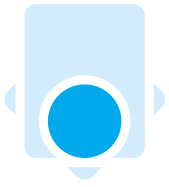
Area, In. ²	41.4	33.9	25.8	36.4	33.9	27.9	21.3	31.4	23.9	18.3
I _x , In. ⁴	2360	1990	1540	1890	1450	1240	971	1090	678	534
I _y , In. ⁴	1680	1410	1100	864	783	668	524	702	536	422
Ratio r _x / r _y	1.18	1.18	1.18	1.48	1.36	1.36	1.36	1.25	1.12	1.12
r _y , In.	6.37	6.46	6.52	4.87	4.81	4.89	4.95	4.73	4.73	4.80

*Slender- element cross-section. Width-Thickness and/or Depth-Thickness ratio, λ_r, exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of 1.40√E/F_y.



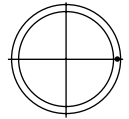
LRFD Columns

NOTES



LRFD Columns Round HSS

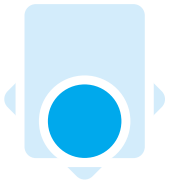
F_y=42



ERW

Design Axial Strength in kips ($\phi=0.85$)

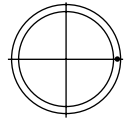
Nominal Outside Diameter		20.000		18.000		16.000			14.000			
Wall Thickness		0.500	0.375	0.500	0.375	0.500	0.438	0.375	0.312	0.500	0.375	0.312
Weight Per Foot		104.13	78.60	93.45	70.59	82.77	72.80	62.58	52.28	72.09	54.57	45.61
Design Wall Thickness		0.456	0.349	0.465	0.349	0.465	0.407	0.349	0.291	0.465	0.349	0.291
F_y = 42 ksi												
Effective length KL in feet	0	1020	768	914	693	810	710	614	514	707	536	446
	2	1020	767	913	692	809	710	613	513	706	535	446
	3	1020	766	912	691	808	709	612	513	704	534	445
	4	1010	765	911	690	807	707	611	512	703	532	444
	5	1010	764	909	689	804	705	610	510	700	530	442
	6	1010	763	906	687	802	703	608	509	697	528	440
	7	1010	761	904	685	799	700	605	507	694	526	438
	8	1010	759	901	683	795	697	603	505	690	523	436
	9	1000	756	897	680	791	694	600	502	685	519	433
	10	999	754	893	677	787	690	597	500	680	516	430
	11	995	751	889	674	782	686	593	497	675	511	426
	12	991	748	884	670	777	681	589	493	669	507	423
	13	986	744	879	666	771	676	585	490	662	502	419
	14	981	740	874	662	765	671	580	486	655	497	415
	15	976	737	868	658	759	665	575	482	648	492	410
	16	970	732	862	653	752	659	570	478	640	486	405
	17	964	728	855	649	744	653	565	473	632	480	400
	18	958	723	848	643	737	646	559	468	624	474	395
	19	952	718	841	638	729	640	553	463	615	467	390
	20	945	713	834	632	721	632	547	458	606	460	384
	21	938	708	826	627	712	625	541	453	596	453	378
	22	930	702	818	620	703	617	534	447	587	446	372
	23	922	697	809	614	694	609	527	442	576	438	366
	24	914	691	800	608	684	601	520	436	566	430	359
	25	906	685	792	601	675	592	513	430	556	423	353
	26	898	678	782	594	665	583	505	423	545	414	346
	27	889	672	773	587	654	575	497	417	534	406	339
	28	880	665	763	580	644	565	489	410	522	398	332
	29	871	658	753	572	633	556	481	404	511	389	325
	30	861	651	743	565	622	547	473	397	500	381	318
	31	852	644	733	557	611	537	465	390	488	372	311
	32	842	636	722	549	600	527	457	383	476	363	304
	33	832	629	711	541	589	517	448	376	465	354	296
	34	821	621	700	533	577	507	440	369	453	345	289
	35	811	613	689	524	566	497	431	362	441	337	282
	36	800	605	678	516	554	487	422	354	429	328	274
	37	790	597	667	507	542	477	413	347	417	319	267
	38	779	589	656	499	530	466	404	340	405	310	259
	39	768	581	644	490	519	456	396	332	393	301	252
	40	756	573	632	482	507	446	387	325	381	292	245
PROPERTIES												
Area, in. ²	28.5	21.5	25.6	19.4	22.7	19.9	17.2	14.4	19.8	15.0	12.5	
I, in. ⁴	1360	1040	985	754	685	606	526	443	453	349	295	
r, in.	6.91	6.95	6.20	6.24	5.49	5.51	5.53	5.55	4.79	4.83	4.85	



LRFD Columns Round HSS

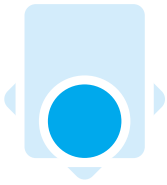
Design Axial Strength in kips ($\phi=0.85$)

F_y=42



ERW

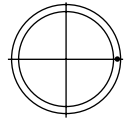
Nominal Outside Diameter		12.750			12.500					
Wall Thickness		0.500	0.375	0.250	0.625	0.500	0.375	0.312	0.250	0.188
Weight Per Foot		65.42	49.56	33.38	79.27	64.08	48.56	40.61	32.71	24.72
Design Wall Thickness		0.465	0.349	0.233	0.581	0.465	0.349	0.291	0.233	0.174
F_y = 42 ksi										
Effective length KL in feet	0	639	486	327	778	628	475	400	321	241
	2	638	485	326	777	627	474	399	320	240
	3	636	484	326	775	626	473	398	319	240
	4	634	482	325	772	623	471	397	318	239
	5	632	480	323	769	621	469	395	317	238
	6	628	478	322	764	617	467	393	315	237
	7	625	475	320	760	613	464	391	313	235
	8	620	471	318	754	609	460	388	311	234
	9	615	468	315	748	604	457	385	309	232
	10	610	464	313	741	598	453	381	306	230
	11	604	459	310	733	592	448	378	303	227
	12	597	454	306	725	586	443	373	300	225
	13	590	449	303	716	579	438	369	296	222
	14	583	444	299	706	571	432	364	292	220
	15	575	438	295	696	563	426	359	288	217
	16	567	432	291	685	555	420	354	284	214
	17	558	425	287	674	546	414	349	280	210
	18	549	418	283	663	537	407	343	275	207
	19	540	411	278	651	527	400	337	271	203
	20	530	404	273	638	517	392	331	266	200
	21	520	397	268	625	507	385	324	261	196
	22	510	389	263	612	496	377	318	255	192
	23	499	381	258	598	486	369	311	250	188
	24	488	373	252	585	475	360	304	245	184
	25	477	364	247	571	463	352	297	239	180
	26	466	356	241	556	452	344	290	233	176
	27	455	347	235	542	440	335	283	228	171
	28	443	339	230	527	429	326	276	222	167
	29	431	330	224	513	417	318	268	216	163
	30	420	321	218	498	405	309	261	210	158
	31	408	312	212	483	393	300	254	204	154
	32	396	303	206	468	381	291	246	198	149
	33	384	295	200	453	370	282	239	192	145
	34	372	286	194	438	358	273	231	186	141
	35	360	277	188	424	346	264	224	180	136
	36	349	268	182	409	334	255	216	174	132
	37	337	259	176	394	322	247	209	169	127
	38	325	250	171	380	311	238	202	163	123
	39	314	242	165	366	299	229	194	157	119
	40	303	233	159	352	288	221	187	151	114
PROPERTIES										
Area, in. ²	17.9	13.6	9.16	21.8	17.6	13.3	11.2	8.98	6.74	
I, in. ⁴	339	262	180	387	319	246	208	169	128	
r, in.	4.35	4.39	4.43	4.22	4.26	4.30	4.32	4.34	4.36	



LRFD Columns Round HSS

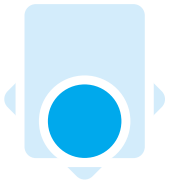
Design Axial Strength in kips ($\phi=0.85$)

F_y=42



ERW

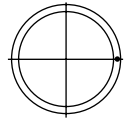
Nominal Outside Diameter		12.313						12.250					
Wall Thickness		0.625	0.500	0.375	0.312	0.250	0.188	0.625	0.500	0.375	0.312	0.250	0.188
Weight Per Foot		78.02	63.08	47.81	39.99	32.21	24.35	77.60	62.75	47.56	39.78	32.04	24.22
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174	0.581	0.465	0.349	0.291	0.233	0.174
F_y = 42 ksi													
Effective length KL in feet	0	764	618	468	393	316	237	760	614	464	389	314	236
	2	762	616	467	392	315	237	759	613	463	388	314	235
	3	760	615	466	391	314	236	757	611	462	387	313	235
	4	758	613	464	390	313	235	754	609	460	386	312	234
	5	754	610	462	388	312	234	751	606	458	384	310	233
	6	750	607	459	386	310	233	746	603	456	382	309	232
	7	745	603	456	383	308	232	741	599	453	380	307	230
	8	739	598	453	381	306	230	736	594	450	377	304	228
	9	733	593	449	377	303	228	729	589	446	374	302	227
	10	726	587	445	374	301	226	722	584	442	370	299	224
	11	718	581	441	370	298	224	714	577	437	367	296	222
	12	710	574	436	366	294	221	706	571	432	362	293	220
	13	700	567	430	362	291	219	697	563	427	358	289	217
	14	691	560	424	357	287	216	687	556	421	353	285	214
	15	681	551	418	352	283	213	677	548	415	348	281	211
	16	670	543	412	346	279	210	666	539	408	343	277	208
	17	659	534	405	341	274	206	655	530	402	337	273	205
	18	647	525	398	335	270	203	643	521	395	332	268	201
	19	635	515	391	329	265	199	631	511	388	326	263	198
	20	622	505	384	323	260	196	618	501	380	319	258	194
	21	609	495	376	316	255	192	605	491	372	313	253	190
	22	596	484	368	310	250	188	592	480	365	306	248	186
	23	582	473	360	303	244	184	578	469	356	300	242	182
	24	568	462	352	296	239	180	564	458	348	293	237	178
	25	554	451	343	289	233	176	550	447	340	286	231	174
	26	540	439	335	282	227	171	536	435	331	279	226	170
	27	525	428	326	275	222	167	521	424	323	271	220	165
	28	511	416	317	268	216	163	506	412	314	264	214	161
	29	496	404	309	260	210	158	492	400	305	257	208	157
	30	481	392	300	253	204	154	477	389	296	249	202	152
	31	466	381	291	245	198	149	462	377	287	242	196	148
	32	452	369	282	238	192	145	447	365	278	235	190	143
	33	437	357	273	230	186	140	432	353	270	227	184	139
	34	422	345	264	223	180	136	418	341	261	220	178	134
	35	407	333	255	216	174	132	403	329	252	212	172	130
	36	393	321	246	208	168	127	388	318	243	205	167	126
	37	378	310	238	201	162	123	374	306	234	198	161	121
	38	364	298	229	194	157	118	360	295	226	191	155	117
	39	350	287	221	186	151	114	346	283	217	183	149	113
	40	336	276	212	179	145	110	332	272	209	176	144	108
PROPERTIES													
Area, in. ²	21.4	17.3	13.1	11.0	8.84	6.64	21.3	17.2	13.0	10.9	8.80	6.60	
I, in. ⁴	369	304	235	199	161	122	363	299	231	196	159	120	
r, in.	4.15	4.19	4.23	4.25	4.27	4.29	4.13	4.17	4.21	4.23	4.25	4.27	



LRFD Columns Round HSS

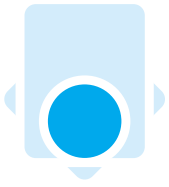
Design Axial Strength in kips ($\phi=0.85$)

F_y=42



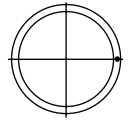
ERW

Nominal Outside Diameter		11.250					10.750			
Wall Thickness		0.625	0.500	0.375	0.312	0.250	0.188	0.500	0.365	0.250
Weight Per Foot		70.92	57.41	43.56	36.45	29.37	22.21	54.74	40.48	28.04
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174	0.465	0.340	0.233
F_y = 42 ksi										
Effective length KL in feet	0	696	564	428	357	288	216	536	396	275
	2	694	563	427	356	287	215	534	395	274
	3	692	561	426	355	286	215	532	394	273
	4	689	559	424	354	285	214	530	392	272
	5	685	556	422	352	284	213	527	390	271
	6	681	552	419	350	282	212	523	387	269
	7	675	548	416	347	280	210	518	384	266
	8	669	543	412	344	277	208	513	380	264
	9	662	537	408	340	275	206	507	376	261
	10	654	531	404	337	271	204	501	371	258
	11	646	524	399	333	268	201	494	366	254
	12	637	517	393	328	265	199	486	361	251
	13	627	509	388	323	261	196	478	355	247
	14	617	501	381	318	257	193	470	349	243
	15	606	492	375	313	252	190	461	342	238
	16	594	483	368	307	248	186	451	335	233
	17	582	473	361	301	243	183	442	328	229
	18	570	463	353	295	238	179	431	321	223
	19	557	453	346	289	233	175	421	313	218
	20	543	443	338	282	228	172	410	305	213
	21	530	432	330	276	223	168	399	297	207
	22	516	421	321	269	217	163	388	289	202
	23	502	409	313	262	212	159	376	281	196
	24	487	398	304	255	206	155	365	272	190
	25	473	386	296	247	200	151	353	263	184
	26	458	374	287	240	194	146	341	255	178
	27	443	363	278	233	188	142	329	246	173
	28	428	351	269	225	182	138	317	237	167
	29	414	339	260	218	176	133	305	229	161
	30	399	327	251	210	170	129	294	220	155
	31	384	315	242	203	165	124	282	212	149
	32	369	303	233	196	159	120	270	203	143
	33	355	292	224	188	153	115	259	195	137
	34	340	280	216	181	147	111	248	186	131
	35	326	268	207	174	141	107	236	178	126
	36	312	257	198	167	135	102	225	170	120
	37	298	246	190	160	130	98	215	162	115
	38	285	235	182	153	124	94	204	154	109
	39	272	224	174	146	119	90	194	146	104
	40	258	214	166	139	113	86	184	139	99
PROPERTIES										
Area, in. ²	19.5	15.8	12.0	10.0	8.06	6.05	15.0	11.1	7.70	
I, in. ⁴	278	229	178	151	122	92.9	199	151	106	
r, in.	3.78	3.82	3.86	3.88	3.90	3.92	3.64	3.68	3.72	



LRFD Columns Round HSS

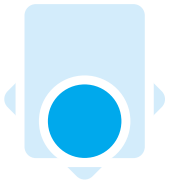
F_y=42



ERW

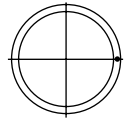
Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		10.000						9.625				
Wall Thickness		0.625	0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.250	0.188
Weight Per Foot		62.58	50.73	38.55	32.28	26.03	19.70	48.73	37.05	31.03	25.03	18.95
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.233	0.174
F_y = 42 ksi												
Effective length KL in feet	0	614	496	378	317	255	192	478	364	305	245	185
	2	612	495	377	316	254	191	477	363	304	244	184
	3	610	493	376	315	254	190	475	361	302	243	183
	4	606	490	374	313	252	189	472	359	301	242	182
	5	602	487	371	311	251	188	468	357	298	240	181
	6	597	483	368	309	249	187	464	354	296	238	179
	7	591	478	365	306	246	185	459	350	293	236	178
	8	584	472	360	302	243	183	453	345	289	233	175
	9	576	466	356	298	240	181	447	341	285	230	173
	10	567	459	351	294	237	178	440	335	281	226	171
	11	558	452	345	289	233	175	432	330	276	223	168
	12	548	444	339	284	229	172	424	323	271	218	165
	13	537	435	333	279	225	169	415	317	265	214	161
	14	526	426	326	274	221	166	406	310	260	210	158
	15	514	417	319	268	216	163	396	303	254	205	154
	16	501	407	311	262	211	159	386	295	247	200	151
	17	488	397	304	255	206	155	375	287	241	194	147
	18	475	386	296	248	201	151	364	279	234	189	143
	19	461	375	288	242	195	147	353	271	227	184	139
	20	447	364	279	235	190	143	342	262	220	178	134
	21	433	353	271	228	184	139	330	253	213	172	130
	22	418	341	262	220	178	134	318	245	206	166	126
	23	404	329	253	213	172	130	306	236	198	160	121
	24	389	318	244	206	166	126	294	227	191	154	117
	25	374	306	235	198	160	121	283	218	183	149	112
	26	359	294	226	191	154	117	271	209	176	143	108
	27	345	282	217	183	148	112	259	200	168	137	104
	28	330	270	208	176	143	108	247	191	161	131	99
	29	315	259	200	168	137	103	236	182	154	125	95
	30	301	247	191	161	131	99	224	174	147	119	90
	31	287	236	182	154	125	95	213	165	140	113	86
	32	273	225	174	147	119	90	202	157	133	108	82
	33	259	214	165	140	114	86	191	149	126	102	78
	34	246	203	157	133	108	82	180	141	119	97	74
	35	232	192	149	126	103	78	170	133	112	92	70
	36	219	182	141	119	97	74	161	125	106	87	66
	37	208	172	133	113	92	70	152	119	101	82	62
	38	197	163	126	107	87	66	144	113	95	78	59
	39	187	155	120	102	83	63	137	107	90	74	56
	40	178	147	114	97	79	60	130	102	86	70	53
PROPERTIES												
Area, In. ²	17.2	13.9	10.6	8.88	7.15	5.37	13.4	10.2	8.53	6.87	5.17	
I, In. ⁴	191	159	123	105	85.3	64.8	141	110	93.0	75.9	57.7	
r, In.	3.34	3.38	3.41	3.43	3.45	3.47	3.24	3.28	3.30	3.32	3.34	



LRFD Columns Round HSS

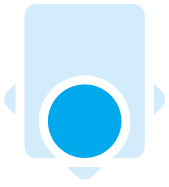
F_y=42



ERW

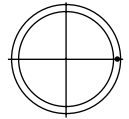
Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		8.750					8.625					7.625		
Wall Thickness	0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.322	0.250	0.188	0.375	0.328	0.125	
Weight Per Foot	44.06	33.54	28.12	22.70	17.19	43.39	33.04	28.55	22.36	16.94	29.04	25.56	10.01	
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.300	0.233	0.174	0.349	0.305	0.116	
F_y = 42 ksi														
Effective length KL in feet	0	432	329	276	222	167	425	324	280	219	165	285	250	98
	2	430	327	275	222	167	423	322	279	218	164	283	249	97
	3	428	326	274	220	166	421	321	278	217	163	281	247	97
	4	425	324	272	219	165	418	319	276	216	162	279	245	96
	5	421	321	269	217	163	414	316	273	214	161	276	242	95
	6	416	317	266	215	162	409	312	270	211	159	272	239	94
	7	411	313	263	212	160	403	308	267	209	157	267	235	92
	8	404	308	259	209	157	397	303	263	206	155	262	230	90
	9	397	303	255	206	155	390	298	258	202	152	256	225	88
	10	390	297	250	202	152	382	292	253	198	149	249	219	86
	11	381	291	245	198	149	374	286	248	194	146	243	213	84
	12	372	285	239	193	146	365	279	242	190	143	235	207	82
	13	363	278	233	189	142	355	272	236	185	140	228	200	79
	14	353	270	227	184	139	345	265	230	180	136	220	193	77
	15	343	262	221	179	135	335	257	223	175	132	211	186	74
	16	332	254	214	173	131	324	249	216	170	128	203	179	71
	17	321	246	207	168	127	313	240	209	164	124	194	171	68
	18	309	238	200	162	123	301	232	202	158	120	185	163	65
	19	298	229	193	156	118	290	223	194	153	115	176	155	62
	20	286	220	186	151	114	278	214	187	147	111	167	148	59
	21	274	211	178	145	109	266	206	179	141	107	159	140	56
	22	262	202	171	139	105	254	197	171	135	102	150	132	53
	23	250	193	164	133	101	243	188	164	129	98	141	125	50
	24	239	185	156	127	96	231	179	156	123	93	133	117	48
	25	227	176	149	121	92	219	170	148	117	89	124	110	45
	26	215	167	141	115	87	208	161	141	111	85	116	103	42
	27	204	158	134	109	83	196	153	134	106	80	108	96	39
	28	193	150	127	103	79	185	144	126	100	76	100	89	37
	29	182	141	120	98	74	174	136	119	94	72	94	83	34
	30	171	133	113	92	70	164	128	112	89	68	87	77	32
	31	160	125	107	87	66	153	120	105	84	64	82	73	30
	32	150	118	100	82	62	144	113	99	78	60	77	68	28
	33	141	111	94	77	59	135	106	93	74	56	72	64	26
	34	133	104	89	72	55	127	100	88	69	53	68	60	25
	35	126	98	84	68	52	120	94	83	66	50	64	57	23
	36	119	93	79	65	49	114	89	78	62	47	61	54	22
	37	112	88	75	61	47	108	84	74	59	45	57	51	21
	38	107	83	71	58	44	102	80	70	56	42	55	48	20
	39	101	79	67	55	42	97	76	67	53	40	52	46	19
	40	96	75	64	52	40	92	72	63	50	38	49	44	18
PROPERTIES														
Area, in. ²	12.1	9.21	7.73	6.23	4.69	11.9	9.07	7.85	6.14	4.62	7.98	7.01	2.74	
I, in. ⁴	104	81.4	69.3	56.6	43.1	99.5	77.8	68.1	54.1	41.3	52.9	47.1	19.3	
r, in.	2.93	2.97	2.99	3.01	3.03	2.89	2.93	2.95	2.97	2.99	2.58	2.59	2.66	



LRFD Columns Round HSS

F_y=42

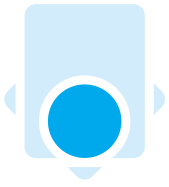


ERW

Design Axial Strength in kips ($\phi=0.85$)

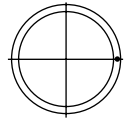
Nominal Outside Diameter		7.500					7.000					
Wall Thickness		0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.250	0.188	0.125
Weight Per Foot		37.38	28.54	23.95	19.36	14.68	34.71	26.53	22.29	18.02	13.68	9.18
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.233	0.174	0.116
F_y = 42 ksi												
Effective length KL in feet	0	368	280	235	190	143	341	260	219	177	133	90
	2	366	278	234	189	142	339	259	217	176	132	89
	3	363	276	232	188	141	336	257	216	174	131	88
	4	359	274	230	186	140	332	254	213	172	130	87
	5	355	270	227	184	138	327	250	210	170	128	86
	6	349	266	224	181	136	321	246	207	167	126	85
	7	343	262	220	178	134	315	241	203	164	124	83
	8	336	256	216	174	131	307	235	198	160	121	81
	9	328	250	211	170	128	298	229	193	156	118	79
	10	319	244	205	166	125	289	222	187	151	114	77
	11	309	237	200	162	122	279	214	181	147	111	75
	12	299	229	193	157	118	269	207	174	141	107	72
	13	289	222	187	151	114	258	199	168	136	103	70
	14	278	213	180	146	110	247	190	161	130	99	67
	15	267	205	173	141	106	236	182	154	125	95	64
	16	255	197	166	135	102	224	173	146	119	90	61
	17	243	188	159	129	98	212	164	139	113	86	58
	18	232	179	151	123	93	200	155	131	107	81	55
	19	220	170	144	117	89	188	146	124	101	77	52
	20	208	161	137	111	84	177	137	117	95	72	49
	21	196	152	129	105	80	165	128	109	89	68	46
	22	184	143	122	99	75	154	120	102	84	64	43
	23	173	135	115	94	71	143	112	95	78	60	41
	24	162	126	107	88	67	132	103	88	72	55	38
	25	151	118	101	82	63	122	95	82	67	51	35
	26	140	110	94	77	59	113	88	75	62	47	32
	27	130	102	87	71	55	104	82	70	57	44	30
	28	121	95	81	66	51	97	76	65	53	41	28
	29	113	88	75	62	47	91	71	61	50	38	26
	30	105	83	71	58	44	85	66	57	47	36	24
	31	98	77	66	54	41	79	62	53	44	33	23
	32	92	73	62	51	39	74	58	50	41	31	21
	33	87	68	58	48	37	70	55	47	38	29	20
	34	82	64	55	45	34	66	52	44	36	28	19
	35	77	61	52	43	32	62	49	42	34	26	18
	36	73	57	49	40	31	59	46	39	32	25	17
	37	69	54	46	38	29	56	44	37	31	23	16
	38	66	51	44	36	28	53	41	35	29	22	15
	39	62	49	42	34	26	<u>50</u>	<u>39</u>	<u>34</u>	<u>28</u>	21	14
	40	59	46	40	33	25					20	14
PROPERTIES												
Area, in. ²	10.3	7.84	6.59	5.32	4.00	9.55	7.29	6.13	4.95	3.73	2.51	
I, in. ⁴	63.9	50.2	42.9	35.2	26.9	51.2	40.4	34.6	28.4	21.7	14.9	
r, in.	2.49	2.53	2.55	2.57	2.59	2.32	2.35	2.37	2.39	2.41	2.43	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=42

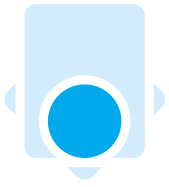


ERW

Design Axial Strength in kips ($\phi=0.85$)

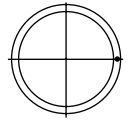
Nominal Outside Diameter		6.875					6.625							
Wall Thickness	0.500	0.375	0.312	0.250	0.188	0.500	0.432	0.375	0.312	0.280	0.250	0.188	0.125	
Weight Per Foot	34.04	26.03	21.87	17.69	13.43	32.71	28.57	25.03	21.04	18.97	17.02	12.92	8.68	
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.465	0.403	0.349	0.291	0.261	0.233	0.174	0.116	
F_y = 42 ksi														
Effective length KL in feet	0	334	256	215	174	131	321	281	246	207	186	167	126	85
	2	332	254	214	172	130	319	279	244	205	185	166	125	84
	3	329	252	212	171	129	316	277	242	203	183	164	124	83
	4	325	249	209	169	127	312	273	239	201	181	163	123	82
	5	320	245	206	167	126	307	269	235	198	178	160	121	81
	6	314	241	203	164	123	300	263	230	194	175	157	119	80
	7	307	236	198	160	121	293	257	225	190	171	153	116	78
	8	299	230	194	157	118	285	250	219	185	167	150	113	76
	9	291	223	188	152	115	276	243	212	179	162	145	110	74
	10	281	217	183	148	112	267	234	205	173	156	141	106	72
	11	271	209	176	143	108	257	226	198	167	151	135	103	69
	12	261	201	170	138	104	246	216	190	160	145	130	99	67
	13	250	193	163	132	100	235	207	181	153	139	125	95	64
	14	239	185	156	127	96	223	197	173	146	132	119	90	61
	15	227	176	149	121	92	211	186	164	139	126	113	86	58
	16	215	167	142	115	87	200	176	155	132	119	107	82	55
	17	203	158	134	109	83	188	166	146	124	112	101	77	52
	18	192	149	127	103	78	176	156	137	117	106	95	73	49
	19	180	141	119	97	74	164	145	129	109	99	89	68	46
	20	168	132	112	91	70	153	135	120	102	93	84	64	43
	21	157	123	105	86	65	141	126	111	95	86	78	60	40
	22	146	115	98	80	61	131	116	103	88	80	72	55	38
	23	135	106	91	74	57	120	107	95	81	74	67	51	35
	24	124	98	84	69	53	110	98	87	75	68	61	47	32
	25	114	91	77	64	49	101	90	80	69	63	57	44	30
	26	106	84	72	59	45	94	84	74	64	58	52	40	27
	27	98	78	66	55	42	87	78	69	59	54	49	37	25
	28	91	72	62	51	39	81	72	64	55	50	45	35	24
	29	85	67	58	47	36	75	67	60	51	47	42	32	22
	30	79	63	54	44	34	70	63	56	48	44	39	30	21
	31	74	59	50	41	32	66	59	52	45	41	37	28	19
	32	70	55	47	39	30	62	55	49	42	38	35	27	18
	33	66	52	44	37	28	58	52	46	40	36	33	25	17
	34	62	49	42	34	26	55	49	43	37	34	31	24	16
	35	58	46	40	32	25	52	46	41	35	32	29	22	15
	36	55	44	37	31	24	<u>49</u>	<u>44</u>	39	33	30	27	21	14
	37	<u>52</u>	41	35	29	22			<u>37</u>	<u>31</u>	<u>29</u>	<u>26</u>	<u>20</u>	14
	38		<u>39</u>	<u>34</u>	28	21							<u>19</u>	13
	39				<u>26</u>	20								<u>13</u>
	40													
PROPERTIES														
Area, In. ²	9.36	7.16	6.02	4.86	3.66	9.00	7.88	6.88	5.79	5.22	4.68	3.53	2.37	
I, In. ⁴	48.3	38.2	32.7	26.8	20.6	42.9	38.3	34.0	29.1	26.5	23.9	18.4	12.6	
r, In.	2.27	2.31	2.33	2.35	2.37	2.18	2.20	2.22	2.24	2.25	2.26	2.28	2.30	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=42

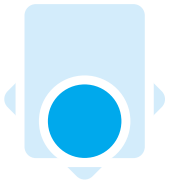


ERW

Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		6.125					6.000						
Wall Thickness		0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.280	0.250	0.188	0.125
Weight Per Foot		30.04	23.03	19.37	15.69	11.92	29.37	22.53	18.95	17.11	15.35	11.67	7.84
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.261	0.233	0.174	0.116
F_y = 42 ksi													
Effective length K _L in feet	0	295	226	190	154	116	289	221	186	168	151	114	76
	2	293	224	189	153	115	286	219	185	167	149	113	76
	3	289	222	187	151	114	283	217	183	165	148	111	75
	4	285	218	184	149	112	278	214	180	162	146	110	74
	5	280	214	181	146	110	273	209	177	159	143	108	73
	6	273	209	177	143	108	266	204	172	156	140	105	71
	7	265	204	172	139	105	258	199	168	151	136	103	69
	8	257	198	167	135	102	249	192	162	147	131	99	67
	9	247	191	161	130	99	240	185	156	141	127	96	65
	10	237	183	155	125	95	229	177	150	136	122	92	62
	11	227	175	148	120	91	219	169	143	130	116	88	60
	12	215	167	141	115	87	207	161	136	123	111	84	57
	13	204	158	134	109	83	196	152	129	117	105	80	54
	14	192	150	127	103	78	184	143	122	110	99	75	51
	15	180	141	120	97	74	172	135	114	104	93	71	48
	16	169	132	112	91	69	160	126	107	97	87	67	45
	17	157	123	105	85	65	148	117	100	90	82	62	42
	18	145	114	97	79	61	137	108	92	84	76	58	39
	19	134	106	90	74	56	126	100	85	77	70	53	37
	20	123	97	83	68	52	115	91	78	71	64	49	34
	21	112	89	77	62	48	104	83	72	65	59	45	31
	22	102	81	70	57	44	95	76	65	59	54	41	28
	23	94	75	64	52	40	87	69	60	54	49	38	26
	24	86	68	59	48	37	80	64	55	50	45	35	24
	25	79	63	54	44	34	74	59	50	46	42	32	22
	26	73	58	50	41	31	68	54	47	43	38	30	20
	27	68	54	46	38	29	63	50	43	39	36	27	19
	28	63	50	43	35	27	59	47	40	37	33	26	17
	29	59	47	40	33	25	55	44	38	34	31	24	16
	30	55	44	38	31	24	51	41	35	32	29	22	15
	31	52	41	35	29	22	48	38	33	30	27	21	14
	32	48	38	33	27	21	45	36	31	28	25	20	13
	33	<u>45</u>	36	31	25	20	<u>42</u>	<u>34</u>	<u>29</u>	<u>26</u>	24	18	13
	34	<u>42</u>	<u>34</u>	<u>29</u>	<u>24</u>	18	<u>39</u>	<u>31</u>	<u>26</u>	<u>23</u>	<u>21</u>	<u>17</u>	<u>12</u>
	35	<u>39</u>	<u>31</u>	<u>26</u>	<u>21</u>	<u>17</u>	<u>36</u>	<u>28</u>	<u>23</u>	<u>20</u>	<u>18</u>	<u>14</u>	<u>10</u>
	36												
	37												
	38												
	39												
	40												
PROPERTIES													
Area, in. ²	8.27	6.33	5.33	4.31	3.25	8.09	6.20	5.22	4.71	4.22	3.18	2.14	
I, in. ⁴	33.3	26.5	22.7	18.7	14.4	31.2	24.8	21.3	19.4	17.6	13.5	9.28	
r, in.	2.01	2.05	2.07	2.08	2.10	1.96	2.00	2.02	2.03	2.04	2.06	2.08	

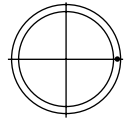
Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

Design Axial Strength in kips ($\phi=0.85$)

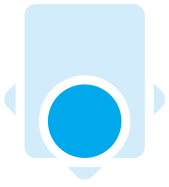
F_y=42



ERW

Nominal Outside Diameter		5.563				5.500		
Wall Thickness		0.375	0.258	0.188	0.134	0.500	0.375	0.258
Weight Per Foot		20.78	14.62	10.79	7.77	26.70	20.53	14.44
Design Wall Thickness		0.349	0.241	0.174	0.125	0.465	0.349	0.241
F_y = 42 ksi								
Effective length KL in feet	0	204	144	105	76	263	202	142
	2	202	142	104	76	260	200	141
	3	200	141	103	75	256	197	139
	4	196	138	101	74	251	193	136
	5	191	135	99	72	245	189	133
	6	186	131	97	70	238	183	130
	7	180	127	94	68	230	177	125
	8	173	123	90	66	220	170	121
	9	166	117	87	63	210	163	116
	10	158	112	83	60	199	155	110
	11	149	106	79	57	188	147	104
	12	141	100	74	54	177	138	98
	13	132	94	70	51	165	129	92
	14	123	88	65	48	153	120	86
	15	114	82	61	45	141	111	80
	16	105	76	57	41	130	103	74
	17	97	70	52	38	118	94	68
	18	88	64	48	35	107	86	62
	19	80	58	44	32	97	78	56
	20	73	53	40	29	87	70	51
	21	66	48	36	27	79	64	46
	22	60	44	33	24	72	58	42
	23	55	40	30	22	66	53	39
	24	50	37	28	20	61	49	35
	25	46	34	26	19	56	45	33
	26	43	31	24	17	52	41	30
	27	40	29	22	16	48	38	28
	28	37	27	20	15	45	36	26
	29	34	25	19	14	42	33	24
	30	<u>32</u>	23	18	13	<u>42</u>	<u>31</u>	23
	31		<u>22</u>	<u>17</u>	12			<u>21</u>
	32				<u>11</u>			
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
PROPERTIES								
Area, in. ²	5.72	4.03	2.95	2.14	7.36	5.65	3.98	
I, in. ⁴	19.5	14.3	10.7	7.90	23.5	18.8	13.8	
r, in.	1.85	1.88	1.91	1.92	1.79	1.83	1.86	

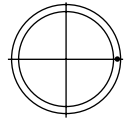
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

Design Axial Strength in kips ($\phi=0.85$)

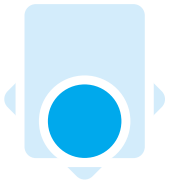
F_y=42



ERW

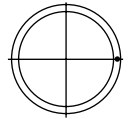
Nominal Outside Diameter		5.000						4.500				
Wall Thickness		0.500	0.375	0.312	0.258	0.250	0.188	0.125	0.337	0.237	0.188	0.125
Weight Per Foot		24.03	18.52	15.62	13.07	12.68	9.66	6.51	14.98	10.79	8.66	5.84
Design Wall Thickness		0.465	0.349	0.291	0.241	0.233	0.174	0.116	0.315	0.221	0.174	0.116
F_y = 42 ksi												
Effective length K _L in feet	0	236	182	154	129	125	94	64	148	106	84	57
	2	233	180	152	127	123	93	63	145	104	83	56
	3	229	177	149	125	121	92	62	143	102	81	55
	4	224	173	146	122	119	90	61	139	100	79	54
	5	217	168	142	119	115	87	59	134	96	77	52
	6	209	162	137	115	111	85	57	128	92	74	50
	7	200	155	131	110	107	81	55	121	88	70	48
	8	190	148	125	105	102	78	53	114	83	66	45
	9	179	140	119	100	97	74	50	107	77	62	42
	10	168	132	112	94	91	70	47	99	72	58	40
	11	156	123	105	88	86	65	44	91	66	53	37
	12	145	114	97	82	80	61	42	83	61	49	34
	13	133	105	90	76	74	57	39	75	55	44	31
	14	121	96	82	70	68	52	36	67	50	40	28
	15	110	88	75	63	62	48	33	60	44	36	25
	16	99	79	68	58	56	43	30	52	39	32	22
	17	88	71	61	52	51	39	27	46	35	28	20
	18	78	63	55	46	46	35	24	41	31	25	18
	19	70	57	49	42	41	32	22	37	28	23	16
	20	64	51	44	38	37	29	20	34	25	20	14
	21	58	47	40	34	33	26	18	30	23	19	13
	22	53	43	37	31	31	24	16	28	21	17	12
	23	48	39	34	28	28	22	15	25	19	15	11
	24	44	36	31	26	26	20	14	<u>23</u>	17	14	10
	25	41	33	28	24	24	18	13	<u>16</u>	<u>16</u>	<u>13</u>	<u>9</u>
	26	<u>38</u>	30	26	22	22	17	12				
	27	<u>28</u>	<u>28</u>	<u>24</u>	21	20	16	11				
	28				<u>19</u>	<u>19</u>	<u>15</u>	<u>10</u>				
	29											
	30											
	31											
	32											
	33											
	34											
	35											
	36											
	37											
	38											
	39											
	40											
PROPERTIES												
Area, in. ²	6.62	5.10	4.30	3.60	3.49	2.64	1.78	4.14	2.97	2.36	1.60	
I, in. ⁴	17.2	13.9	12.0	10.2	9.94	7.69	5.31	9.12	6.82	5.54	3.84	
r, in.	1.61	1.65	1.67	1.68	1.69	1.71	1.73	1.48	1.51	1.53	1.55	

Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

F_y=42

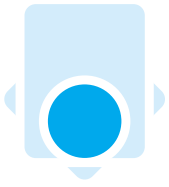


Design Axial Strength in kips ($\phi=0.85$)

ERW

Nominal Outside Diameter		4.000							
Wall Thickness	0.337	0.313	0.250	0.237	0.226	0.220	0.188	0.125	
Weight Per Foot	13.18	12.33	10.01	9.52	9.11	8.88	7.65	5.17	
Design Wall Thickness	0.315	0.291	0.233	0.221	0.211	0.205	0.174	0.116	
F_y = 42 ksi									
Effective length KL in feet	0	130	121	99	94	90	87	75	51
	2	128	119	97	92	88	85	73	50
	3	124	116	94	89	86	83	71	49
	4	120	112	91	86	83	81	69	47
	5	115	107	87	83	79	77	66	45
	6	108	101	82	78	75	73	63	43
	7	101	94	77	73	70	68	59	40
	8	94	87	72	68	65	64	55	37
	9	86	80	66	63	60	58	50	35
	10	78	73	60	57	55	53	46	32
	11	70	65	54	52	49	48	41	29
	12	62	58	48	46	44	43	37	26
	13	55	51	42	41	39	38	33	23
	14	47	45	37	36	34	33	29	20
	15	41	39	32	31	30	29	25	18
	16	36	34	28	27	26	25	22	15
	17	32	30	25	24	23	22	20	14
	18	29	27	22	22	21	20	17	12
	19	26	24	20	19	18	18	16	11
	20	23	22	18	17	17	16	14	10
	21	<u>21</u>	20	16	16	15	15	13	9
	22		<u>18</u>	<u>15</u>	<u>14</u>	<u>14</u>	<u>13</u>	<u>12</u>	<u>8</u>
	23								
	24								
	25								
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	34								
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	38								
	39								
	40								
PROPERTIES									
Area, in. ²	3.65	3.39	2.76	2.62	2.51	2.44	2.09	1.42	
I, in. ⁴	6.24	5.87	4.91	4.70	4.52	4.41	3.83	2.67	
r, in.	1.31	1.32	1.33	1.34	1.34	1.34	1.35	1.37	

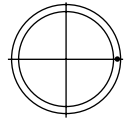
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

Design Axial Strength in kips ($\phi=0.85$)

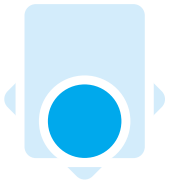
F_y=42



ERW

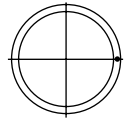
Nominal Outside Diameter		3.500						
Wall Thickness	0.313	0.300	0.250	0.216	0.203	0.188	0.125	
Weight Per Foot	10.65	10.25	8.68	7.58	7.15	6.65	4.51	
Design Wall Thickness	0.291	0.280	0.233	0.201	0.189	0.174	0.116	
F_y = 42 ksi								
Effective length KL in feet	0	105	101	85	74	70	65	44
	2	102	98	83	72	69	63	43
	3	98	95	80	70	66	61	42
	4	94	91	77	67	63	59	40
	5	88	85	72	63	60	55	38
	6	82	79	67	59	56	52	35
	7	75	72	62	54	51	48	32
	8	68	65	56	49	47	43	30
	9	60	58	50	44	42	39	27
	10	53	51	44	39	37	34	24
	11	46	44	39	34	32	30	21
	12	39	38	33	29	28	26	18
	13	33	32	28	25	24	22	16
	14	29	28	24	22	20	19	13
	15	25	24	21	19	18	17	12
	16	22	21	19	16	16	15	10
	17	20	19	16	15	14	13	9
	18	17	17	15	13	12	12	8
	19	16	15	13	12	11	10	7
	20	<u>16</u>	<u>15</u>	<u>13</u>	<u>12</u>	<u>11</u>	<u>10</u>	<u>7</u>
	21							
	22							
	23							
	24							
	25							
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	40							
PROPERTIES								
Area, in. ²	2.93	2.83	2.39	2.08	1.97	1.82	1.23	
I, in. ⁴	3.81	3.70	3.21	2.84	2.70	2.52	1.77	
r, in.	1.14	1.14	1.16	1.17	1.17	1.18	1.20	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=42

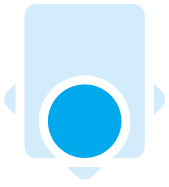


ERW

Design Axial Strength in kips ($\phi=0.85$)

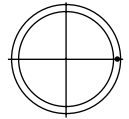
Nominal Outside Diameter		3.000							2.875				
Wall Thickness	0.300	0.250	0.216	0.203	0.188	0.152	0.134	0.120	0.250	0.203	0.188	0.125	
Weight Per Foot	8.65	7.34	6.42	6.06	5.65	4.62	4.10	3.69	7.01	5.79	5.40	3.67	
Design Wall Thickness	0.280	0.233	0.201	0.189	0.174	0.142	0.125	0.112	0.233	0.189	0.174	0.116	
F_y = 42 ksi													
Effective length KL in feet	0	85	72	63	60	55	45	40	36	69	57	53	36
	2	82	70	61	58	53	44	39	35	66	55	51	35
	3	78	67	58	55	51	42	37	34	63	52	48	33
	4	73	63	55	52	48	39	35	32	59	49	45	31
	5	67	58	50	48	44	37	33	29	54	44	42	29
	6	61	52	46	43	40	33	30	27	48	40	37	26
	7	54	46	41	39	36	30	27	24	42	35	33	23
	8	47	40	36	34	31	26	23	21	36	30	28	20
	9	40	34	31	29	27	22	20	18	31	26	24	17
	10	33	29	26	24	23	19	17	16	25	21	20	14
	11	27	24	21	20	19	16	14	13	21	18	17	12
	12	23	20	18	17	16	13	12	11	17	15	14	10
	13	20	17	15	15	14	11	10	9	15	13	12	8
	14	17	15	13	13	12	10	9	8	13	11	10	7
	15	15	13	11	11	10	9	8	7	<u>11</u>	<u>9</u>	<u>9</u>	6
	16	<u>13</u>	<u>11</u>	<u>10</u>	<u>10</u>	<u>9</u>	<u>7</u>	<u>7</u>	<u>6</u>				<u>6</u>
	17							<u>6</u>	<u>5</u>				
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	40												
PROPERTIES													
Area, in. ²	2.39	2.03	1.77	1.67	1.54	1.27	1.13	1.02	1.93	1.59	1.48	1.01	
I, in. ⁴	2.24	1.95	1.74	1.66	1.55	1.30	1.17	1.06	1.70	1.45	1.35	0.958	
r, in.	0.967	0.982	0.992	0.996	1.00	1.01	1.02	1.02	0.938	0.952	0.957	0.976	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=42

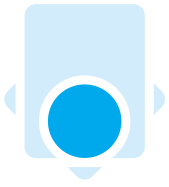


ERW

Design Axial Strength in kips ($\phi=0.85$)

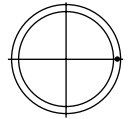
Nominal Outside Diameter		2.500			2.375				1.900	1.660	
Wall Thickness	0.250	0.188	0.125	0.250	0.218	0.188	0.154	0.125	0.145	0.140	
Weight Per Foot	6.01	4.64	3.17	5.67	5.02	4.39	3.65	3.00	2.72	2.27	
Design Wall Thickness	0.233	0.174	0.116	0.233	0.204	0.174	0.143	0.116	0.135	0.130	
F_y = 42 ksi											
Effective length KL in feet	0	59	45	31	56	50	43	36	29	27	22
	2	56	43	30	53	47	40	34	28	24	20
	3	52	40	28	49	43	38	31	26	22	17
	4	48	37	25	44	39	34	28	23	19	14
	5	42	33	23	38	34	30	25	21	15	10
	6	36	28	20	32	29	25	21	18	12	8
	7	30	24	17	27	24	21	18	15	9	6
	8	25	20	14	21	19	17	14	12	7	4
	9	20	16	11	17	15	13	11	10	5	3
	10	16	13	9	14	12	11	9	8	4	<u>3</u>
	11	13	11	8	11	10	9	8	6		
	12	11	9	6	<u>9</u>	<u>9</u>	8	6	5		
	13	<u>9</u>	<u>8</u>	5			<u>6</u>	<u>5</u>	<u>5</u>		
	14			<u>5</u>							
	15										
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	40										
PROPERTIES											
Area, in. ²	1.66	1.27	0.87	1.57	1.39	1.20	1.00	0.82	0.75	0.62	
I, in. ⁴	1.08	0.865	0.619	0.910	0.827	0.733	0.627	0.527	0.293	0.184	
r, in.	0.806	0.825	0.844	0.762	0.771	0.781	0.791	0.800	0.626	0.543	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

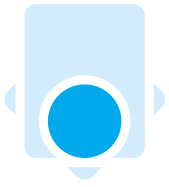
F_y=46



ERW

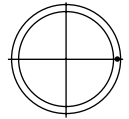
Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		20.000		18.000		16.000				14.000		
Wall Thickness		0.500	0.375	0.500	0.375	0.500	0.438	0.375	0.312	0.500	0.375	0.312
Weight Per Foot		104.13	78.60	93.45	70.59	82.77	72.80	62.58	52.28	72.09	54.57	45.61
Design Wall Thickness		0.465	0.349	0.465	0.349	0.465	0.407	0.349	0.291	0.465	0.349	0.291
F_y = 46 ksi												
Effective length KL in feet	0	1110	841	1000	759	888	778	673	563	774	587	489
	2	1110	840	1000	758	886	777	672	562	773	586	488
	3	1110	839	999	757	885	776	671	561	771	584	487
	4	1110	838	997	756	883	774	669	560	769	583	486
	5	1110	836	995	754	880	772	667	559	766	580	484
	6	1110	835	992	752	877	769	665	557	763	578	482
	7	1100	832	989	749	874	766	662	554	758	575	479
	8	1100	830	985	747	870	762	659	552	754	571	476
	9	1100	827	981	743	865	758	655	549	748	567	473
	10	1090	824	976	740	859	754	652	546	742	563	469
	11	1090	820	971	736	854	749	647	542	736	558	465
	12	1080	817	965	732	847	743	643	538	729	552	461
	13	1080	813	959	727	841	737	637	534	721	547	456
	14	1070	808	953	722	833	731	632	529	713	541	451
	15	1060	804	946	717	826	724	626	525	704	534	445
	16	1060	799	938	712	817	717	620	519	695	527	440
	17	1050	793	931	706	809	710	614	514	685	520	434
	18	1040	788	922	700	800	702	607	508	675	513	428
	19	1040	782	914	693	790	693	600	503	665	505	421
	20	1030	776	905	687	780	685	592	496	654	497	415
	21	1020	769	896	680	770	676	585	490	643	488	408
	22	1010	763	886	672	760	667	577	484	631	480	400
	23	1000	756	876	665	749	657	569	477	619	471	393
	24	991	749	866	657	738	647	560	470	607	462	386
	25	982	742	855	649	726	637	552	463	595	452	378
	26	972	734	844	641	714	627	543	455	582	443	370
	27	961	726	833	633	702	617	534	448	569	433	362
	28	950	718	822	624	690	606	525	440	556	424	354
	29	940	710	810	615	677	595	515	432	543	414	346
	30	928	702	798	606	665	584	506	424	529	404	337
	31	917	693	786	597	652	573	496	416	516	394	329
	32	905	685	773	588	639	561	486	408	502	383	321
	33	893	676	761	579	625	550	476	400	489	373	312
	34	881	667	748	569	612	538	466	391	475	363	304
	35	869	658	735	559	599	526	456	383	462	353	295
	36	857	648	722	549	585	515	446	375	448	342	287
	37	844	639	709	540	572	503	436	366	434	332	278
	38	831	629	696	530	558	491	426	358	421	322	270
	39	818	620	682	520	544	479	415	349	407	312	261
	40	805	610	669	509	531	467	405	340	394	302	253
PROPERTIES												
Area, in. ²	28.5	21.5	25.6	19.4	22.7	19.9	17.2	14.4	19.8	15.0	12.5	
I, in. ⁴	1360	1040	985	754	685	606	526	443	453	349	295	
r, in.	6.91	6.95	6.20	6.24	5.49	5.51	5.53	5.55	4.79	4.83	4.85	



LRFD Columns Round HSS

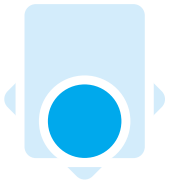
F_y=46



ERW

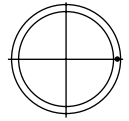
Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		12.750			12.500					
Wall Thickness		0.500	0.375	0.250	0.625	0.500	0.375	0.312	0.250	0.188
Weight Per Foot		65.42	49.56	33.38	79.27	64.08	48.56	40.61	32.71	24.72
Design Wall Thickness		0.465	0.349	0.233	0.581	0.465	0.349	0.291	0.233	0.174
F_y = 46 ksi										
Effective length KL in feet	0	700	532	358	852	688	520	438	351	263
	2	698	531	357	851	687	519	437	350	263
	3	697	529	357	848	685	518	436	349	262
	4	694	528	355	845	682	516	434	348	261
	5	691	525	354	841	679	513	432	347	260
	6	687	522	352	836	675	510	430	345	259
	7	683	519	350	830	670	507	427	342	257
	8	677	515	347	823	665	503	424	340	255
	9	671	511	344	816	659	498	420	337	253
	10	665	506	341	807	652	493	416	334	250
	11	658	500	337	798	645	488	411	330	248
	12	650	495	334	788	637	482	406	326	245
	13	642	488	329	778	629	476	401	322	242
	14	633	482	325	766	620	469	396	317	238
	15	624	475	321	754	610	462	390	313	235
	16	614	468	316	742	600	455	383	308	231
	17	604	460	311	728	590	447	377	303	227
	18	593	452	305	715	579	439	370	297	223
	19	582	444	300	700	568	430	363	292	219
	20	570	435	294	686	556	422	356	286	215
	21	558	426	288	671	544	413	348	280	210
	22	546	417	282	655	531	404	341	274	206
	23	534	408	276	639	519	394	333	267	201
	24	521	398	270	623	506	385	325	261	196
	25	508	388	263	607	493	375	317	255	192
	26	495	379	257	590	480	365	308	248	187
	27	482	369	250	573	466	355	300	241	182
	28	469	359	243	556	453	345	292	235	177
	29	455	348	236	539	439	335	283	228	172
	30	442	338	230	522	426	325	274	221	167
	31	428	328	223	505	412	314	266	214	161
	32	414	318	216	488	398	304	257	207	156
	33	401	308	209	471	385	294	249	201	151
	34	387	297	202	455	371	284	240	194	146
	35	374	287	196	438	358	274	232	187	141
	36	360	277	189	421	345	264	223	180	136
	37	347	267	182	405	331	254	215	174	131
	38	334	257	176	389	318	244	207	167	126
	39	321	248	169	373	306	234	199	161	121
	40	309	238	163	357	293	225	191	154	117
PROPERTIES										
Area, in. ²	17.9	13.6	9.16	21.8	17.6	13.3	11.2	8.98	6.74	
I, in. ⁴	339	262	180	387	319	246	208	169	128	
r, in.	4.35	4.39	4.43	4.22	4.26	4.30	4.32	4.34	4.36	



LRFD Columns Round HSS

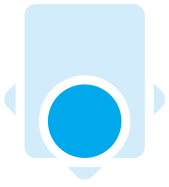
F_y=46



ERW

Design Axial Strength in kips ($\phi=0.85$)

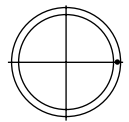
Nominal Outside Diameter		12.313						12.250					
Wall Thickness		0.625	0.500	0.375	0.312	0.250	0.188	0.625	0.500	0.375	0.312	0.250	0.188
Weight Per Foot		78.02	63.08	47.81	39.99	32.21	24.35	77.60	62.75	47.56	39.78	32.04	24.22
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174	0.581	0.465	0.349	0.291	0.233	0.174
F_y = 46 ksi													
Effective length KL in feet	0	837	676	512	430	346	260	833	673	508	426	344	258
	2	835	675	511	429	345	259	831	671	507	425	343	258
	3	833	673	510	428	344	258	829	669	506	424	342	257
	4	829	670	508	426	343	257	825	667	504	423	341	256
	5	825	667	505	424	341	256	821	663	501	420	339	255
	6	820	663	502	422	339	255	816	659	498	418	338	253
	7	814	658	499	419	337	253	810	654	495	415	335	251
	8	807	653	495	416	334	251	803	649	491	412	332	249
	9	799	647	490	412	331	249	795	643	486	408	329	247
	10	791	640	485	408	328	246	787	636	481	404	326	245
	11	782	633	480	403	324	244	778	629	476	399	322	242
	12	772	625	474	398	320	241	767	621	470	394	319	239
	13	761	616	467	393	316	238	757	612	463	389	314	236
	14	749	607	461	387	311	234	745	603	457	383	310	233
	15	737	597	453	381	307	231	733	593	449	377	305	229
	16	725	587	446	375	302	227	720	583	442	371	300	225
	17	711	577	438	368	296	223	707	573	434	364	295	221
	18	697	566	430	362	291	219	693	561	426	358	289	217
	19	683	554	421	354	285	215	678	550	417	351	284	213
	20	668	542	412	347	279	210	664	538	408	343	278	209
	21	653	530	403	340	273	206	648	526	399	336	272	204
	22	637	518	394	332	267	201	633	514	390	328	265	200
	23	621	505	385	324	261	197	617	501	381	320	259	195
	24	605	492	375	316	255	192	600	488	371	312	253	190
	25	589	479	365	308	248	187	584	475	361	304	246	185
	26	572	466	355	299	241	182	567	461	351	296	239	180
	27	555	452	345	291	235	177	551	448	341	287	233	175
	28	538	439	335	282	228	172	534	435	331	279	226	170
	29	521	425	325	274	221	167	517	421	321	270	219	165
	30	504	412	315	265	214	162	500	407	311	262	212	160
	31	487	398	304	257	207	157	483	394	301	253	206	155
	32	470	384	294	248	201	151	466	380	290	245	199	150
	33	454	371	284	240	194	146	449	367	280	236	192	145
	34	437	357	274	231	187	141	432	353	270	228	185	140
	35	420	344	264	223	180	136	415	340	260	220	178	135
	36	404	331	254	215	174	131	399	327	250	211	172	130
	37	387	318	244	206	167	126	383	314	241	203	165	125
	38	371	305	234	198	160	121	367	301	231	195	159	120
	39	356	292	225	190	154	117	351	288	221	187	152	115
	40	340	280	215	182	148	112	336	276	212	179	146	110
PROPERTIES													
Area, in. ²	21.4	17.3	13.1	11.0	8.84	6.64	21.3	17.2	13.0	10.9	8.80	6.60	
I, in. ⁴	369	304	235	199	161	122	363	299	231	196	159	120	
r, in.	4.15	4.19	4.23	4.25	4.27	4.29	4.13	4.17	4.21	4.23	4.25	4.27	



LRFD Columns Round HSS

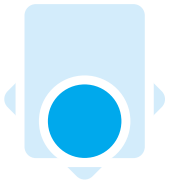
Design Axial Strength in kips ($\phi=0.85$)

F_y=46



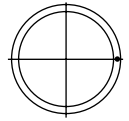
ERW

Nominal Outside Diameter		11.250					10.750			
Wall Thickness		0.625	0.500	0.375	0.312	0.250	0.188	0.500	0.365	0.250
Weight Per Foot		70.92	57.41	43.56	36.45	29.37	22.21	54.74	40.48	28.04
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174	0.465	0.340	0.233
F_y = 46 ksi										
Effective length KL in feet	0	762	618	469	391	315	237	587	434	301
	2	760	616	468	390	314	236	585	433	300
	3	758	614	466	389	313	235	583	431	299
	4	754	611	464	387	312	234	580	429	298
	5	750	608	462	385	310	233	576	426	296
	6	744	603	458	382	308	231	571	423	294
	7	738	598	454	379	305	229	566	419	291
	8	730	592	450	375	303	227	560	415	288
	9	722	585	445	371	299	225	553	410	284
	10	712	578	440	367	296	222	545	404	281
	11	702	570	434	362	292	219	537	398	277
	12	692	561	427	356	288	216	528	392	272
	13	680	552	420	351	283	213	518	385	267
	14	668	542	413	345	278	209	508	377	262
	15	655	532	405	338	273	205	498	369	257
	16	641	521	397	332	268	201	486	361	252
	17	627	510	389	325	262	197	475	353	246
	18	612	498	380	317	256	193	463	344	240
	19	597	486	371	310	250	188	450	335	234
	20	581	474	362	302	244	184	438	326	228
	21	565	461	352	294	238	179	425	317	221
	22	549	448	343	286	232	174	412	307	215
	23	533	435	333	278	225	169	398	297	208
	24	516	421	323	270	218	165	385	287	201
	25	499	408	313	262	212	160	371	278	194
	26	482	394	302	253	205	154	358	268	188
	27	465	381	292	245	198	149	344	258	181
	28	448	367	282	236	191	144	331	248	174
	29	431	353	272	228	184	139	317	238	167
	30	414	340	261	219	178	134	304	228	160
	31	397	326	251	211	171	129	290	218	154
	32	381	313	241	202	164	124	277	209	147
	33	364	300	231	194	158	119	265	199	140
	34	348	287	221	186	151	114	252	190	134
	35	332	274	212	178	144	109	240	181	128
	36	317	261	202	170	138	105	227	172	122
	37	301	249	193	162	132	100	215	163	115
	38	286	237	184	154	126	95	204	154	109
	39	271	225	174	147	119	91	194	146	104
	40	258	214	166	139	114	86	184	139	99
PROPERTIES										
Area, In. ²	19.5	15.8	12.0	10.0	8.06	6.05	15.0	11.1	7.70	
I, In. ⁴	278	229	178	151	122	92.9	199	151	106	
r, In.	3.78	3.82	3.86	3.88	3.90	3.92	3.64	3.68	3.72	



LRFD Columns Round HSS

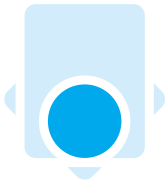
F_y=46



ERW

Design Axial Strength in kips ($\phi=0.85$)

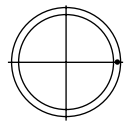
Nominal Outside Diameter		10.000						9.625				
Wall Thickness		0.625	0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.250	0.188
Weight Per Foot		62.58	50.73	38.55	32.28	26.03	19.70	48.73	37.05	31.03	25.03	18.95
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.233	0.174
F_y = 46 ksi												
Effective length KL in feet	0	673	543	414	347	280	210	524	399	334	269	202
	2	670	542	413	346	279	209	522	397	332	268	201
	3	667	539	411	345	278	208	520	396	331	267	201
	4	663	536	409	343	276	207	516	393	329	265	199
	5	658	532	406	340	274	206	512	390	326	263	198
	6	652	527	402	337	271	204	507	386	323	260	196
	7	645	521	398	333	269	202	501	382	319	257	194
	8	636	515	393	329	265	199	494	376	315	254	191
	9	627	507	387	325	262	197	486	371	310	250	188
	10	617	499	381	320	258	194	478	364	305	246	185
	11	605	490	375	314	253	190	469	358	299	242	182
	12	593	481	368	308	249	187	459	350	293	237	178
	13	581	471	360	302	244	183	448	343	287	232	175
	14	567	460	352	295	238	179	437	334	280	226	171
	15	553	449	344	288	233	175	426	326	273	220	166
	16	538	437	335	281	227	171	414	317	266	215	162
	17	523	425	326	274	221	166	401	307	258	208	157
	18	508	413	316	266	215	162	389	298	250	202	153
	19	492	400	307	258	208	157	376	288	242	196	148
	20	475	387	297	250	202	152	362	278	234	189	143
	21	459	374	287	241	195	147	349	268	225	182	138
	22	442	361	277	233	189	142	335	258	217	176	133
	23	425	347	267	225	182	137	322	248	208	169	128
	24	408	333	257	216	175	132	308	237	200	162	123
	25	391	320	246	208	168	127	294	227	191	155	117
	26	374	306	236	199	161	122	281	217	183	148	112
	27	357	293	226	191	154	117	267	207	174	142	107
	28	340	280	216	182	148	112	254	197	166	135	102
	29	324	266	206	174	141	107	241	187	158	128	97
	30	308	253	196	165	134	102	228	177	150	122	93
	31	292	241	186	157	128	97	216	168	142	115	88
	32	276	228	177	149	121	92	204	159	134	109	83
	33	261	216	167	142	115	87	191	149	126	103	78
	34	246	204	158	134	109	83	180	141	119	97	74
	35	232	192	149	126	103	78	170	133	112	92	70
	36	219	182	141	119	97	74	161	125	106	87	66
	37	208	172	133	113	92	70	152	119	101	82	62
	38	197	163	126	107	87	66	144	113	95	78	59
	39	187	155	120	102	83	63	137	107	90	74	56
	40	178	147	114	97	79	60	130	102	86	70	53
PROPERTIES												
Area, In. ²	17.2	13.9	10.6	8.88	7.15	5.37	13.4	10.2	8.53	6.87	5.17	
I, In. ⁴	191	159	123	105	85.3	64.8	141	110	93.0	75.9	57.7	
r, In.	3.34	3.38	3.41	3.43	3.45	3.47	3.24	3.28	3.30	3.32	3.34	



LRFD Columns Round HSS

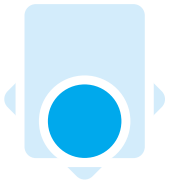
Design Axial Strength in kips ($\phi=0.85$)

F_y=46



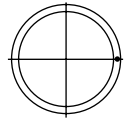
ERW

Nominal Outside Diameter		8.750					8.625					7.625		
Wall Thickness	0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.322	0.250	0.188	0.375	0.328	0.125	
Weight Per Foot	44.06	33.54	28.12	22.70	17.19	43.39	33.04	28.55	22.36	16.94	29.04	25.56	10.01	
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.300	0.233	0.174	0.349	0.305	0.116	
F_y = 46 ksi														
Effective length KL in feet	0	473	360	302	244	183	465	355	307	240	181	312	274	107
	2	471	359	301	243	183	463	353	306	239	180	310	273	107
	3	468	357	299	241	182	460	351	304	238	179	308	271	106
	4	465	354	297	239	180	457	348	302	236	178	305	268	105
	5	460	350	294	237	179	452	345	299	234	176	301	264	104
	6	454	346	291	234	177	446	341	295	231	174	296	260	102
	7	448	341	287	231	174	440	336	291	227	171	291	255	100
	8	440	336	282	227	171	432	330	286	224	169	284	250	98
	9	432	329	277	223	168	424	324	280	220	165	277	244	96
	10	423	323	271	219	165	414	317	275	215	162	270	237	93
	11	413	315	265	214	161	404	309	268	210	158	262	230	91
	12	402	307	259	209	158	394	301	261	205	155	253	223	88
	13	391	299	252	203	153	382	293	254	199	150	244	215	85
	14	379	290	244	198	149	371	284	247	194	146	235	207	82
	15	367	281	237	192	145	358	275	239	188	142	225	198	79
	16	354	272	229	185	140	346	266	231	181	137	215	189	75
	17	341	262	221	179	135	333	256	223	175	132	205	181	72
	18	328	252	213	172	130	320	246	214	168	127	195	172	69
	19	315	242	204	166	125	306	236	205	162	122	185	163	65
	20	301	232	196	159	120	293	226	197	155	117	174	154	62
	21	288	222	187	152	115	279	216	188	148	112	164	145	59
	22	274	212	179	145	110	265	205	179	141	107	154	136	55
	23	260	201	170	138	105	252	195	170	134	102	144	128	52
	24	247	191	162	132	100	239	185	162	128	97	135	119	49
	25	234	181	154	125	95	225	175	153	121	92	126	111	46
	26	221	171	145	118	90	212	165	145	114	87	116	103	42
	27	208	162	137	112	85	200	156	136	108	82	108	96	39
	28	195	152	129	105	80	187	146	128	101	77	100	89	37
	29	183	143	122	99	76	175	137	120	95	73	94	83	34
	30	171	134	114	93	71	164	128	112	89	68	87	77	32
	31	160	125	107	87	66	153	120	105	84	64	82	73	30
	32	150	118	100	82	62	144	113	99	78	60	77	68	28
	33	141	111	94	77	59	135	106	93	74	56	72	64	26
	34	133	104	89	72	55	127	100	88	69	53	68	60	25
	35	126	98	84	68	52	120	94	83	66	50	64	57	23
	36	119	93	79	65	49	114	89	78	62	47	61	54	22
	37	112	88	75	61	47	108	84	74	59	45	57	51	21
	38	107	83	71	58	44	102	80	70	56	42	55	48	20
	39	101	79	67	55	42	97	76	67	53	40	52	46	19
	40	96	75	64	52	40	92	72	63	50	38	49	44	18
PROPERTIES														
Area, In. ²	12.1	9.21	7.73	6.23	4.69	11.9	9.07	7.85	6.14	4.62	7.98	7.01	2.74	
I, In. ⁴	104	81.4	69.3	56.6	43.1	99.5	77.8	68.1	54.1	41.3	52.9	47.1	19.3	
r, In.	2.93	2.97	2.99	3.01	3.03	2.89	2.93	2.95	2.97	2.99	2.58	2.59	2.66	



LRFD Columns Round HSS

F_y=46

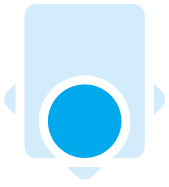


ERW

Design Axial Strength in kips ($\phi=0.85$)

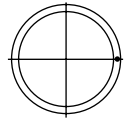
Nominal Outside Diameter		7.500					7.000					
Wall Thickness		0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.250	0.188	0.125
Weight Per Foot		37.38	28.54	23.95	19.36	14.68	34.71	26.53	22.29	18.02	13.68	9.18
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.233	0.174	0.116
F_y = 46 ksi												
Effective length KL in feet	0	403	307	258	208	156	373	285	240	194	146	98
	2	400	305	256	207	155	371	283	238	192	145	97
	3	397	302	254	205	154	367	281	236	191	144	97
	4	393	299	252	203	153	363	277	233	188	142	96
	5	387	295	248	201	151	357	273	230	186	140	94
	6	381	290	244	197	148	350	268	225	182	137	93
	7	373	285	240	194	146	342	262	220	178	134	91
	8	364	278	234	189	143	333	255	215	174	131	88
	9	355	271	228	185	139	323	247	208	169	127	86
	10	344	263	222	180	135	312	239	202	163	123	83
	11	333	255	215	174	131	300	231	195	158	119	80
	12	322	247	208	168	127	288	221	187	152	115	77
	13	309	237	200	162	123	275	212	179	145	110	74
	14	297	228	192	156	118	262	202	171	139	105	71
	15	283	218	184	150	113	249	192	163	132	100	68
	16	270	208	176	143	108	236	182	154	125	95	64
	17	256	198	168	136	103	222	172	146	119	90	61
	18	243	188	159	129	98	208	161	137	112	85	58
	19	229	178	150	123	93	195	151	129	105	80	54
	20	216	167	142	116	88	182	141	120	98	75	51
	21	202	157	134	109	83	169	132	112	92	70	48
	22	189	147	125	102	78	156	122	104	85	65	44
	23	176	138	117	96	73	144	113	96	79	60	41
	24	164	128	109	89	68	132	104	89	73	56	38
	25	151	119	102	83	63	122	95	82	67	51	35
	26	140	110	94	77	59	113	88	75	62	47	32
	27	130	102	87	71	55	104	82	70	57	44	30
	28	121	95	81	66	51	97	76	65	53	41	28
	29	113	88	75	62	47	91	71	61	50	38	26
	30	105	83	71	58	44	85	66	57	47	36	24
	31	98	77	66	54	41	79	62	53	44	33	23
	32	92	73	62	51	39	74	58	50	41	31	21
	33	87	68	58	48	37	70	55	47	38	29	20
	34	82	64	55	45	34	66	52	44	36	28	19
	35	77	61	52	43	32	62	49	42	34	26	18
	36	73	57	49	40	31	59	46	39	32	25	17
	37	69	54	46	38	29	56	44	37	31	23	16
	38	66	51	44	36	28	53	41	35	29	22	15
	39	62	49	42	34	26	<u>50</u>	<u>39</u>	<u>34</u>	<u>28</u>	21	14
	40	59	46	40	33	25					20	14
PROPERTIES												
Area, in. ²	10.3	7.84	6.59	5.32	4.00	9.55	7.29	6.13	4.95	3.73	2.51	
I, in. ⁴	63.9	50.2	42.9	35.2	26.9	51.2	40.4	34.6	28.4	21.7	14.9	
r, in.	2.49	2.53	2.55	2.57	2.59	2.32	2.35	2.37	2.39	2.41	2.43	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=46

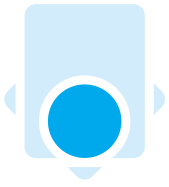


ERW

Design Axial Strength in kips ($\phi=0.85$)

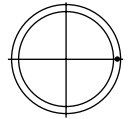
Nominal Outside Diameter		6.875					6.625							
Wall Thickness	0.500	0.375	0.312	0.250	0.188	0.500	0.432	0.375	0.312	0.280	0.250	0.188	0.125	
Weight Per Foot	34.04	26.03	21.87	17.69	13.43	32.71	28.57	25.03	21.04	18.97	17.02	12.92	8.68	
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.465	0.403	0.349	0.291	0.261	0.233	0.174	0.116	
F_y = 46 ksi														
Effective length KL in feet	0	366	280	235	190	143	352	308	269	226	204	183	138	93
	2	363	278	234	189	142	349	306	267	225	203	182	137	92
	3	360	275	232	187	141	346	303	264	222	201	180	136	91
	4	355	272	229	185	139	341	298	261	220	198	178	134	90
	5	349	268	225	182	137	334	293	256	216	195	175	132	89
	6	342	262	221	178	134	327	287	251	211	191	171	129	87
	7	334	256	216	174	132	318	279	244	206	186	167	126	85
	8	324	249	210	170	128	309	271	237	200	181	162	123	82
	9	314	242	204	165	124	298	262	229	194	175	157	119	80
	10	303	233	197	159	120	287	252	221	187	169	151	115	77
	11	292	225	190	154	116	275	242	212	179	162	145	110	74
	12	279	216	182	148	112	262	231	203	171	155	139	106	71
	13	266	206	174	141	107	249	220	193	163	148	133	101	68
	14	253	196	166	135	102	236	208	183	155	140	126	96	65
	15	240	186	158	128	97	222	196	173	147	133	119	91	61
	16	226	176	149	121	92	209	185	163	138	125	113	86	58
	17	213	166	141	114	87	195	173	152	130	117	106	81	55
	18	199	155	132	108	82	182	161	142	121	110	99	75	51
	19	186	145	124	101	77	169	150	132	113	102	92	70	48
	20	173	135	115	94	72	156	138	123	105	95	86	66	45
	21	160	126	107	88	67	143	127	113	97	88	79	61	41
	22	147	116	99	81	62	131	117	104	89	81	73	56	38
	23	135	107	92	75	57	120	107	95	81	74	67	51	35
	24	124	98	84	69	53	110	98	87	75	68	61	47	32
	25	114	91	77	64	49	101	90	80	69	63	57	44	30
	26	106	84	72	59	45	94	84	74	64	58	52	40	27
	27	98	78	66	55	42	87	78	69	59	54	49	37	25
	28	91	72	62	51	39	81	72	64	55	50	45	35	24
	29	85	67	58	47	36	75	67	60	51	47	42	32	22
	30	79	63	54	44	34	70	63	56	48	44	39	30	21
	31	74	59	50	41	32	66	59	52	45	41	37	28	19
	32	70	55	47	39	30	62	55	49	42	38	35	27	18
	33	66	52	44	37	28	58	52	46	40	36	33	25	17
	34	62	49	42	34	26	55	49	43	37	34	31	24	16
	35	58	46	40	32	25	52	46	41	35	32	29	22	15
	36	55	44	37	31	24	49	44	39	33	30	27	21	14
	37	<u>52</u>	41	35	29	22	<u>46</u>	<u>41</u>	<u>37</u>	<u>31</u>	<u>29</u>	<u>26</u>	<u>20</u>	14
	38	<u>49</u>	<u>39</u>	<u>34</u>	28	21	<u>43</u>	<u>38</u>	<u>34</u>	<u>29</u>	<u>26</u>	<u>23</u>	<u>19</u>	<u>13</u>
	39	<u>46</u>	<u>36</u>	<u>31</u>	26	20	<u>40</u>	<u>35</u>	<u>31</u>	<u>26</u>	<u>23</u>	<u>20</u>	<u>15</u>	<u>12</u>
	40	<u>43</u>	<u>33</u>	<u>28</u>	<u>22</u>	<u>18</u>	<u>37</u>	<u>32</u>	<u>28</u>	<u>23</u>	<u>20</u>	<u>17</u>	<u>13</u>	<u>11</u>
PROPERTIES														
Area, in. ²	9.36	7.16	6.02	4.86	3.66	9.00	7.88	6.88	5.79	5.22	4.68	3.53	2.37	
I, in. ⁴	48.3	38.2	32.7	26.8	20.6	42.9	38.3	34.0	29.1	26.5	23.9	18.4	12.6	
r, in.	2.27	2.31	2.33	2.35	2.37	2.18	2.20	2.22	2.24	2.25	2.26	2.28	2.30	

Note: Double Horizontal Line indicates KL/r limit of 200.



LRFD Columns Round HSS

F_y=46

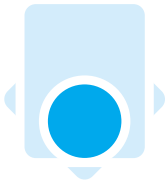


ERW

Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		6.125					6.000						
Wall Thickness		0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.280	0.250	0.188	0.125
Weight Per Foot		30.04	23.03	19.37	15.69	11.92	29.37	22.53	18.95	17.11	15.35	11.67	7.84
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.261	0.233	0.174	0.116
F_y = 46 ksi													
Effective length KL in feet	0	323	248	208	169	127	316	242	204	184	165	124	84
	2	320	245	207	167	126	313	240	202	182	163	123	83
	3	316	242	204	165	125	309	237	200	180	162	122	82
	4	311	239	201	163	123	304	233	196	177	159	120	81
	5	305	234	197	159	120	297	228	192	174	156	117	79
	6	297	228	192	155	117	289	222	187	169	152	115	77
	7	288	221	187	151	114	280	215	182	164	147	111	75
	8	277	214	180	146	110	269	208	175	158	142	107	73
	9	266	205	174	141	106	258	199	168	152	137	103	70
	10	254	197	166	135	102	246	190	161	146	131	99	67
	11	242	187	159	129	97	233	181	153	139	125	94	64
	12	229	178	150	122	93	220	171	145	131	118	90	61
	13	216	168	142	115	88	207	161	137	124	111	85	57
	14	202	158	134	109	83	193	151	128	116	105	79	54
	15	189	147	125	102	78	179	141	120	109	98	74	51
	16	175	137	117	95	72	166	130	111	101	91	69	47
	17	162	127	108	88	67	153	120	103	93	84	64	44
	18	149	117	100	82	62	140	111	95	86	78	59	41
	19	136	108	92	75	58	127	101	87	79	71	55	37
	20	124	98	84	69	53	115	92	79	72	65	50	34
	21	112	89	77	63	48	104	83	72	65	59	45	31
	22	102	81	70	57	44	95	76	65	59	54	41	28
	23	94	75	64	52	40	87	69	60	54	49	38	26
	24	86	68	59	48	37	80	64	55	50	45	35	24
	25	79	63	54	44	34	74	59	50	46	42	32	22
	26	73	58	50	41	31	68	54	47	43	38	30	20
	27	68	54	46	38	29	63	50	43	39	36	27	19
	28	63	50	43	35	27	59	47	40	37	33	26	17
	29	59	47	40	33	25	55	44	38	34	31	24	16
	30	55	44	38	31	24	51	41	35	32	29	22	15
	31	52	41	35	29	22	48	38	33	30	27	21	14
	32	48	38	33	27	21	45	36	31	28	25	20	13
	33	45	36	31	25	20	<u>42</u>	<u>34</u>	<u>29</u>	<u>26</u>	<u>24</u>	<u>18</u>	<u>13</u>
	34	<u>42</u>	<u>34</u>	<u>29</u>	<u>24</u>	<u>18</u>	<u>40</u>	<u>32</u>	<u>27</u>	<u>24</u>	<u>23</u>	<u>17</u>	<u>12</u>
	35					<u>17</u>							
	36												
	37												
	38												
	39												
	40												
PROPERTIES													
Area, in. ²	8.27	6.33	5.33	4.31	3.25	8.09	6.20	5.22	4.71	4.22	3.18	2.14	
I, in. ⁴	33.3	26.5	22.7	18.7	14.4	31.2	24.8	21.3	19.4	17.6	13.5	9.28	
r, in.	2.01	2.05	2.07	2.08	2.10	1.96	2.00	2.02	2.03	2.04	2.06	2.08	

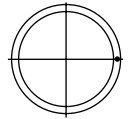
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

Design Axial Strength in kips ($\phi=0.85$)

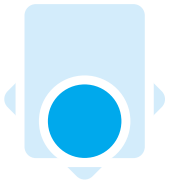
F_y=46



ERW

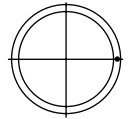
Nominal Outside Diameter		5.563				5.500		
Wall Thickness		0.375	0.258	0.188	0.134	0.500	0.375	0.258
Weight Per Foot		20.78	14.62	10.79	7.77	26.70	20.53	14.44
Design Wall Thickness		0.349	0.241	0.174	0.125	0.465	0.349	0.241
F_y = 46 ksi								
Effective length KL in feet	0	224	158	115	84	288	221	156
	2	221	156	114	83	284	218	154
	3	218	154	113	82	280	215	152
	4	214	151	111	80	274	211	149
	5	208	147	108	78	267	206	145
	6	202	143	105	76	258	199	141
	7	195	138	101	74	248	192	136
	8	187	132	97	71	237	184	130
	9	178	126	93	68	225	175	124
	10	169	120	88	64	213	165	118
	11	159	113	84	61	200	156	111
	12	149	106	79	57	186	146	104
	13	139	99	74	54	173	135	97
	14	128	92	69	50	159	125	90
	15	118	85	63	46	146	115	83
	16	108	78	58	43	133	105	76
	17	99	71	54	39	120	96	69
	18	89	65	49	36	108	87	63
	19	80	58	44	32	97	78	57
	20	73	53	40	29	87	70	51
	21	66	48	36	27	79	64	46
	22	60	44	33	24	72	58	42
	23	55	40	30	22	66	53	39
	24	50	37	28	20	61	49	35
	25	46	34	26	19	56	45	33
	26	43	31	24	17	52	41	30
	27	40	29	22	16	48	38	28
	28	37	27	20	15	45	36	26
	29	34	25	19	14	42	33	24
	30	<u>32</u>	23	18	13	<u>42</u>	<u>31</u>	23
	31		<u>22</u>	<u>17</u>	<u>12</u>			<u>21</u>
	32				<u>11</u>			
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
PROPERTIES								
Area, in. ²	5.72	4.03	2.95	2.14	7.36	5.65	3.98	
I, in. ⁴	19.5	14.3	10.7	7.90	23.5	18.8	13.8	
r, in.	1.85	1.88	1.91	1.92	1.79	1.83	1.86	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=46

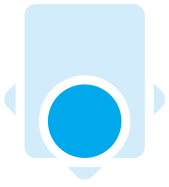


ERW

Design Axial Strength in kips ($\phi=0.85$)

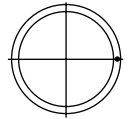
Nominal Outside Diameter		5.000						4.500				
Wall Thickness		0.500	0.375	0.312	0.258	0.250	0.188	0.125	0.337	0.237	0.188	0.125
Weight Per Foot		24.03	18.52	15.62	13.07	12.68	9.66	6.51	14.98	10.79	8.66	5.84
Design Wall Thickness		0.465	0.349	0.291	0.241	0.233	0.174	0.116	0.315	0.221	0.174	0.116
F_y = 46 ksi												
Effective length K _L in feet	0	259	199	168	141	136	103	70	162	116	92	63
	2	255	197	166	139	135	102	69	159	114	91	62
	3	250	193	163	136	132	100	68	156	112	89	60
	4	244	188	159	133	129	98	66	151	108	86	59
	5	236	182	154	129	125	95	64	145	104	83	57
	6	226	175	148	124	121	92	62	138	100	80	54
	7	216	168	142	119	116	88	59	130	94	75	51
	8	204	159	135	113	110	84	57	122	88	71	48
	9	191	149	127	107	104	79	54	113	82	66	45
	10	178	140	119	100	97	74	50	104	76	61	42
	11	165	130	110	93	91	69	47	95	69	56	38
	12	151	119	102	86	84	64	44	86	63	51	35
	13	138	109	93	79	77	59	40	77	57	46	32
	14	124	99	85	72	70	54	37	68	51	41	28
	15	112	90	77	65	64	49	34	60	45	36	25
	16	99	80	69	58	57	44	30	52	39	32	22
	17	88	71	61	52	51	40	27	46	35	28	20
	18	78	63	55	46	46	35	24	41	31	25	18
	19	70	57	49	42	41	32	22	37	28	23	16
	20	64	51	44	38	37	29	20	34	25	20	14
	21	58	47	40	34	33	26	18	30	23	19	13
	22	53	43	37	31	31	24	16	28	21	17	12
	23	48	39	34	28	28	22	15	25	19	15	11
	24	44	36	31	26	26	20	14	<u>23</u>	17	14	10
	25	41	33	28	24	24	18	13	<u>16</u>	<u>16</u>	<u>13</u>	<u>9</u>
	26	<u>38</u>	30	26	22	22	17	12				
	27	<u>28</u>	<u>28</u>	<u>24</u>	21	20	16	11				
	28				<u>19</u>	<u>19</u>	<u>15</u>	<u>10</u>				
	29											
	30											
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	40											
PROPERTIES												
Area, in. ²	6.62	5.10	4.30	3.60	3.49	2.64	1.78	4.14	2.97	2.36	1.60	
I, in. ⁴	17.2	13.9	12.0	10.2	9.94	7.69	5.31	9.12	6.82	5.54	3.84	
r, in.	1.61	1.65	1.67	1.68	1.69	1.71	1.73	1.48	1.51	1.53	1.55	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=46

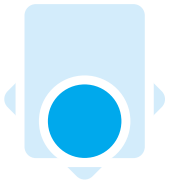


Design Axial Strength in kips ($\phi=0.85$)

ERW

Nominal Outside Diameter		4.000							
Wall Thickness	0.337	0.313	0.250	0.237	0.226	0.220	0.188	0.125	
Weight Per Foot	13.18	12.33	10.01	9.52	9.11	8.88	7.65	5.17	
Design Wall Thickness	0.315	0.291	0.233	0.221	0.211	0.205	0.174	0.116	
		F_y = 46 ksi							
Effective length KL in feet	0	143	133	108	102	98	95	82	56
	2	140	130	106	100	96	93	80	54
	3	136	126	103	98	93	91	78	53
	4	130	121	99	94	90	88	75	51
	5	124	115	94	90	86	83	72	49
	6	116	109	89	84	81	79	67	46
	7	108	101	83	79	75	73	63	43
	8	99	93	76	73	69	68	58	40
	9	90	84	69	66	63	62	53	37
	10	81	76	62	60	57	56	48	33
	11	72	68	56	53	51	50	43	30
	12	63	60	49	47	45	44	38	26
	13	55	52	43	41	39	38	33	23
	14	47	45	37	36	34	33	29	20
	15	41	39	32	31	30	29	25	18
	16	36	34	28	27	26	25	22	15
	17	32	30	25	24	23	22	20	14
	18	29	27	22	22	21	20	17	12
	19	26	24	20	19	18	18	16	11
	20	23	22	18	17	17	16	14	10
	21	<u>21</u>	20	16	16	15	15	13	9
	22		<u>18</u>	<u>15</u>	<u>14</u>	<u>14</u>	<u>13</u>	<u>12</u>	<u>8</u>
	23								
	24								
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	39								
	40								
PROPERTIES									
Area, in. ²	3.65	3.39	2.76	2.62	2.51	2.44	2.09	1.42	
I, in. ⁴	6.24	5.87	4.91	4.70	4.52	4.41	3.83	2.67	
r, in.	1.31	1.32	1.33	1.34	1.34	1.34	1.35	1.37	

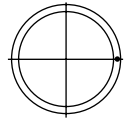
Note: Double Horizontal Line indicates KL/r limit of 200.



LRFD Columns Round HSS

Design Axial Strength in kips ($\phi=0.85$)

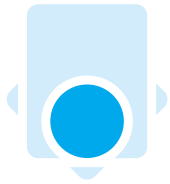
F_y=46



ERW

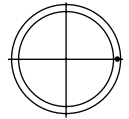
Nominal Outside Diameter		3.500						
Wall Thickness	0.313	0.300	0.250	0.216	0.203	0.188	0.125	
Weight Per Foot	10.65	10.25	8.68	7.58	7.15	6.65	4.51	
Design Wall Thickness	0.291	0.280	0.233	0.201	0.189	0.174	0.116	
		F_y = 46 ksi						
Effective length K _L in feet	0	115	111	93	81	77	71	48
	2	111	107	91	79	75	69	47
	3	107	103	88	76	72	67	45
	4	102	98	83	73	69	64	43
	5	95	92	78	68	65	60	41
	6	88	85	72	63	60	55	38
	7	80	77	66	57	54	51	35
	8	71	69	59	52	49	46	31
	9	63	61	52	46	43	41	28
	10	54	53	45	40	38	35	25
	11	46	45	39	35	33	31	21
	12	39	38	33	29	28	26	18
	13	33	32	28	25	24	22	16
	14	29	28	24	22	20	19	13
	15	25	24	21	19	18	17	12
	16	22	21	19	16	16	15	10
	17	20	19	16	15	14	13	9
	18	17	17	15	13	12	12	8
	19	16	15	13	12	11	10	7
	20	<u>16</u>	<u>15</u>	<u>13</u>	<u>12</u>	<u>11</u>	<u>10</u>	<u>7</u>
	21							
	22							
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	40							
PROPERTIES								
Area, in. ²	2.93	2.83	2.39	2.08	1.97	1.82	1.23	
I, in. ⁴	3.81	3.70	3.21	2.84	2.70	2.52	1.77	
r, in.	1.14	1.14	1.16	1.17	1.17	1.18	1.20	

Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

F_y=46

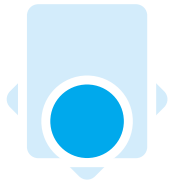


ERW

Design Axial Strength in kips ($\phi=0.85$)

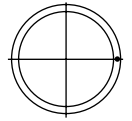
Nominal Outside Diameter		3.000							2.875					
Wall Thickness		0.300	0.250	0.216	0.203	0.188	0.152	0.134	0.120	0.250	0.203	0.188	0.125	
Weight Per Foot		8.65	7.34	6.42	6.06	5.65	4.62	4.10	3.69	7.01	5.79	5.40	3.67	
Design Wall Thickness		0.280	0.233	0.201	0.189	0.174	0.142	0.125	0.112	0.233	0.189	0.174	0.116	
F_y = 46 ksi														
Effective length K _L in feet	0	93	79	69	65	60	50	44	40	75	62	58	39	
	2	90	76	67	63	58	48	43	38	72	60	55	38	
	3	85	73	63	60	55	46	41	37	68	56	53	36	
	4	79	68	59	56	52	43	38	34	63	52	49	34	
	5	72	62	54	51	47	39	35	32	57	48	44	31	
	6	64	55	49	46	42	35	32	29	51	42	40	27	
	7	56	49	43	40	37	31	28	25	44	37	34	24	
	8	48	42	37	35	32	27	24	22	37	31	29	21	
	9	40	35	31	30	27	23	21	19	31	26	25	17	
	10	33	29	26	25	23	19	17	16	25	21	20	14	
	11	27	24	21	20	19	16	14	13	21	18	17	12	
	12	23	20	18	17	16	13	12	11	17	15	14	10	
	13	20	17	15	15	14	11	10	9	15	13	12	8	
	14	17	15	13	13	12	10	9	8	13	11	10	7	
	15	15	13	11	11	10	9	8	7	<u>11</u>	<u>9</u>	<u>9</u>	6	
	16	<u>13</u>	<u>11</u>	<u>10</u>	<u>10</u>	<u>9</u>	<u>7</u>	7	6				<u>6</u>	
	17							<u>6</u>	<u>5</u>					
	18													
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	39													
	40													
PROPERTIES														
Area, In. ²	2.39	2.03	1.77	1.67	1.54	1.27	1.13	1.02	1.93	1.59	1.48	1.01		
I, In. ⁴	2.24	1.95	1.74	1.66	1.55	1.30	1.17	1.06	1.70	1.45	1.35	0.958		
r, In.	0.967	0.982	0.992	0.996	1.00	1.01	1.02	1.02	0.938	0.952	0.957	0.976		

Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

F_y=46

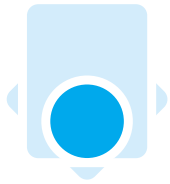


ERW

Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		2.500			2.375				1.900	1.660	
Wall Thickness	0.250	0.188	0.125	0.250	0.218	0.188	0.154	0.125	0.145	0.140	
Weight Per Foot	6.01	4.64	3.17	5.67	5.02	4.39	3.65	3.00	2.72	2.27	
Design Wall Thickness	0.233	0.174	0.116	0.233	0.204	0.174	0.143	0.116	0.135	0.130	
F_y = 46 ksi											
Effective length K _L in feet	0	65	50	34	61	54	47	39	32	29	24
	2	61	47	32	57	51	44	37	30	27	21
	3	57	44	30	53	47	41	34	28	23	18
	4	51	40	27	47	42	36	31	25	20	14
	5	45	35	24	40	36	32	27	22	16	11
	6	38	30	21	34	30	26	22	19	12	8
	7	31	25	17	27	24	22	18	15	9	6
	8	25	20	14	21	19	17	14	12	7	4
	9	20	16	11	17	15	13	11	10	5	3
	10	16	13	9	14	12	11	9	8	<u>4</u>	<u>3</u>
	11	13	11	8	11	10	9	8	6		
	12	11	9	6	<u>9</u>	<u>9</u>	8	6	5		
	13	<u>9</u>	<u>8</u>	5			<u>6</u>	<u>5</u>	<u>5</u>		
	14			<u>5</u>							
	15										
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	38										
	39										
	40										
PROPERTIES											
Area, in. ²	1.66	1.27	0.87	1.57	1.39	1.20	1.00	0.82	0.75	0.62	
I, in. ⁴	1.08	0.865	0.619	0.910	0.827	0.733	0.627	0.527	0.293	0.184	
r, in.	0.806	0.825	0.844	0.762	0.771	0.781	0.791	0.800	0.626	0.543	

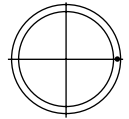
Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

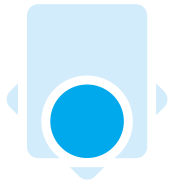
Design Axial Strength in kips ($\phi=0.85$)

F_y=50



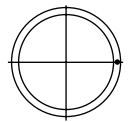
ERW

Nominal Outside Diameter		20.000		18.000		16.000			14.000			
Wall Thickness		0.500	0.375	0.500	0.375	0.500	0.438	0.375	0.312	0.500	0.375	0.312
Weight Per Foot		104.13	78.60	93.45	70.59	82.77	72.80	62.58	52.28	72.09	54.57	45.61
Design Wall Thickness		0.465	0.349	0.465	0.349	0.465	0.407	0.349	0.291	0.465	0.349	0.291
F_y = 50 ksi												
Effective length KL in feet	0	1210	914	1090	825	965	846	731	612	842	638	531
	2	1210	913	1090	824	963	845	730	611	840	636	530
	3	1210	912	1090	822	962	843	729	610	838	635	529
	4	1210	911	1080	821	959	841	727	609	835	633	527
	5	1200	909	1080	819	956	838	725	607	832	630	525
	6	1200	907	1080	817	953	835	722	605	828	627	523
	7	1200	904	1070	814	948	831	719	602	823	624	520
	8	1190	901	1070	810	943	827	715	599	817	619	516
	9	1190	898	1060	807	938	822	711	595	811	615	512
	10	1180	894	1060	803	932	817	706	591	804	609	508
	11	1180	890	1050	798	925	811	701	587	796	604	503
	12	1170	886	1050	793	917	805	696	583	788	597	498
	13	1170	881	1040	788	909	798	690	578	779	591	493
	14	1160	876	1030	782	901	790	683	572	769	584	487
	15	1150	870	1020	776	892	782	677	567	759	576	480
	16	1140	864	1010	769	882	774	669	561	748	568	474
	17	1140	858	1010	763	872	765	662	554	737	560	467
	18	1130	851	996	755	862	756	654	548	725	551	460
	19	1120	845	986	748	850	746	646	541	713	542	452
	20	1110	837	975	740	839	736	637	534	700	532	444
	21	1100	830	964	732	827	726	628	526	687	522	436
	22	1090	822	953	723	815	715	619	519	674	512	428
	23	1080	814	941	715	802	704	609	511	660	502	419
	24	1070	806	929	706	789	693	600	503	646	492	411
	25	1060	797	917	696	776	681	589	494	632	481	402
	26	1040	789	904	687	762	669	579	486	617	470	393
	27	1030	779	891	677	748	657	569	477	602	459	383
	28	1020	770	878	667	734	644	558	468	587	448	374
	29	1010	761	864	657	719	632	547	459	572	436	365
	30	993	751	850	646	704	619	536	450	557	425	355
	31	980	741	836	636	690	606	525	441	541	413	346
	32	966	731	822	625	675	593	514	431	526	402	336
	33	953	721	807	614	659	580	502	422	511	390	326
	34	939	710	793	603	644	566	491	412	495	378	317
	35	925	700	778	592	629	553	479	403	480	367	307
	36	910	689	763	581	613	540	468	393	464	355	297
	37	896	678	748	569	598	526	456	383	449	344	288
	38	881	667	733	558	583	513	445	374	434	332	278
	39	866	656	717	546	567	499	433	364	419	321	269
	40	851	645	702	535	552	486	421	354	404	310	260
PROPERTIES												
Area, in. ²	28.5	21.5	25.6	19.4	22.7	19.9	17.2	14.4	19.8	15.0	12.5	
I, in. ⁴	1360	1040	985	754	685	606	526	443	453	349	295	
r, in.	6.91	6.95	6.20	6.24	5.49	5.51	5.53	5.55	4.79	4.83	4.85	



LRFD Columns Round HSS

F_y=50

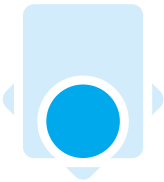


ERW

Design Axial Strength in kips ($\phi=0.85$)

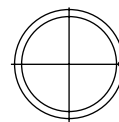
Nominal Outside Diameter		12.750			12.500					
Wall Thickness	0.500	0.375	0.250	0.625	0.500	0.375	0.312	0.250	0.188	
Weight Per Foot	65.42	49.56	33.38	79.27	64.08	48.56	40.61	32.71	24.72	
Design Wall Thickness	0.465	0.349	0.233	0.581	0.465	0.349	0.291	0.233	0.174*	
F_y = 50 ksi										
Effective length KL in feet	0	761	578	389	927	748	565	476	382	279
	2	759	577	388	924	746	564	475	381	278
	3	757	575	387	922	744	562	474	380	277
	4	754	573	386	918	741	560	472	378	276
	5	750	570	384	913	737	557	469	376	275
	6	746	567	382	907	733	554	466	374	273
	7	740	563	379	900	727	550	463	371	271
	8	734	558	376	892	721	545	459	368	269
	9	727	553	373	883	714	540	455	365	267
	10	720	547	369	873	706	534	450	361	264
	11	711	541	365	863	697	528	445	357	261
	12	702	534	360	851	688	521	439	352	258
	13	692	527	356	838	678	513	433	347	254
	14	682	519	350	825	668	506	426	342	251
	15	671	511	345	811	656	497	419	337	247
	16	660	503	339	796	645	489	412	331	243
	17	648	494	333	781	633	479	404	325	238
	18	635	484	327	765	620	470	396	318	234
	19	622	475	321	748	607	460	388	312	229
	20	609	465	314	731	593	450	380	305	225
	21	595	454	307	714	579	440	371	298	220
	22	581	444	300	696	565	429	362	291	215
	23	567	433	293	678	550	418	353	284	210
	24	552	422	286	659	536	407	344	277	204
	25	537	411	278	640	521	396	335	269	199
	26	522	400	271	621	505	385	325	262	194
	27	507	388	263	602	490	373	315	254	188
	28	492	377	256	583	475	362	306	246	183
	29	476	365	248	564	459	350	296	239	177
	30	461	353	240	544	444	339	286	231	172
	31	446	342	232	525	428	327	277	223	166
	32	430	330	225	506	413	316	267	215	161
	33	415	319	217	487	398	304	258	208	155
	34	400	307	209	468	382	293	248	200	149
	35	385	296	202	449	367	281	238	192	144
	36	370	285	194	431	353	270	229	185	139
	37	355	274	187	412	338	259	220	178	133
	38	341	263	179	395	324	248	211	170	128
	39	326	252	172	377	309	238	202	163	123
	40	312	241	165	360	296	227	193	156	118
PROPERTIES										
Area, in. ²	17.9	13.6	9.16	21.8	17.6	13.3	11.2	8.98	6.74	
I, in. ⁴	339	262	180	387	319	246	208	169	128	
r, in.	4.35	4.39	4.43	4.22	4.26	4.30	4.32	4.34	4.36	

*Slender- element cross-section. Diameter-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $0.114E/F_y$.



LRFD Columns Round HSS

F_y=50

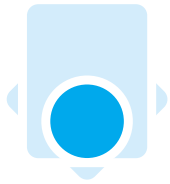


ERW

Design Axial Strength in kips ($\phi=0.85$)

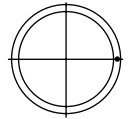
Nominal Outside Diameter		12.313						12.250					
Wall Thickness		0.625	0.500	0.375	0.312	0.250	0.188	0.625	0.500	0.375	0.312	0.250	0.188
Weight Per Foot		78.02	63.08	47.81	39.99	32.21	24.35	77.60	62.75	47.56	39.78	32.04	24.22
Design Wall Thickness		0.581	0.465	0.349	0.291	0.233	0.174*	0.581	0.465	0.349	0.291	0.233	0.174*
F_y = 50 ksi													
Effective length KL in feet	0	910	735	557	468	376	276	905	731	553	463	374	275
	2	907	733	555	466	375	275	903	729	551	462	373	274
	3	905	731	554	465	374	274	900	727	550	461	372	273
	4	901	728	552	463	372	273	896	724	547	459	371	272
	5	896	724	549	461	370	272	891	720	544	456	369	271
	6	890	720	545	458	368	270	885	715	541	454	366	269
	7	883	714	541	454	365	268	878	710	537	450	363	267
	8	875	708	536	450	362	266	870	703	532	446	360	265
	9	866	700	531	446	359	264	861	696	527	442	357	262
	10	856	692	525	441	355	261	851	688	521	437	353	260
	11	845	684	518	436	350	258	840	679	514	431	349	256
	12	833	674	512	430	346	255	828	670	507	426	344	253
	13	820	664	504	424	341	251	816	660	500	419	339	250
	14	807	654	496	417	335	247	802	649	492	413	334	246
	15	793	642	488	410	330	243	788	638	483	406	328	242
	16	778	631	479	403	324	239	773	626	475	398	322	238
	17	762	618	470	395	318	235	757	614	465	391	316	233
	18	746	605	460	387	312	230	741	601	456	383	310	229
	19	729	592	450	379	305	225	724	587	446	375	303	224
	20	712	578	440	370	298	221	707	574	436	366	296	219
	21	695	564	429	362	291	216	690	560	425	357	289	214
	22	677	550	419	353	284	210	671	545	414	348	282	209
	23	658	535	408	343	277	205	653	531	404	339	275	204
	24	640	520	397	334	269	200	634	516	392	330	267	198
	25	621	505	385	325	262	194	615	501	381	321	260	193
	26	602	490	374	315	254	189	596	485	370	311	252	187
	27	582	475	363	306	247	184	577	470	358	302	245	182
	28	563	459	351	296	239	178	558	455	347	292	237	176
	29	544	444	339	286	231	172	539	439	335	282	229	171
	30	525	429	328	277	223	167	519	424	324	273	221	165
	31	505	413	316	267	216	161	500	409	312	263	214	160
	32	486	398	305	257	208	156	481	393	301	254	206	154
	33	467	383	293	248	200	150	462	378	289	244	198	148
	34	449	368	282	238	193	145	443	363	278	235	191	143
	35	430	353	271	229	185	139	425	348	267	225	183	137
	36	412	338	260	220	178	134	407	334	256	216	176	132
	37	394	323	249	210	170	128	389	319	245	207	168	127
	38	376	309	238	201	163	123	371	305	234	198	161	121
	39	359	295	227	193	156	118	354	291	224	189	154	116
	40	341	281	217	184	149	113	336	277	213	181	147	111
PROPERTIES													
Area, in. ²	21.4	17.3	13.1	11.0	8.84	6.64	21.3	17.2	13.0	10.9	8.80	6.60	
I, in. ⁴	369	304	235	199	161	122	363	299	231	196	159	120	
r, in.	4.15	4.19	4.23	4.25	4.27	4.29	4.13	4.17	4.21	4.23	4.25	4.27	

*Slender- element cross-section. Diameter-Thickness ratio, λ_r , exceeds AISC "Specification for the Design of Steel Hollow Structural Sections" Section 2.2.1 limiting value of $0.114E/F_y$.



LRFD Columns Round HSS

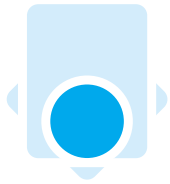
F_y=50



ERW

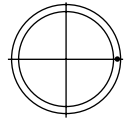
Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		11.250					10.750			
Wall Thickness	0.625	0.500	0.375	0.312	0.250	0.188	0.500	0.365	0.250	
Weight Per Foot	70.92	57.41	43.56	36.45	29.37	22.21	54.74	40.48	28.04	
Design Wall Thickness	0.581	0.465	0.349	0.291	0.233	0.174	0.465	0.340	0.233	
F_y = 50 ksi										
Effective length KL in feet	0	829	672	510	425	343	257	638	472	327
	2	826	670	509	424	342	256	635	470	326
	3	823	667	507	422	340	256	633	468	325
	4	819	664	504	420	339	254	629	466	323
	5	814	659	501	418	337	253	625	463	321
	6	807	654	497	414	334	251	620	459	318
	7	799	648	493	411	331	249	613	454	315
	8	791	641	487	406	328	246	606	449	312
	9	781	633	482	402	324	243	598	443	308
	10	770	625	475	396	320	240	589	436	303
	11	758	615	468	391	315	237	579	429	298
	12	745	605	461	384	310	233	569	422	293
	13	732	594	453	378	305	229	557	414	288
	14	717	583	444	371	299	225	546	405	282
	15	702	571	435	363	293	220	533	396	276
	16	686	558	426	355	287	216	520	387	269
	17	670	545	416	347	280	211	507	377	263
	18	653	532	406	339	274	206	493	367	256
	19	635	518	395	330	267	201	479	356	249
	20	617	503	384	321	260	195	464	346	241
	21	599	488	373	312	252	190	449	335	234
	22	580	474	362	303	245	185	434	324	226
	23	561	458	351	294	238	179	419	313	219
	24	542	443	339	284	230	173	403	301	211
	25	523	428	328	275	222	168	388	290	203
	26	504	412	316	265	215	162	373	279	196
	27	484	397	305	255	207	156	357	268	188
	28	465	381	293	246	199	150	342	256	180
	29	446	366	281	236	191	145	327	245	173
	30	427	351	270	226	184	139	312	234	165
	31	408	336	259	217	176	133	297	223	158
	32	390	321	247	208	169	127	283	213	150
	33	371	306	236	198	161	122	268	202	143
	34	354	292	225	189	154	116	254	192	136
	35	336	277	215	180	147	111	240	182	129
	36	319	264	204	172	140	106	227	172	122
	37	302	250	194	163	133	101	215	163	115
	38	286	237	183	154	126	95	204	154	109
	39	271	225	174	147	119	91	194	146	104
	40	258	214	166	139	114	86	184	139	99
PROPERTIES										
Area, in. ²	19.5	15.8	12.0	10.0	8.06	6.05	15.0	11.1	7.70	
I, in. ⁴	278	229	178	151	122	92.9	199	151	106	
r, in.	3.78	3.82	3.86	3.88	3.90	3.92	3.64	3.68	3.72	



LRFD Columns Round HSS

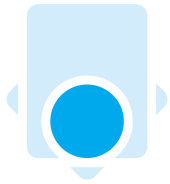
F_y=50



ERW

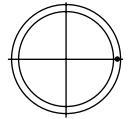
Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		10.000						9.625				
Wall Thickness	0.625	0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.250	0.188	
Weight Per Foot	62.58	50.73	38.55	32.28	26.03	19.70	48.73	37.05	31.03	25.03	18.95	
Design Wall Thickness	0.581	0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.233	0.174	
F_y = 50 ksi												
Effective length KL in feet	0	731	591	451	377	304	228	570	434	363	292	220
	2	728	589	449	376	303	227	567	432	361	291	219
	3	725	586	447	374	301	226	564	430	359	289	218
	4	720	582	444	372	300	225	560	427	357	288	216
	5	714	577	440	369	297	223	555	423	354	285	215
	6	707	571	436	365	294	221	549	418	350	282	212
	7	698	565	431	361	291	219	542	413	346	279	210
	8	688	557	425	356	287	216	534	407	341	275	207
	9	677	548	419	351	283	213	525	400	335	270	204
	10	665	539	412	345	278	209	515	393	329	265	200
	11	652	528	404	339	273	205	504	385	323	260	196
	12	638	517	395	332	268	201	493	377	315	254	192
	13	623	506	387	324	262	197	481	367	308	248	187
	14	608	493	377	317	256	192	468	358	300	242	183
	15	591	480	367	309	249	187	454	348	292	236	178
	16	574	467	357	300	242	182	441	337	283	229	173
	17	556	453	347	291	235	177	426	327	274	222	167
	18	538	438	336	282	228	172	411	316	265	214	162
	19	520	424	325	273	221	166	397	304	256	207	156
	20	501	409	314	264	213	161	381	293	246	199	151
	21	482	393	302	254	206	155	366	282	237	192	145
	22	463	378	291	245	198	149	350	270	227	184	139
	23	444	363	279	235	190	144	335	258	217	176	133
	24	424	347	267	225	183	138	320	247	208	168	128
	25	405	332	256	216	175	132	304	235	198	161	122
	26	386	317	244	206	167	126	289	224	189	153	116
	27	367	302	233	197	159	121	274	212	179	146	110
	28	349	287	222	187	152	115	259	201	170	138	105
	29	331	272	210	178	144	109	245	190	161	131	99
	30	313	258	199	169	137	104	231	180	152	124	94
	31	295	244	189	160	130	98	217	169	143	117	89
	32	278	230	178	151	123	93	204	159	134	110	83
	33	261	216	168	142	116	88	191	149	126	103	78
	34	246	204	158	134	109	83	180	141	119	97	74
	35	232	192	149	126	103	78	170	133	112	92	70
	36	219	182	141	119	97	74	161	125	106	87	66
	37	208	172	133	113	92	70	152	119	101	82	62
	38	197	163	126	107	87	66	144	113	95	78	59
	39	187	155	120	102	83	63	137	107	90	74	56
	40	178	147	114	97	79	60	130	102	86	70	53
PROPERTIES												
Area, In. ²	17.2	13.9	10.6	8.88	7.15	5.37	13.4	10.2	8.53	6.87	5.17	
I, In. ⁴	191	159	123	105	85.3	64.8	141	110	93.0	75.9	57.7	
r, In.	3.34	3.38	3.41	3.43	3.45	3.47	3.24	3.28	3.30	3.32	3.34	



LRFD Columns Round HSS

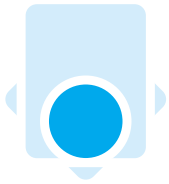
F_y=50



ERW

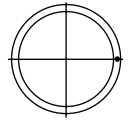
Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		8.750					8.625					7.625		
Wall Thickness	0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.322	0.250	0.188	0.375	0.328	0.125	
Weight Per Foot	44.06	33.54	28.12	22.70	17.19	43.39	33.04	28.55	22.36	16.94	29.04	25.56	10.01	
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.300	0.233	0.174	0.349	0.305	0.166	
F_y = 50 ksi														
Effective length KL in feet	0	514	391	329	265	199	506	385	334	261	196	339	298	116
	2	512	390	327	264	198	503	384	332	260	195	337	296	116
	3	509	387	325	262	197	500	381	330	258	194	334	294	115
	4	504	384	322	260	196	496	378	327	256	193	331	291	114
	5	499	380	319	257	194	490	374	324	253	191	326	286	112
	6	492	375	315	254	191	483	369	319	250	188	320	282	110
	7	484	369	310	250	188	475	363	314	246	185	314	276	108
	8	475	363	305	246	185	467	356	309	242	182	306	269	106
	9	466	355	299	241	182	457	349	302	237	178	298	262	103
	10	455	347	292	236	178	446	341	296	232	175	290	255	100
	11	443	339	285	230	173	434	332	288	226	170	280	246	97
	12	431	330	277	224	169	422	323	280	220	166	270	238	94
	13	418	320	269	218	164	409	313	272	213	161	260	229	91
	14	404	310	261	211	159	395	303	263	207	156	249	219	87
	15	390	299	252	204	154	381	293	254	199	151	238	209	83
	16	376	288	243	197	149	366	282	245	192	145	226	199	80
	17	361	277	234	189	143	351	270	235	185	140	215	189	76
	18	346	266	224	182	137	336	259	225	177	134	203	179	72
	19	330	254	215	174	132	321	248	216	170	128	192	169	68
	20	315	243	205	166	126	305	236	206	162	123	180	159	64
	21	299	231	195	159	120	290	224	196	154	117	169	149	60
	22	284	220	186	151	114	275	213	186	146	111	158	139	57
	23	269	208	176	143	109	260	201	176	139	105	147	130	53
	24	254	197	167	136	103	245	190	166	131	100	136	121	49
	25	239	186	157	128	97	230	179	157	124	94	126	111	46
	26	224	175	148	121	92	216	168	147	116	89	116	103	42
	27	210	164	139	113	86	202	158	138	109	83	108	96	39
	28	196	154	130	106	81	188	147	129	102	78	100	89	37
	29	183	143	122	99	76	175	137	120	95	73	94	83	34
	30	171	134	114	93	71	164	128	112	89	68	87	77	32
	31	160	125	107	87	66	153	120	105	84	64	82	73	30
	32	150	118	100	82	62	144	113	99	78	60	77	68	28
	33	141	111	94	77	59	135	106	93	74	56	72	64	26
	34	133	104	89	72	55	127	100	88	69	53	68	60	25
	35	126	98	84	68	52	120	94	83	66	50	64	57	23
	36	119	93	79	65	49	114	89	78	62	47	61	54	22
	37	112	88	75	61	47	108	84	74	59	45	57	51	21
	38	107	83	71	58	44	102	80	70	56	42	55	48	20
	39	101	79	67	55	42	97	76	67	53	40	52	46	19
	40	96	75	64	52	40	92	72	63	50	38	49	44	18
PROPERTIES														
Area, In. ²	12.1	9.21	7.73	6.23	4.69	11.9	9.07	7.85	6.14	4.62	7.98	7.01	2.74	
I, In. ⁴	104	81.4	69.3	56.6	43.1	99.5	77.8	68.1	54.1	41.3	52.9	47.1	19.3	
r, In.	2.93	2.97	2.99	3.01	3.03	2.89	2.93	2.95	2.97	2.99	2.58	2.59	2.66	



LRFD Columns Round HSS

F_y=50

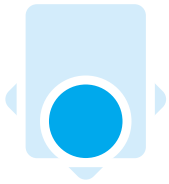


ERW

Design Axial Strength in kips ($\phi=0.85$)

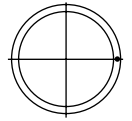
Nominal Outside Diameter		7.500					7.000					
Wall Thickness		0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.250	0.188	0.125
Weight Per Foot		37.38	28.54	23.95	19.36	14.68	34.71	26.53	22.29	18.02	13.68	9.18
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.233	0.174	0.116
F_y = 50 ksi												
Effective length K _L in feet	0	438	333	280	226	170	406	310	261	210	159	107
	2	435	331	278	225	169	403	307	259	209	157	106
	3	431	328	276	223	168	399	305	256	207	156	105
	4	426	325	273	220	166	393	301	253	204	154	104
	5	420	320	269	217	163	387	295	249	201	152	102
	6	412	314	264	213	161	378	289	244	197	149	100
	7	403	307	259	209	157	369	282	238	192	145	98
	8	393	300	253	204	154	358	274	231	187	141	95
	9	381	292	246	199	150	346	265	224	181	137	92
	10	369	283	238	193	145	334	256	216	175	132	89
	11	356	273	230	186	141	320	246	208	168	127	86
	12	343	263	222	180	136	306	235	199	161	122	83
	13	329	252	213	173	130	292	224	190	154	117	79
	14	314	241	204	165	125	277	213	180	147	111	75
	15	299	230	195	158	119	261	202	171	139	105	71
	16	283	219	185	150	114	246	190	161	131	100	68
	17	268	207	175	143	108	231	179	152	123	94	64
	18	253	196	166	135	102	215	167	142	116	88	60
	19	237	184	156	127	96	200	156	132	108	82	56
	20	222	173	147	120	91	186	145	123	101	77	52
	21	207	161	137	112	85	171	134	114	93	71	49
	22	192	150	128	105	80	157	123	105	86	66	45
	23	178	140	119	97	74	144	113	96	79	61	42
	24	164	129	110	90	69	132	104	89	73	56	38
	25	151	119	102	83	64	122	95	82	67	51	35
	26	140	110	94	77	59	113	88	75	62	47	32
	27	130	102	87	71	55	104	82	70	57	44	30
	28	121	95	81	66	51	97	76	65	53	41	28
	29	113	88	75	62	47	91	71	61	50	38	26
	30	105	83	71	58	44	85	66	57	47	36	24
	31	98	77	66	54	41	79	62	53	44	33	23
	32	92	73	62	51	39	74	58	50	41	31	21
	33	87	68	58	48	37	70	55	47	38	29	20
	34	82	64	55	45	34	66	52	44	36	28	19
	35	77	61	52	43	32	62	49	42	34	26	18
	36	73	57	49	40	31	59	46	39	32	25	17
	37	69	54	46	38	29	56	44	37	31	23	16
	38	66	51	44	36	28	53	41	35	29	22	15
	39	62	49	42	34	26	<u>50</u>	<u>39</u>	<u>34</u>	<u>28</u>	21	14
	40	59	46	40	33	25					20	14
PROPERTIES												
Area, in. ²	10.3	7.84	6.59	5.32	4.00	9.55	7.29	6.13	4.95	3.73	2.51	
I, in. ⁴	63.9	50.2	42.9	35.2	26.9	51.2	40.4	34.6	28.4	21.7	14.9	
r, in.	2.49	2.53	2.55	2.57	2.59	2.32	2.35	2.37	2.39	2.41	2.43	

Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

F_y=50

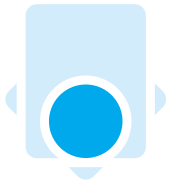


ERW

Design Axial Strength in kips ($\phi=0.85$)

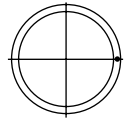
Nominal Outside Diameter		6.875					6.625							
Wall Thickness	0.500	0.375	0.312	0.250	0.188	0.500	0.432	0.375	0.312	0.280	0.250	0.188	0.125	
Weight Per Foot	34.04	26.03	21.87	17.69	13.43	32.71	28.57	25.03	21.04	18.97	17.02	12.92	8.68	
Design Wall Thickness	0.465	0.349	0.291	0.233	0.174	0.465	0.403	0.349	0.291	0.261	0.233	0.174	0.116	
F_y = 50 ksi														
Effective length KL in feet	0	398	304	256	207	156	383	335	292	246	222	199	150	101
	2	395	302	254	205	154	379	332	290	244	220	197	149	100
	3	391	299	251	203	153	375	328	287	241	218	195	147	99
	4	385	295	248	200	151	369	323	283	238	215	192	145	98
	5	378	290	244	197	148	362	317	277	233	211	189	143	96
	6	370	283	239	193	145	353	310	271	228	206	185	139	94
	7	360	276	233	188	142	343	301	263	222	200	180	136	91
	8	349	268	226	183	138	332	291	255	215	194	174	132	89
	9	337	259	219	177	134	320	281	246	208	187	168	127	86
	10	324	250	211	171	129	306	269	236	199	180	162	123	83
	11	311	240	202	164	124	293	257	226	191	172	155	117	79
	12	296	229	194	157	119	278	245	215	182	164	148	112	76
	13	282	218	184	150	113	263	232	204	173	156	140	107	72
	14	267	207	175	142	108	248	219	192	163	148	133	101	68
	15	251	195	165	135	102	232	205	181	153	139	125	95	64
	16	236	184	156	127	96	217	192	169	144	130	117	89	61
	17	220	172	146	119	90	202	179	158	134	122	110	84	57
	18	205	161	136	111	85	187	166	146	125	113	102	78	53
	19	190	149	127	104	79	172	153	135	115	105	95	72	49
	20	176	138	118	96	73	158	140	124	106	97	87	67	45
	21	162	127	109	89	68	144	128	114	98	89	80	61	42
	22	148	117	100	82	63	131	117	104	89	81	73	56	38
	23	135	107	92	75	58	120	107	95	81	74	67	51	35
	24	124	98	84	69	53	110	98	87	75	68	61	47	32
	25	114	91	77	64	49	101	90	80	69	63	57	44	30
	26	106	84	72	59	45	94	84	74	64	58	52	40	27
	27	98	78	66	55	42	87	78	69	59	54	49	37	25
	28	91	72	62	51	39	81	72	64	55	50	45	35	24
	29	85	67	58	47	36	75	67	60	51	47	42	32	22
	30	79	63	54	44	34	70	63	56	48	44	39	30	21
	31	74	59	50	41	32	66	59	52	45	41	37	28	19
	32	70	55	47	39	30	62	55	49	42	38	35	27	18
	33	66	52	44	37	28	58	52	46	40	36	33	25	17
	34	62	49	42	34	26	55	49	43	37	34	31	24	16
	35	58	46	40	32	25	52	46	41	35	32	29	22	15
	36	55	44	37	31	24	49	44	39	33	30	27	21	14
	37	<u>52</u>	41	35	29	22	<u>46</u>	<u>41</u>	<u>37</u>	<u>31</u>	<u>29</u>	<u>26</u>	20	14
	38	<u>49</u>	<u>39</u>	<u>34</u>	28	21	<u>43</u>	<u>38</u>	<u>34</u>	<u>28</u>	<u>26</u>	<u>23</u>	<u>19</u>	<u>13</u>
	39	<u>46</u>	<u>37</u>	<u>32</u>	<u>26</u>	<u>20</u>	<u>40</u>	<u>35</u>	<u>31</u>	<u>25</u>	<u>23</u>	<u>20</u>	<u>16</u>	<u>12</u>
	40	<u>43</u>	<u>34</u>	<u>29</u>	<u>23</u>	<u>18</u>	<u>37</u>	<u>32</u>	<u>28</u>	<u>22</u>	<u>20</u>	<u>17</u>	<u>13</u>	<u>11</u>
Area, in. ²	9.36	7.16	6.02	4.86	3.66	9.00	7.88	6.88	5.79	5.22	4.68	3.53	2.37	
I, in. ⁴	48.3	38.2	32.7	26.8	20.6	42.9	38.3	34.0	29.1	26.5	23.9	18.4	12.6	
r, in.	2.27	2.31	2.33	2.35	2.37	2.18	2.20	2.22	2.24	2.25	2.26	2.28	2.30	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=50

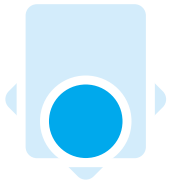


ERW

Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		6.125					6.000						
Wall Thickness		0.500	0.375	0.312	0.250	0.188	0.500	0.375	0.312	0.280	0.250	0.188	0.125
Weight Per Foot		30.04	23.03	19.37	15.69	11.92	29.37	22.53	18.95	17.11	15.35	11.67	7.84
Design Wall Thickness		0.465	0.349	0.291	0.233	0.174	0.465	0.349	0.291	0.261	0.233	0.174	0.116
F_y = 50 ksi													
Effective length K _L in feet	0	351	269	227	183	138	344	264	222	200	179	135	91
	2	348	266	224	181	137	340	261	220	198	178	134	90
	3	343	263	222	179	135	335	257	217	196	175	132	89
	4	337	258	218	176	133	329	253	213	192	172	130	87
	5	329	253	213	172	130	321	247	208	188	168	127	86
	6	320	246	207	168	127	312	240	202	183	164	124	83
	7	309	238	201	163	123	301	232	196	177	158	120	81
	8	297	229	194	157	119	289	223	188	170	153	115	78
	9	285	220	186	150	114	275	213	180	163	146	111	75
	10	271	209	177	144	109	261	203	171	155	139	105	71
	11	256	199	168	136	103	247	192	162	147	132	100	68
	12	241	188	159	129	98	232	180	153	139	125	95	64
	13	226	176	150	121	92	216	169	143	130	117	89	60
	14	211	165	140	114	87	201	157	134	121	109	83	56
	15	196	153	130	106	81	186	146	124	113	102	77	53
	16	180	142	121	98	75	170	134	115	104	94	72	49
	17	166	130	111	91	69	156	123	105	96	86	66	45
	18	151	119	102	83	64	141	112	96	87	79	60	41
	19	137	109	93	76	58	128	102	87	80	72	55	38
	20	124	99	85	69	53	115	92	79	72	65	50	34
	21	112	89	77	63	48	104	83	72	65	59	45	31
	22	102	81	70	57	44	95	76	65	59	54	41	28
	23	94	75	64	52	40	87	69	60	54	49	38	26
	24	86	68	59	48	37	80	64	55	50	45	35	24
	25	79	63	54	44	34	74	59	50	46	42	32	22
	26	73	58	50	41	31	68	54	47	43	38	30	20
	27	68	54	46	38	29	63	50	43	39	36	27	19
	28	63	50	43	35	27	59	47	40	37	33	26	17
	29	59	47	40	33	25	55	44	38	34	31	24	16
	30	55	44	38	31	24	51	41	35	32	29	22	15
	31	52	41	35	29	22	48	38	33	30	27	21	14
	32	48	38	33	27	21	45	36	31	28	25	20	13
	33	45	36	31	25	20	<u>42</u>	<u>34</u>	<u>29</u>	<u>26</u>	24	18	13
	34	<u>42</u>	<u>34</u>	<u>29</u>	<u>24</u>	<u>18</u>					<u>23</u>	<u>17</u>	<u>12</u>
	35					<u>17</u>							
	36												
	37												
	38												
	39												
	40												
PROPERTIES													
Area, in. ²	8.27	6.33	5.33	4.31	3.25	8.09	6.20	5.22	4.71	4.22	3.18	2.14	
I, in. ⁴	33.3	26.5	22.7	18.7	14.4	31.2	24.8	21.3	19.4	17.6	13.5	9.28	
r, in.	2.01	2.05	2.07	2.08	2.10	1.96	2.00	2.02	2.03	2.04	2.06	2.08	

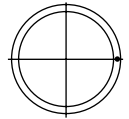
Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

Design Axial Strength in kips ($\phi=0.85$)

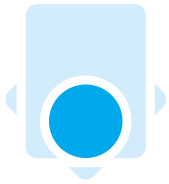
F_y=50



ERW

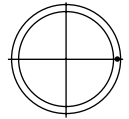
Nominal Outside Diameter		5.563				5.500		
Wall Thickness	0.375	0.258	0.188	0.134	0.500	0.375	0.258	
Weight Per Foot	20.78	14.62	10.79	7.77	26.70	20.53	14.44	
Design Wall Thickness	0.349	0.241	0.174	0.125	0.465	0.349	0.241	
F_y = 50 ksi								
Effective length KL in feet	0	243	171	125	91	313	240	169
	2	240	169	124	90	309	237	167
	3	236	167	122	89	304	233	165
	4	231	163	120	87	297	228	161
	5	225	159	117	85	288	222	157
	6	218	154	113	82	278	214	152
	7	209	148	109	79	266	206	146
	8	200	142	104	76	253	196	139
	9	189	135	99	72	240	186	132
	10	179	127	94	68	225	175	125
	11	168	119	88	64	210	164	117
	12	156	112	83	60	195	153	109
	13	145	104	77	56	180	141	101
	14	133	96	71	52	164	130	93
	15	122	88	65	48	149	118	85
	16	111	80	60	44	135	107	78
	17	100	72	54	40	121	97	70
	18	90	65	49	36	108	87	63
	19	80	58	44	32	97	78	57
	20	73	53	40	29	87	70	51
	21	66	48	36	27	79	64	46
	22	60	44	33	24	72	58	42
	23	55	40	30	22	66	53	39
	24	50	37	28	20	61	49	35
	25	46	34	26	19	56	45	33
	26	43	31	24	17	52	41	30
	27	40	29	22	16	48	38	28
	28	37	27	20	15	45	36	26
	29	34	25	19	14	42	33	24
	30	<u>32</u>	23	18	13	<u>42</u>	<u>31</u>	23
	31		<u>22</u>	<u>17</u>	12			<u>21</u>
	32				<u>11</u>			
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
PROPERTIES								
Area, in. ²	5.72	4.03	2.95	2.14	7.36	5.65	3.98	
I, in. ⁴	19.5	14.3	10.7	7.90	23.5	18.8	13.8	
r, in.	1.85	1.88	1.91	1.92	1.79	1.83	1.86	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=50

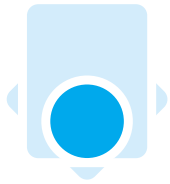


ERW

Design Axial Strength in kips ($\phi=0.85$)

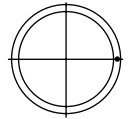
Nominal Outside Diameter		5.000						4.500				
Wall Thickness		0.500	0.375	0.312	0.258	0.250	0.188	0.125	0.337	0.237	0.188	0.125
Weight Per Foot		24.03	18.52	15.62	13.07	12.68	9.66	6.51	14.98	10.79	8.66	5.84
Design Wall Thickness		0.465	0.349	0.291	0.241	0.233	0.174	0.116	0.315	0.221	0.174	0.116
F_y = 50 ksi												
Effective length K _L in feet	0	281	217	183	153	148	112	76	176	126	100	68
	2	277	213	180	151	146	111	75	173	124	99	67
	3	271	209	177	148	143	109	73	169	121	96	65
	4	264	204	172	144	140	106	72	163	117	93	63
	5	254	197	166	139	135	103	69	156	112	90	61
	6	243	189	160	134	130	99	67	148	107	85	58
	7	231	179	152	127	124	94	64	139	101	80	55
	8	217	169	144	121	117	89	60	129	94	75	51
	9	202	158	135	113	110	84	57	119	87	70	48
	10	187	147	125	105	103	78	53	109	80	64	44
	11	172	136	116	97	95	73	49	98	72	58	40
	12	157	124	106	89	87	67	46	88	65	52	36
	13	142	113	97	81	80	61	42	78	58	47	32
	14	127	102	87	74	72	55	38	69	51	42	29
	15	113	91	78	66	65	50	34	60	45	36	25
	16	99	80	69	59	58	45	31	52	39	32	22
	17	88	71	61	52	51	40	27	46	35	28	20
	18	78	63	55	46	46	35	24	41	31	25	18
	19	70	57	49	42	41	32	22	37	28	23	16
	20	64	51	44	38	37	29	20	34	25	20	14
	21	58	47	40	34	33	26	18	30	23	19	13
	22	53	43	37	31	31	24	16	28	21	17	12
	23	48	39	34	28	28	22	15	25	19	15	11
	24	44	36	31	26	26	20	14	<u>23</u>	17	14	10
	25	41	33	28	24	24	18	13	<u>16</u>	<u>16</u>	<u>13</u>	<u>9</u>
	26	<u>38</u>	30	26	22	22	17	12				
	27	<u>28</u>	<u>28</u>	<u>24</u>	21	20	16	11				
	28				<u>19</u>	<u>19</u>	<u>15</u>	<u>10</u>				
	29											
	30											
	31											
	32											
	33											
	34											
	35											
	36											
	37											
	38											
	39											
	40											
PROPERTIES												
Area, in. ²	6.62	5.10	4.30	3.60	3.49	2.64	1.78	4.14	2.97	2.36	1.60	
I, in. ⁴	17.2	13.9	12.0	10.2	9.94	7.69	5.31	9.12	6.82	5.54	3.84	
r, in.	1.61	1.65	1.67	1.68	1.69	1.71	1.73	1.48	1.51	1.53	1.55	

Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

F_y=50

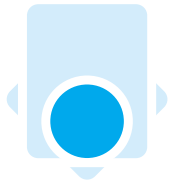


ERW

Design Axial Strength in kips ($\phi=0.85$)

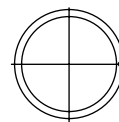
Nominal Outside Diameter		4.000							
Wall Thickness	0.337	0.313	0.250	0.237	0.226	0.220	0.188	0.125	
Weight Per Foot	13.18	12.33	10.01	9.52	9.11	8.88	7.65	5.17	
Design Wall Thickness	0.315	0.291	0.233	0.221	0.211	0.205	0.174	0.116	
		F_y = 50 ksi							
Effective length KL in feet	0	155	144	117	111	107	104	89	60
	2	151	141	115	109	104	101	87	59
	3	147	136	111	106	101	98	84	57
	4	141	131	107	101	97	94	81	55
	5	133	124	101	96	92	90	77	52
	6	124	116	95	90	86	84	72	49
	7	115	107	88	84	80	78	67	46
	8	105	98	80	77	73	71	61	42
	9	94	88	72	69	66	64	56	38
	10	84	79	65	62	59	58	50	34
	11	74	69	57	55	52	51	44	31
	12	64	60	50	48	46	45	39	27
	13	55	52	43	41	40	38	33	23
	14	47	45	37	36	34	33	29	20
	15	41	39	32	31	30	29	25	18
	16	36	34	28	27	26	25	22	15
	17	32	30	25	24	23	22	20	14
	18	29	27	22	22	21	20	17	12
	19	26	24	20	19	18	18	16	11
	20	23	22	18	17	17	16	14	10
	21	<u>21</u>	20	16	16	15	15	13	9
	22		<u>18</u>	<u>15</u>	<u>14</u>	<u>14</u>	<u>13</u>	<u>12</u>	<u>8</u>
	23								
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PROPERTIES									
Area, in. ²	3.65	3.39	2.76	2.62	2.51	2.44	2.09	1.42	
I, in. ⁴	6.24	5.87	4.91	4.70	4.52	4.41	3.83	2.67	
r, in.	1.31	1.32	1.33	1.34	1.34	1.34	1.35	1.37	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

F_y=50

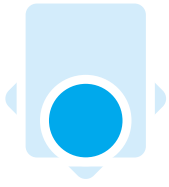


ERW

Design Axial Strength in kips ($\phi=0.85$)

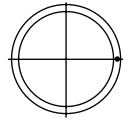
Nominal Outside Diameter		3.500						
Wall Thickness	0.313	0.300	0.250	0.216	0.203	0.188	0.125	
Weight Per Foot	10.65	10.25	8.68	7.58	7.15	6.65	4.51	
Design Wall Thickness	0.291	0.280	0.233	0.201	0.189	0.174	0.116	
		F_y = 50 ksi						
Effective length K _L in feet	0	125	120	102	88	84	77	52
	2	121	116	98	86	81	75	51
	3	116	112	95	82	78	72	49
	4	109	106	90	78	74	69	47
	5	102	98	84	73	69	64	44
	6	93	90	77	67	63	59	40
	7	84	81	69	61	57	53	37
	8	74	72	62	54	51	48	33
	9	65	62	54	47	45	42	29
	10	55	53	46	41	39	36	25
	11	47	45	39	35	33	31	22
	12	39	38	33	29	28	26	18
	13	33	32	28	25	24	22	16
	14	29	28	24	22	20	19	13
	15	25	24	21	19	18	17	12
	16	22	21	19	16	16	15	10
	17	20	19	16	15	14	13	9
	18	17	17	15	13	12	12	8
	19	16	15	13	12	11	10	7
	20	<u>16</u>	<u>15</u>	<u>13</u>	<u>12</u>	<u>11</u>	<u>10</u>	<u>7</u>
	21							
	22							
	23							
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	36							
	37							
	38							
	39							
	40							
PROPERTIES								
Area, in. ²	2.93	2.83	2.39	2.08	1.97	1.82	1.23	
I, in. ⁴	3.81	3.70	3.21	2.84	2.70	2.52	1.77	
r, in.	1.14	1.14	1.16	1.17	1.17	1.18	1.20	

Note: Double Horizontal Line indicates K_L/r limit of 200.



LRFD Columns Round HSS

F_y=50



ERW

Design Axial Strength in kips ($\phi=0.85$)

Nominal Outside Diameter		3.000							2.875				
Wall Thickness	0.300	0.250	0.216	0.203	0.188	0.152	0.134	0.120	0.250	0.203	0.188	0.125	
Weight Per Foot	8.65	7.34	6.42	6.06	5.65	4.62	4.10	3.69	7.01	5.79	5.40	3.67	
Design Wall Thickness	0.280	0.233	0.201	0.189	0.174	0.142	0.125	0.112	0.233	0.189	0.174	0.116	
F_y = 50 ksi													
Effective length KL in feet	0	102	86	75	71	65	54	48	43	82	68	63	43
	2	97	83	72	68	63	52	46	42	78	65	60	41
	3	92	78	68	65	60	49	44	40	74	61	57	39
	4	85	72	63	60	55	46	41	37	68	56	52	36
	5	77	66	58	54	50	42	37	34	61	51	47	33
	6	68	58	51	48	45	37	33	30	53	44	42	29
	7	59	51	45	42	39	33	29	26	46	38	36	25
	8	49	43	38	36	33	28	25	23	38	32	30	21
	9	41	36	32	30	28	23	21	19	31	26	25	18
	10	33	29	26	25	23	19	17	16	25	21	20	14
	11	27	24	21	20	19	16	14	13	21	18	17	12
	12	23	20	18	17	16	13	12	11	17	15	14	10
	13	20	17	15	15	14	11	10	9	15	13	12	8
	14	17	15	13	13	12	10	9	8	13	11	10	7
	15	15	13	11	11	10	9	8	7	<u>11</u>	<u>9</u>	<u>9</u>	6
	16	<u>13</u>	<u>11</u>	<u>10</u>	<u>10</u>	<u>9</u>	<u>7</u>	<u>7</u>	<u>6</u>				<u>6</u>
	17							<u>6</u>	<u>5</u>				
	18												
	19												
	20												
	21												
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	40												
PROPERTIES													
Area, in. ²	2.39	2.03	1.77	1.67	1.54	1.27	1.13	1.02	1.93	1.59	1.48	1.01	
I, in. ⁴	2.24	1.95	1.74	1.66	1.55	1.30	1.17	1.06	1.70	1.45	1.35	0.958	
r, in.	0.967	0.982	0.992	0.996	1.00	1.01	1.02	1.02	0.938	0.952	0.957	0.976	

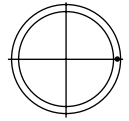
Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns Round HSS

Design Axial Strength in kips ($\phi=0.85$)

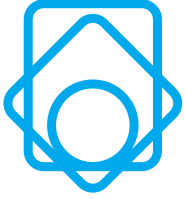
F_y=50



ERW

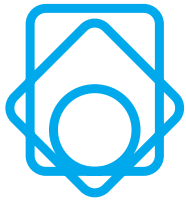
Nominal Outside Diameter		2.500			2.375				1.900	1.660	
Wall Thickness	0.250	0.188	0.125	0.250	0.218	0.188	0.154	0.125	0.145	0.140	
Weight Per Foot	6.01	4.64	3.17	5.67	5.02	4.39	3.65	3.00	2.72	2.27	
Design Wall Thickness	0.233	0.174	0.116	0.233	0.204	0.174	0.143	0.116	0.135	0.130	
F_y = 50 ksi											
Effective length KL in feet	0	71	54	37	67	59	51	43	35	32	26
	2	66	51	35	62	55	48	40	33	29	23
	3	61	47	32	57	50	44	37	30	25	19
	4	54	42	29	50	44	39	32	27	21	15
	5	47	37	26	42	38	33	28	23	16	11
	6	39	31	22	35	31	27	23	19	12	8
	7	32	25	18	27	25	22	19	16	9	6
	8	25	20	14	21	19	17	14	12	7	4
	9	20	16	11	17	15	13	11	10	5	3
	10	16	13	9	14	12	11	9	8	<u>4</u>	<u>3</u>
	11	13	11	8	11	10	9	8	6		
	12	11	9	6	<u>9</u>	<u>9</u>	8	6	5		
	13	<u>9</u>	<u>8</u>	5			<u>6</u>	<u>5</u>	<u>5</u>		
	14			<u>5</u>							
	15										
	16										
	17										
	18										
	19										
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	35										
	36										
	37										
	38										
	39										
	40										
PROPERTIES											
Area, in. ²	1.66	1.27	0.87	1.57	1.39	1.20	1.00	0.82	0.75	0.62	
I, in. ⁴	1.08	0.865	0.619	0.910	0.827	0.733	0.627	0.527	0.293	0.184	
r, in.	0.806	0.825	0.844	0.762	0.771	0.781	0.791	0.800	0.626	0.543	

Note: Double Horizontal Line indicates K/r limit of 200.



LRFD Columns

NOTES



LRFD Columns

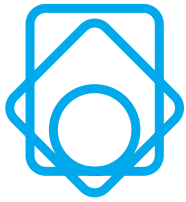
Design Stress, $\phi_c \times F_{cr}$, for Compression Members

$F_y = 42$ ksi minimum specified yield stress steel, $\phi_c = 0.85$							
$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)
1	35.70	41	32.20	81	23.86	121	14.53
2	35.69	42	32.03	82	23.62	122	14.31
3	35.68	43	31.87	83	23.38	123	14.10
4	35.66	44	31.70	84	23.15	124	13.88
5	35.65	45	31.52	85	22.91	125	13.66
6	35.62	46	31.35	86	22.67	126	13.44
7	35.59	47	31.17	87	22.43	127	13.23
8	35.56	48	30.99	88	22.19	128	13.02
9	35.52	49	30.81	89	21.95	129	12.82
10	35.48	50	30.62	90	21.71	130	12.62
11	35.44	51	30.43	91	21.47	131	12.43
12	35.39	52	30.24	92	21.23	132	12.25
13	35.33	53	30.04	93	20.99	133	12.06
14	35.27	54	29.85	94	20.75	134	11.88
15	35.21	55	29.65	95	20.51	135	11.71
16	35.14	56	29.45	96	20.27	136	11.54
17	35.07	57	29.24	97	20.03	137	11.37
18	35.00	58	29.04	98	19.79	138	11.20
19	34.92	59	28.83	99	19.55	139	11.04
20	34.83	60	28.62	100	19.32	140	10.89
21	34.75	61	28.41	101	19.08	141	10.73
22	34.65	62	28.19	102	18.84	142	10.58
23	34.56	63	27.98	103	18.61	143	10.43
24	34.46	64	27.76	104	18.37	144	10.29
25	34.36	65	27.54	105	18.14	145	10.15
26	34.25	66	27.32	106	17.90	146	10.01
27	34.14	67	27.10	107	17.67	147	9.87
28	34.02	68	26.87	108	17.44	148	9.74
29	33.90	69	26.65	109	17.21	149	9.61
30	33.78	70	26.42	110	16.98	150	9.48
31	33.65	71	26.19	111	16.75	151	9.36
32	33.52	72	25.97	112	16.52	152	9.23
33	33.39	73	25.73	113	16.30	153	9.11
34	33.25	74	25.50	114	16.07	154	9.00
35	33.11	75	25.27	115	15.85	155	8.88
36	32.97	76	25.04	116	15.62	156	8.77
37	32.82	77	24.80	117	15.40	157	8.66
38	32.67	78	24.57	118	15.18	158	8.55
39	32.52	79	24.33	119	14.96	159	8.44
40	32.36	80	24.10	120	14.74	160	8.33

Tabulated design comprehensive stress does not apply to slender sections. When element width-to-thickness ratio exceeds λ_r , refer to AISC LRFD Specification Section 4.2.
Note: $\lambda_c = 1.5$ at $Kl/r = 123.8$

$F_y = 46$ ksi minimum specified yield stress steel, $\phi_c = 0.85$							
$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)
1	39.10	41	34.92	81	25.15	121	14.57
2	39.09	42	34.73	82	24.87	122	14.33
3	39.08	43	34.53	83	24.60	123	14.10
4	39.06	44	34.33	84	24.32	124	13.88
5	39.03	45	34.12	85	24.05	125	13.66
6	39.01	46	33.91	86	23.77	126	13.44
7	38.97	47	33.70	87	23.50	127	13.23
8	38.93	48	33.49	88	23.22	128	13.02
9	38.89	49	33.27	89	22.95	129	12.82
10	38.84	50	33.05	90	22.67	130	12.62
11	38.78	51	32.82	91	22.40	131	12.43
12	38.72	52	32.60	92	22.13	132	12.25
13	38.66	53	32.37	93	21.85	133	12.06
14	38.59	54	32.14	94	21.58	134	11.88
15	38.51	55	31.90	95	21.31	135	11.71
16	38.43	56	31.66	96	21.03	136	11.54
17	38.35	57	31.42	97	20.76	137	11.37
18	38.26	58	31.18	98	20.49	138	11.20
19	38.16	59	30.94	99	20.22	139	11.04
20	38.06	60	30.69	100	19.95	140	10.89
21	37.96	61	30.44	101	19.69	141	10.73
22	37.85	62	30.19	102	19.42	142	10.58
23	37.73	63	29.94	103	19.15	143	10.43
24	37.61	64	29.68	104	18.89	144	10.29
25	37.49	65	29.43	105	18.62	145	10.15
26	37.36	66	29.17	106	18.36	146	10.01
27	37.23	67	28.91	107	18.10	147	9.87
28	37.09	68	28.65	108	17.84	148	9.74
29	36.95	69	28.38	109	17.58	149	9.61
30	36.80	70	28.12	110	17.33	150	9.48
31	36.65	71	27.86	111	17.07	151	9.36
32	36.50	72	27.59	112	16.82	152	9.23
33	36.34	73	27.32	113	16.56	153	9.11
34	36.17	74	27.05	114	16.31	154	9.00
35	36.01	75	26.78	115	16.06	155	8.88
36	35.84	76	26.51	116	15.82	156	8.77
37	35.66	77	26.24	117	15.57	157	8.66
38	35.48	78	25.97	118	15.32	158	8.55
39	35.30	79	25.70	119	15.07	159	8.44
40	35.11	80	25.42	120	14.82	160	8.33

Tabulated design comprehensive stress does not apply to slender sections. When element width-to-thickness ratio exceeds λ_r , refer to AISC LRFD Specification Section 4.2.
Note: $\lambda_c = 1.5$ at $Kl/r = 118.3$



LRFD Columns

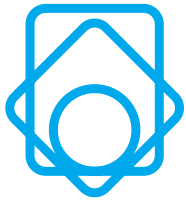
Design Stress, $\phi_c \times F_{cr}$, for Compression Members

$F_y = 50$ ksi minimum specified yield stress steel, $\phi_c = 0.85$							
$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)
1	42.50	41	37.58	81	26.31	121	14.57
2	42.49	42	37.36	82	25.99	122	14.33
3	42.47	43	37.13	83	25.68	123	14.10
4	42.45	44	36.89	84	25.37	124	13.88
5	42.42	45	36.65	85	25.06	125	13.66
6	42.39	46	36.41	86	24.75	126	13.44
7	42.35	47	36.16	87	24.44	127	13.23
8	42.30	48	35.91	88	24.13	128	13.02
9	42.25	49	35.66	89	23.82	129	12.82
10	42.19	50	35.40	90	23.51	130	12.62
11	42.13	51	35.14	91	23.20	131	12.43
12	42.05	52	34.88	92	22.89	132	12.25
13	41.98	53	34.61	93	22.58	133	12.06
14	41.90	54	34.34	94	22.27	134	11.88
15	41.81	55	34.07	95	21.97	135	11.71
16	41.71	56	33.79	96	21.66	136	11.54
17	41.61	57	33.51	97	21.36	137	11.37
18	41.51	58	33.23	98	21.06	138	11.20
19	41.39	59	32.95	99	20.76	139	11.04
20	41.28	60	32.66	100	20.46	140	10.89
21	41.15	61	32.38	101	20.16	141	10.73
22	41.02	62	32.09	102	19.86	142	10.58
23	40.89	63	31.79	103	19.57	143	10.43
24	40.75	64	31.50	104	19.27	144	10.29
25	40.60	65	31.21	105	18.98	145	10.15
26	40.45	66	30.91	106	18.69	146	10.01
27	40.29	67	30.61	107	18.40	147	9.87
28	40.13	68	30.31	108	18.11	148	9.74
29	39.97	69	30.01	109	17.83	149	9.61
30	39.79	70	29.70	110	17.55	150	9.48
31	39.62	71	29.40	111	17.26	151	9.36
32	39.43	72	29.09	112	16.98	152	9.23
33	39.25	73	28.79	113	16.71	153	9.11
34	39.06	74	28.48	114	16.42	154	9.00
35	38.86	75	28.17	115	16.13	155	8.88
36	38.66	76	27.86	116	15.86	156	8.77
37	38.45	77	27.55	117	15.59	157	8.66
38	38.24	78	27.24	118	15.32	158	8.55
39	38.03	79	26.93	119	15.07	159	8.44
40	37.81	80	26.62	120	14.82	160	8.33

Tabulated design comprehensive stress does not apply to slender sections. When element width-to-thickness ratio exceeds λ_r , refer to AISC LRFD Specification Section 4.2.
Note: $\lambda_c = 1.5$ at $Kl/r = 113.5$

$F_y = 60$ ksi minimum specified yield stress steel, $\phi_c = 0.85$							
$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)
1	51.00	41	44.01	81	28.68	121	14.57
2	50.98	42	43.69	82	28.27	122	14.33
3	50.96	43	43.36	83	27.87	123	14.10
4	50.93	44	43.03	84	27.46	124	13.88
5	50.89	45	42.70	85	27.06	125	13.66
6	50.84	46	42.36	86	26.65	126	13.44
7	50.78	47	42.01	87	26.25	127	13.23
8	50.71	48	41.67	88	25.85	128	13.02
9	50.64	49	41.31	89	25.45	129	12.82
10	50.55	50	40.95	90	25.06	130	12.62
11	50.46	51	40.59	91	24.66	131	12.43
12	50.36	52	40.23	92	24.27	132	12.25
13	50.25	53	39.86	93	23.88	133	12.06
14	50.13	54	39.49	94	23.49	134	11.88
15	50.00	55	39.11	95	23.10	135	11.71
16	49.87	56	38.73	96	22.72	136	11.54
17	49.72	57	38.35	97	22.34	137	11.37
18	49.57	58	37.97	98	21.96	138	11.20
19	49.41	59	37.58	99	21.58	139	11.04
20	49.24	60	37.19	100	21.21	140	10.89
21	49.06	61	36.79	101	20.84	141	10.73
22	48.88	62	36.40	102	20.47	142	10.58
23	48.69	63	36.00	103	20.11	143	10.43
24	48.49	64	35.60	104	19.73	144	10.29
25	48.28	65	35.20	105	19.35	145	10.15
26	48.06	66	34.80	106	18.99	146	10.01
27	47.84	67	34.40	107	18.64	147	9.87
28	47.61	68	33.99	108	18.29	148	9.74
29	47.37	69	33.59	109	17.96	149	9.61
30	47.13	70	33.18	110	17.63	150	9.48
31	46.88	71	32.77	111	17.32	151	9.36
32	46.62	72	32.36	112	17.01	152	9.23
33	46.35	73	31.95	113	16.71	153	9.11
34	46.08	74	31.54	114	16.42	154	9.00
35	45.80	75	31.13	115	16.13	155	8.88
36	45.52	76	30.72	116	15.86	156	8.77
37	45.23	77	30.31	117	15.59	157	8.66
38	44.93	78	29.90	118	15.32	158	8.55
39	44.63	79	29.50	119	15.07	159	8.44
40	44.32	80	29.09	120	14.82	160	8.33

Tabulated design comprehensive stress does not apply to slender sections. When element width-to-thickness ratio exceeds λ_r , refer to AISC LRFD Specification Section 4.2.
Note: $\lambda_c = 1.5$ at $Kl/r = 103.6$



LRFD Columns

Design Stress, $\phi_c \times F_{cr}$, for Compression Members

F _y = 65 ksi minimum specified yield stress steel, $\phi_c = 0.85$							
$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)
1	55.24	41	47.09	81	29.61	121	14.57
2	55.23	42	46.72	82	29.16	122	14.33
3	55.20	43	46.35	83	28.70	123	14.10
4	55.17	44	45.96	84	28.25	124	13.88
5	55.12	45	45.58	85	27.80	125	13.66
6	55.06	46	45.18	86	27.35	126	13.44
7	54.99	47	44.79	87	26.91	127	13.23
8	54.91	48	44.38	88	26.46	128	13.02
9	54.83	49	43.98	89	26.02	129	12.82
10	54.73	50	43.56	90	25.58	130	12.62
11	54.62	51	43.15	91	25.15	131	12.43
12	54.50	52	42.73	92	24.71	132	12.25
13	54.37	53	42.30	93	24.28	133	12.06
14	54.23	54	41.88	94	23.85	134	11.88
15	54.08	55	41.44	95	23.43	135	11.71
16	53.92	56	41.01	96	23.01	136	11.54
17	53.75	57	40.57	97	22.59	137	11.37
18	53.57	58	40.13	98	22.18	138	11.20
19	53.39	59	39.69	99	21.76	139	11.04
20	53.19	60	39.24	100	21.34	140	10.89
21	52.98	61	38.79	101	20.92	141	10.73
22	52.77	62	38.34	102	20.51	142	10.58
23	52.54	63	37.89	103	20.11	143	10.43
24	52.31	64	37.43	104	19.73	144	10.29
25	52.06	65	36.98	105	19.35	145	10.15
26	51.81	66	36.52	106	18.99	146	10.01
27	51.55	67	36.06	107	18.64	147	9.87
28	51.28	68	35.60	108	18.29	148	9.74
29	51.01	69	35.14	109	17.96	149	9.61
30	50.72	70	34.68	110	17.63	150	9.48
31	50.43	71	34.22	111	17.32	151	9.36
32	50.13	72	33.75	112	17.01	152	9.23
33	49.82	73	33.29	113	16.71	153	9.11
34	49.50	74	32.83	114	16.42	154	9.00
35	49.18	75	32.37	115	16.13	155	8.88
36	48.85	76	31.91	116	15.86	156	8.77
37	48.51	77	31.45	117	15.59	157	8.66
38	48.16	78	30.99	118	15.32	158	8.55
39	47.81	79	30.53	119	15.07	159	8.44
40	47.46	80	30.07	120	14.82	160	8.33

Tabulated design comprehensive stress does not apply to slender sections. When element width-to-thickness ratio exceeds λ_r , refer to AISC LRFD Specification Section 4.2.
Note: $\lambda_c = 1.5$ at $Kl/r = 99.5$

F _y = 70 ksi minimum specified yield stress steel, $\phi_c = 0.85$							
$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)	$\frac{Kl}{r}$	$\phi_c F_{cr}$ (ksi)
1	59.49	41	50.09	81	30.40	121	14.57
2	59.48	42	49.67	82	29.89	122	14.33
3	59.45	43	49.24	83	29.39	123	14.10
4	59.40	44	48.80	84	28.90	124	13.88
5	59.35	45	48.36	85	28.40	125	13.66
6	59.28	46	47.91	86	27.91	126	13.44
7	59.20	47	47.46	87	27.42	127	13.23
8	59.11	48	47.00	88	26.93	128	13.02
9	59.01	49	46.53	89	26.45	129	12.82
10	58.89	50	46.07	90	25.97	130	12.62
11	58.77	51	45.59	91	25.49	131	12.43
12	58.63	52	45.11	92	25.02	132	12.25
13	58.48	53	44.63	93	24.55	133	12.06
14	58.32	54	44.15	94	24.08	134	11.88
15	58.15	55	43.66	95	23.62	135	11.71
16	57.96	56	43.16	96	23.15	136	11.54
17	57.77	57	42.67	97	22.68	137	11.37
18	57.56	58	42.17	98	22.22	138	11.20
19	57.34	59	41.66	99	21.77	139	11.04
20	57.11	60	41.16	100	21.34	140	10.89
21	56.87	61	40.65	101	20.92	141	10.73
22	56.62	62	40.14	102	20.51	142	10.58
23	56.36	63	39.63	103	20.11	143	10.43
24	56.09	64	39.12	104	19.73	144	10.29
25	55.81	65	38.61	105	19.35	145	10.15
26	55.52	66	38.09	106	18.99	146	10.01
27	55.22	67	37.58	107	18.64	147	9.87
28	54.91	68	37.06	108	18.29	148	9.74
29	54.59	69	36.55	109	17.96	149	9.61
30	54.26	70	36.03	110	17.63	150	9.48
31	53.93	71	35.52	111	17.32	151	9.36
32	53.58	72	35.00	112	17.01	152	9.23
33	53.22	73	34.48	113	16.71	153	9.11
34	52.86	74	33.97	114	16.42	154	9.00
35	52.49	75	33.45	115	16.13	155	8.88
36	52.11	76	32.94	116	15.86	156	8.77
37	51.72	77	32.43	117	15.59	157	8.66
38	51.32	78	31.92	118	15.32	158	8.55
39	50.92	79	31.41	119	15.07	159	8.44
40	50.51	80	30.90	120	14.82	160	8.33

Tabulated design comprehensive stress does not apply to slender sections. When element width-to-thickness ratio exceeds λ_r , refer to AISC LRFD Specification Section 4.2.
Note: $\lambda_c = 1.5$ at $Kl/r = 95.9$



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