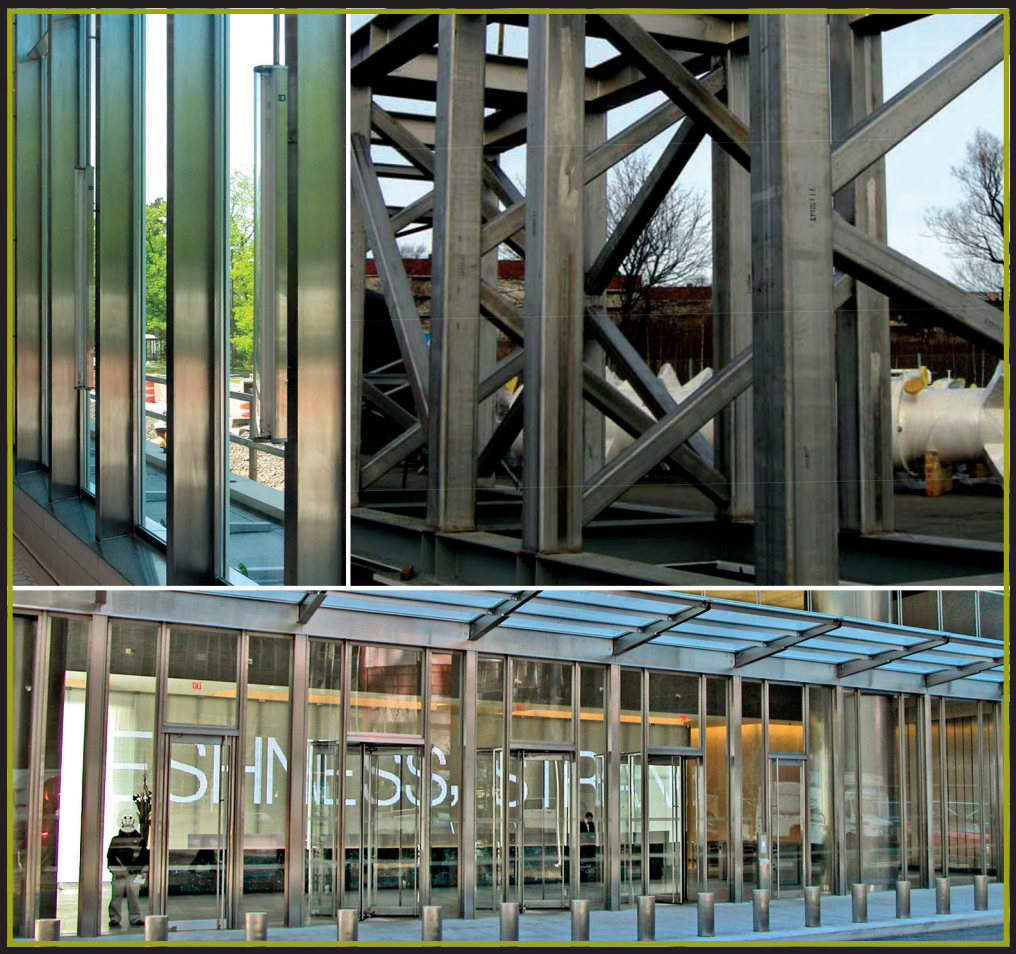
STRUCTURAL STAINLESS STEEL DESIGN TABLES

IN ACCORDANCE WITH AISC DG27: STRUCTURAL STAINLESS STEEL



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PART 4: DESIGN OF COMPRESSION MEMBERS (F_y = 30 ksi)

W24

Table 4-1
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W24×											
lb/ft		131		117 [c1]		104 [c1]		94 [c1]		84 [c1]		76 [c1]	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	688	1030	600	901	518	779	470	707	406	610	359	539
	6	658	990	577	868	499	750	434	653	375	563	331	498
	7	648	974	570	856	492	740	422	634	364	547	322	483
	8	636	956	561	843	485	728	408	613	352	529	311	467
	9	623	937	551	828	476	715	392	589	338	508	299	449
	10	609	915	539	811	466	701	375	563	324	486	286	429
	11	594	892	527	793	456	686	355	533	308	462	272	408
	12	577	867	514	772	445	669	333	501	291	437	257	386
	13	560	841	498	748	433	651	311	468	273	411	241	362
	14	542	814	481	723	420	632	289	434	253	381	225	338
	15	523	786	464	698	407	612	267	401	233	351	207	312
	16	503	757	447	671	393	591	245	369	214	321	189	285
	17	484	727	429	644	378	569	224	337	195	293	172	259
	18	463	696	410	617	362	544	204	306	176	265	155	234
	19	443	666	392	589	345	519	184	277	159	239	140	210
	20	422	635	373	561	328	494	166	250	144	216	126	190
	22	381	573	336	505	295	444	137	206	119	178	104	157
	24	341	512	300	451	263	395	115	173	99.7	150	87.6	132
	26	302	453	265	398	231	348	98.3	148	85.0	128	74.6	112
	28	264	397	231	348	202	303	84.8	127	73.3	110	64.4	96.7
	30	231	347	202	303	176	264	73.8	111	63.8	95.9	56.1	84.3
	32	203	305	177	267	154	232	64.9	97.5	56.1	84.3	49.3	74.1
	34	180	270	157	236	137	206						
	36	160	241	140	211	122	183						
	38	144	216	126	189	110	165						
	40	130	195	114	171	98.9	149						
Properties													
P_{wo}, kips		58.1	87.1	46.8	70.1	37.5	56.3	45.1	67.6	36.2	54.3	29.9	44.9
P_{wi}, kips/in.		12.1	18.2	11.0	16.5	10.0	15.0	10.3	15.5	9.40	14.1	8.80	13.2
P_{wb}, kips		129	194	97.0	146	72.9	109	79.8	120	60.6	91.1	49.8	74.8
P_{fb}, kips		103	156	81.1	122	63.2	94.9	86.0	129	66.6	100	51.9	78.0
A_g, in.^{2}		38.3		34.2		30.4		27.5		24.5		22.2	
I_x, in.^{4}		3990		3510		3080		2670		2340		2070	
I_y, in.^{4}		340		297		259		109		94.4		82.5	
r_y, in.		2.98		2.95		2.92		1.99		1.96		1.93	
r_x/r_y		3.42		3.42		3.46		4.95		4.99		5.01	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		110000		97000		85100		73800		64700		57200	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		9400		8210		7160		3010		2610		2280	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W24-W21

Shape		W24×						W21×					
lb/ft		68 [c1]		62 [c1]		55 [c1]		122		111		101 [c1]	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	313	471	282	423	240	360	640	961	584	878	523	787
	6	289	434	243	365	207	311	611	918	558	838	503	756
	7	280	421	230	345	196	294	601	903	548	824	496	745
	8	271	407	215	323	183	276	590	886	538	809	487	733
	9	260	391	199	299	170	255	577	867	526	791	477	718
	10	248	373	181	273	155	232	563	846	514	772	466	700
	11	236	354	162	244	139	209	548	824	500	752	453	682
	12	222	334	143	214	122	184	533	800	486	730	440	662
	13	208	313	124	186	105	158	516	775	470	707	426	641
	14	194	292	107	160	90.8	136	499	749	454	683	412	619
	15	179	269	93.0	140	79.1	119	480	722	438	658	397	596
	16	163	245	81.7	123	69.5	104	462	694	421	632	381	573
	17	147	222	72.4	109	61.6	92.5	443	666	403	606	365	549
	18	132	199	64.6	97.0	54.9	82.5	424	637	386	580	349	525
	19	119	179	57.9	87.1	49.3	74.1	404	608	368	553	333	500
	20	107	161	52.3	78.6	44.5	66.9	385	578	350	526	317	476
	22	88.7	133	43.2	65.0	36.8	55.3	346	520	314	472	284	427
	24	74.5	112					308	462	279	420	252	379
	26	63.5	95.4					271	407	246	369	222	333
	28	54.7	82.3					236	355	214	322	193	290
	30	47.7	71.7					206	309	187	280	168	253
	32							181	272	164	246	148	222
	34							160	241	145	218	131	197
	36							143	215	130	195	117	176
	38							128	193	116	175	105	158
	40							116	174	105	158	94.6	142
Properties													
P_{wo}, kips		24.3	36.4	25.4	38.1	19.9	29.9	57.6	86.4	48.1	72.2	40.0	60.0
P_{wi}, kips/in.		8.30	12.5	8.60	12.9	7.90	11.9	12.0	18.0	11.0	16.5	10.0	15.0
P_{wb}, kips		41.8	62.8	46.5	69.9	35.9	54.0	144	216	111	167	83.2	125
P_{fb}, kips		38.4	57.8	39.1	58.7	28.6	43.0	103	156	86.0	129	71.9	108
A_g, in.^{2}		19.9		18.0		16.0		35.6		32.5		29.5	
I_x, in.^{4}		1800		1520		1320		2940		2650		2400	
I_y, in.^{4}		70.4		34.5		29.0		305		274		248	
r_y, in.		1.88		1.38		1.35		2.92		2.91		2.90	
r_x/r_y		5.07		6.67		6.73		3.11		3.11		3.11	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		49700		42000		36500		81200		73200		66300	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		1950		953		801		8430		7570		6850	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W21

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W21×											
lb/ft		93		83 [c1]		73 [c1]		68 [c1]		62 [c1]		57 [c1]	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	487	732	431	648	365	549	333	501	295	443	268	404
	6	434	653	385	579	332	499	303	455	268	403	229	344
	7	417	627	369	555	321	482	293	440	259	389	215	323
	8	398	597	352	529	308	462	281	422	248	373	200	301
	9	377	566	333	501	293	441	268	403	237	356	184	276
	10	355	533	313	471	276	415	254	381	224	337	165	248
	11	332	499	293	440	258	387	238	358	211	317	146	219
	12	309	464	272	408	239	359	221	332	197	296	128	192
	13	285	429	251	377	220	331	203	306	181	273	110	166
	14	262	393	230	345	202	303	186	280	165	249	95.0	143
	15	239	359	209	314	183	275	169	254	150	225	82.8	124
	16	216	325	189	284	166	249	153	229	135	202	72.7	109
	17	195	293	170	255	149	223	137	206	120	181	64.4	96.8
	18	175	263	152	228	133	200	122	184	107	161	57.5	86.4
	19	157	236	136	205	119	179	110	165	96.4	145	51.6	77.5
	20	141	213	123	185	108	162	99.0	149	87.0	131	46.6	70.0
	22	117	176	102	153	89.0	134	81.8	123	71.9	108	38.5	57.8
	24	98.3	148	85.5	129	74.7	112	68.7	103	60.4	90.8		
	26	83.7	126	72.9	109	63.7	95.7	58.6	88.0	51.5	77.4		
	28	72.2	108	62.8	94.4	54.9	82.5	50.5	75.9	44.4	66.7		
	30	62.9	94.5	54.7	82.2	47.8	71.9	44.0	66.1				
	32												
	34												
	36												
	38												
	40												
Properties													
P_{wo}, kips		53.9	80.9	43.0	64.5	33.7	50.5	29.5	44.2	24.6	36.9	26.3	39.5
P_{wi}, kips/in.		11.6	17.4	10.3	15.5	9.10	13.7	8.60	12.9	8.00	12.0	8.10	12.2
P_{wb}, kips		130	196	91.2	137	62.9	94.6	53.1	79.8	42.6	64.1	44.2	66.4
P_{fb}, kips		97.1	146	78.3	118	61.5	92.4	52.7	79.2	42.5	63.8	47.4	71.3
A_g, in.^{2}		27.1		24.1		21.3		19.8		18.0		16.5	
I_x, in.^{4}		2050		1810		1580		1460		1310		1150	
I_y, in.^{4}		92.8		80.8		70.5		64.7		57.5		30.6	
r_y, in.		1.85		1.83		1.82		1.81		1.78		1.36	
r_x/r_y		4.70		4.73		4.74		4.74		4.79		6.13	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		56700		50000		43700		40300		36200		31800	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		2560		2230		1950		1790		1590		846	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W21-W18

Shape		W21×				W18×							
lb/ft		50 [c1]		44 [c1]		106		97		86		76 [c1]	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	229	344	194	291	557	837	510	767	453	680	394	592
	6	194	291	164	246	527	792	483	726	428	643	375	564
	7	182	273	153	230	517	777	473	711	419	630	368	554
	8	168	253	142	213	505	759	463	695	410	616	360	542
	9	154	231	129	195	492	740	451	677	399	600	351	527
	10	139	208	116	174	478	719	438	658	388	582	341	512
	11	121	182	102	153	463	696	424	637	375	564	329	495
	12	105	158	87.4	131	447	672	409	615	362	544	318	478
	13	89.8	135	74.5	112	431	647	394	592	348	523	305	459
	14	77.5	116	64.3	96.6	413	621	378	568	334	502	293	440
	15	67.5	101	56.0	84.2	396	595	361	543	319	480	280	420
	16	59.3	89.1	49.2	74.0	377	567	345	518	304	457	266	400
	17	52.5	79.0	43.6	65.5	359	539	328	493	289	434	253	380
	18	46.9	70.4	38.9	58.4	340	512	311	467	274	411	239	359
	19	42.1	63.2	34.9	52.4	322	484	294	441	258	388	226	339
	20	38.0	57.1	31.5	47.3	303	456	276	416	243	365	212	319
	22					267	401	243	365	213	321	186	279
	24					232	349	211	317	185	278	161	241
	26					199	300	181	273	159	238	138	207
	28					172	259	156	235	137	205	119	178
	30					150	225	136	205	119	179	103	155
	32					132	198	120	180	105	157	90.8	136
	34					117	175	106	159	92.7	139	80.4	121
	36					104	156	94.6	142	82.7	124	71.8	108
	38					93.4	140	84.9	128	74.2	112	64.4	96.8
	40					84.3	127	76.6	115	67.0	101	58.1	87.4
Properties													
P_{wo}, kips		20.3	30.5	15.8	23.6	55.5	83.2	46.5	69.8	37.0	55.4	28.9	43.4
P_{wi}, kips/in.		7.60	11.4	7.00	10.5	11.8	17.7	10.7	16.1	9.60	14.4	8.50	12.8
P_{wb}, kips		36.6	55.1	28.5	42.9	161	242	120	180	86.4	130	60.0	90.2
P_{fb}, kips		32.1	48.3	22.7	34.2	99.2	149	85.0	128	66.6	100	51.9	78.0
A_g, in.^{2}		14.5		12.8		31.0		28.4		25.2		22.2	
I_x, in.^{4}		964		822		1900		1740		1520		1320	
I_y, in.^{4}		24.9		20.7		220		201		175		153	
r_y, in.		1.31		1.27		2.67		2.66		2.64		2.62	
r_x/r_y		6.22		6.32		2.93		2.94		2.94		2.95	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		26600		22700		52500		48100		42000		36500	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		688		572		6080		5550		4840		4230	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W18

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W18×											
lb/ft		71		65		60 [c1]		55 [c1]		50 [c1]		46 [c1]	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	372	559	341	513	308	462	277	416	242	363	223	335
	6	325	489	298	448	274	412	247	371	216	325	186	279
	7	310	466	284	427	261	392	237	356	207	311	173	260
	8	293	441	269	404	247	371	225	338	197	296	159	239
	9	275	414	252	379	231	347	211	317	186	280	143	215
	10	257	386	235	353	215	323	196	295	175	262	127	191
	11	237	357	217	326	199	299	181	272	162	243	111	167
	12	218	328	199	299	182	274	165	248	148	222	95.6	144
	13	199	299	181	272	166	249	150	225	134	201	81.8	123
	14	180	270	164	246	149	225	135	203	121	181	70.5	106
	15	162	243	147	221	134	201	121	181	108	162	61.4	92.3
	16	144	216	131	196	119	179	107	161	95.2	143	54.0	81.1
	17	128	192	116	174	106	159	94.8	142	84.4	127	47.8	71.9
	18	114	171	103	155	94.1	141	84.6	127	75.3	113	42.7	64.1
	19	102	154	92.8	140	84.5	127	75.9	114	67.5	102	38.3	57.5
	20	92.3	139	83.8	126	76.2	115	68.5	103	61.0	91.6	34.5	51.9
	22	76.3	115	69.2	104	63.0	94.7	56.6	85.1	50.4	75.7		
	24	64.1	96.4	58.2	87.4	52.9	79.6	47.6	71.5	42.3	63.6		
	26	54.6	82.1	49.6	74.5	45.1	67.8	40.5	60.9	36.1	54.2		
	28	47.1	70.8	42.7	64.2	38.9	58.5						
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
P_{wo}, kips		40.1	60.1	33.8	50.6	28.8	43.3	24.6	36.9	20.2	30.4	21.8	32.7
P_{wi}, kips/in.		9.90	14.9	9.00	13.5	8.30	12.5	7.80	11.7	7.10	10.7	7.20	10.8
P_{wb}, kips		94.6	142	71.0	107	56.0	84.2	46.4	69.7	35.0	52.5	36.4	54.7
P_{fb}, kips		73.7	111	63.2	94.9	54.2	81.5	44.6	67.0	36.5	54.8	41.1	61.8
A_g, in.^{2}		20.7		19.0		17.5		16.1		14.5		13.4	
I_x, in.^{4}		1160		1060		974		881		790		702	
I_y, in.^{4}		60.3		54.8		50.1		44.9		40.1		22.5	
r_y, in.		1.71		1.70		1.69		1.67		1.66		1.30	
r_x/r_y		4.38		4.40		4.41		4.43		4.44		5.57	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		32100		29300		26900		24300		21800		19400	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		1670		1510		1380		1240		1110		622	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W18-W16

Shape		W18×				W16×							
lb/ft		40 [c1]		35 [c1]		100		89		77		67 [c1]	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	184	277	157	236	526	791	467	702	404	608	350	526
	6	154	231	130	196	495	744	439	660	379	570	329	494
	7	143	216	121	182	484	728	429	645	371	557	321	483
	8	132	199	111	167	472	709	418	628	361	543	313	470
	9	120	181	100	151	458	689	406	610	350	527	303	456
	10	107	161	89.1	134	444	667	393	590	339	509	293	441
	11	93.6	141	77.0	116	428	644	379	569	327	491	283	425
	12	80.4	121	65.4	98.3	412	619	364	547	314	471	271	408
	13	68.6	103	55.7	83.7	394	593	348	524	300	451	259	390
	14	59.2	88.9	48.0	72.2	377	566	333	500	286	430	247	372
	15	51.5	77.5	41.9	62.9	359	539	316	475	272	409	235	353
	16	45.3	68.1	36.8	55.3	340	511	300	450	257	387	222	334
	17	40.1	60.3	32.6	49.0	321	483	283	425	243	365	210	315
	18	35.8	53.8	29.1	43.7	303	455	266	400	228	343	197	296
	19	32.1	48.3	26.1	39.2	284	427	250	375	214	322	184	277
	20	29.0	43.6	23.5	35.4	266	400	233	351	200	300	172	259
	22					230	346	202	303	172	259	148	223
	24					197	296	172	259	147	220	126	189
	26					168	252	147	220	125	188	107	161
	28					145	218	126	190	108	162	92.6	139
	30					126	190	110	166	93.8	141	80.7	121
	32					111	167	96.8	146	82.5	124	70.9	107
	34					98.2	148	85.8	129	73.0	110	62.8	94.4
	36					87.6	132	76.5	115	65.2	97.9	56.0	84.2
	38					78.6	118	68.7	103	58.5	87.9	50.3	75.6
	40					71.0	107	62.0	93.1	52.8	79.3	45.4	68.2
Properties													
P_{wo}, kips		16.5	24.8	12.8	19.1	57.6	86.4	45.9	68.9	34.6	51.9	26.3	39.4
P_{wi}, kips/in.		6.30	9.45	6.00	9.00	11.7	17.6	10.5	15.8	9.10	13.7	7.90	11.9
P_{wb}, kips		24.4	36.7	21.1	31.7	175	264	127	190	82.8	124	54.2	81.5
P_{fb}, kips		30.9	46.5	20.3	30.5	109	164	86.0	129	64.9	97.5	49.7	74.6
A_g, in.^{2}		11.6		10.2		29.3		26.0		22.5		19.5	
I_x, in.^{4}		602		500		1480		1290		1100		947	
I_y, in.^{4}		19.1		15.3		186		163		138		119	
r_y, in.		1.28		1.23		2.52		2.50		2.48		2.47	
r_x/r_y		5.63		5.71		2.82		2.82		2.82		2.82	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		16600		13800		40900		35600		30400		26200	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		528		423		5140		4500		3810		3290	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W16

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W16×											
lb/ft		57		50 [c1]		45 [c1]		40 [c1]		36 [c1]		31 [c1]	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	298	448	259	389	225	339	192	289	169	254	142	213
	6	257	386	225	338	198	298	169	254	149	223	114	171
	7	243	365	213	320	189	284	161	243	142	213	105	158
	8	228	343	200	301	178	268	153	230	134	201	95.1	143
	9	213	319	186	280	166	249	143	215	125	188	84.4	127
	10	196	295	172	258	152	229	133	200	116	174	73.2	110
	11	180	270	157	236	139	209	122	184	106	160	62.0	93.1
	12	163	245	143	214	126	189	111	166	95.9	144	52.1	78.4
	13	147	221	128	193	113	170	99.1	149	85.4	128	44.4	66.8
	14	131	198	114	172	101	151	88.0	132	75.4	113	38.3	57.6
	15	116	175	101	152	88.6	133	77.5	116	66.0	99.2	33.4	50.2
	16	103	154	89.1	134	78.0	117	68.2	102	58.0	87.2	29.3	44.1
	17	90.9	137	78.9	119	69.0	104	60.4	90.7	51.4	77.3	26.0	39.1
	18	81.0	122	70.4	106	61.6	92.6	53.8	80.9	45.9	68.9	23.2	34.8
	19	72.7	109	63.2	95.0	55.3	83.1	48.3	72.6	41.2	61.9	20.8	31.3
	20	65.6	98.7	57.0	85.7	49.9	75.0	43.6	65.6	37.1	55.8		
	22	54.2	81.5	47.1	70.8	41.2	62.0	36.0	54.2	30.7	46.1		
	24	45.6	68.5	39.6	59.5	34.6	52.1	30.3	45.5	25.8	38.8		
	26	38.8	58.4	33.7	50.7	29.5	44.4	25.8	38.8				
	28												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
P_{wo}, kips		30.7	46.1	23.9	35.9	19.5	29.2	15.4	23.1	12.7	19.0	12.1	18.2
P_{wi}, kips/in.		8.60	12.9	7.60	11.4	6.90	10.4	6.10	9.15	5.90	8.85	5.50	8.25
P_{wb}, kips		70.0	105	48.1	72.2	36.1	54.3	24.9	37.5	22.5	33.8	18.2	27.4
P_{fb}, kips		57.4	86.3	44.6	67.0	35.8	53.9	28.6	43.0	20.8	31.2	21.7	32.7
A_g, in.^{2}		16.6		14.6		13.1		11.6		10.4		8.99	
I_x, in.^{4}		750		651		579		511		441		367	
I_y, in.^{4}		43.1		37.2		32.8		28.8		24.5		12.4	
r_y, in.		1.61		1.60		1.58		1.57		1.53		1.17	
r_x/r_y		4.17		4.18		4.20		4.22		4.25		5.46	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		20700		18000		16000		14100		12200		10100	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		1190		1030		906		796		677		343	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W16-W14

Shape		W16x		W14×									
lb/ft		26 [c1]		120		109		99		90		82	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	114	171	629	945	569	856	517	778	471	707	426	640
	6	91.2	137	610	917	552	830	502	754	456	686	400	601
	7	83.8	126	605	909	547	822	497	746	451	678	391	588
	8	75.7	114	598	899	541	813	491	738	446	670	381	573
	9	67.0	101	591	888	535	803	485	729	440	662	370	556
	10	57.9	87.0	582	875	527	792	478	719	434	653	358	538
	11	48.6	73.1	573	861	519	780	471	708	428	643	345	519
	12	40.9	61.4	563	846	510	766	462	695	420	632	332	499
	13	34.8	52.3	552	830	500	751	454	682	412	620	318	477
	14	30.0	45.1	541	813	490	736	444	668	404	607	303	456
	15	26.1	39.3	529	795	479	720	434	653	395	593	288	433
	16	23.0	34.5	517	777	468	703	424	637	385	579	273	411
	17	20.4	30.6	504	757	456	685	413	621	375	564	258	388
	18	18.2	27.3	490	737	444	667	402	604	365	549	243	365
	19			477	717	431	648	391	587	355	533	228	342
	20			463	695	418	629	379	569	344	517	213	320
	22			434	652	392	589	355	533	322	484	184	276
	24			404	608	365	549	330	497	300	451	157	236
	26			375	563	338	508	306	459	277	417	134	201
	28			345	518	311	468	281	422	255	383	115	173
	30			315	474	285	428	257	386	233	350	100	151
	32			287	431	259	389	233	350	211	317	88.3	133
	34			259	390	234	351	210	316	190	286	78.2	118
	36			233	350	210	315	189	284	171	257	69.7	105
	38			209	314	188	283	169	254	153	230	62.6	94.1
	40			189	284	170	256	153	230	138	208	56.5	84.9
Properties													
P_{wo}, kips		8.63	12.9	55.5	83.2	45.2	67.7	37.8	56.7	31.2	46.9	43.6	65.4
P_{wi}, kips/in.		5.00	7.50	11.8	17.7	10.5	15.8	9.70	14.6	8.80	13.2	10.2	15.3
P_{wb}, kips		13.7	20.6	214	322	152	228	119	179	89	134	139	209
P_{fb}, kips		13.4	20.1	99.2	149	83.0	125	68.3	103	56.6	85.1	82.1	123
A_g, in.^{2}		7.55		35.0		31.7		28.8		26.2		23.7	
I_x, in.^{4}		294		1360		1230		1100		987		870	
I_y, in.^{4}		9.59		495		447		402		362		148	
r_y, in.		1.13		3.76		3.75		3.73		3.72		2.50	
r_x/r_y		5.52		1.66		1.66		1.65		1.65		2.42	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		8120		37600		34000		30400		27300		24000	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		265		13700		12400		11100		10000		4090	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W14

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W14×											
lb/ft		74		68		61		53		48		43 [c1]	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	386	581	354	532	316	475	275	413	248	373	216	325
	6	363	545	332	499	297	446	248	372	223	336	197	296
	7	355	533	325	488	290	436	239	359	215	323	190	286
	8	345	519	316	475	282	424	229	344	206	309	183	275
	9	335	504	307	461	274	412	218	327	196	294	174	261
	10	324	487	297	446	265	398	206	310	185	279	164	247
	11	313	470	286	430	255	383	194	292	174	262	154	232
	12	300	451	275	413	245	368	182	273	163	245	144	217
	13	287	432	263	395	234	352	169	254	152	228	134	201
	14	274	412	251	377	223	336	156	235	140	211	123	186
	15	261	392	238	358	212	319	144	216	129	194	113	170
	16	247	371	225	339	201	302	132	198	118	177	103	155
	17	233	350	213	320	189	284	120	180	107	161	93.7	141
	18	219	330	200	301	178	267	108	163	96.6	145	84.4	127
	19	206	309	187	282	167	250	97.3	146	86.9	131	75.8	114
	20	192	289	175	263	155	234	87.8	132	78.4	118	68.5	103
	22	166	249	151	227	134	201	72.6	109	64.8	97.4	56.6	85.0
	24	141	212	128	193	114	171	61.0	91.7	54.5	81.8	47.5	71.4
	26	120	181	109	164	96.9	146	52.0	78.1	46.4	69.7	40.5	60.9
	28	104	156	94.3	142	83.6	126	44.8	67.4	40.0	60.1	34.9	52.5
	30	90.4	136	82.1	123	72.8	109	39.0	58.7	34.9	52.4	30.4	45.7
	32	79.4	119	72.2	109	64.0	96.2	34.3	51.6	30.6	46.0		
	34	70.4	106	64.0	96.1	56.7	85.2						
	36	62.8	94.3	57.0	85.7	50.6	76.0						
	38	56.3	84.7	51.2	77.0	45.4	68.2						
	40	50.8	76.4	46.2	69.5	41.0	61.5						
Properties													
P_{wo}, kips		35.3	53.0	29.9	44.8	24.2	36.3	24.4	36.6	20.2	30.3	16.2	24.2
P_{wi}, kips/in.		9.00	13.5	8.30	12.5	7.50	11.3	7.40	11.1	6.80	10.2	6.10	9.15
P_{wb}, kips		95.0	143	75.0	113	55.1	82.8	53.0	79.7	41.1	61.7	29.6	44.4
P_{fb}, kips		69.2	104	58.2	87.5	46.7	70.2	48.9	73.5	39.7	59.7	31.5	47.4
A_g, in.^{2}		21.5		19.7		17.6		15.3		13.8		12.3	
I_x, in.^{4}		784		711		628		530		473		416	
I_y, in.^{4}		134		121		107		57.6		51.4		45.2	
r_y, in.		2.49		2.48		2.47		1.94		1.93		1.91	
r_x/r_y		2.43		2.42		2.42		3.03		3.03		3.04	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		21700		19600		17400		14600		13100		11500	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		3700		3340		2960		1590		1420		1250	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W14-W12

Shape		W14×										W12×	
lb/ft		38 [c1]		34 [c1]		30 [c1]		26 [c1]		22 [c1]		106	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	191	288	167	251	145	218	122	184	98.6	148	555	834
	6	167	251	146	219	126	189	94.3	142	75.5	114	533	802
	7	159	239	139	209	120	180	85.3	128	68.1	102	526	790
	8	149	223	131	197	113	169	75.5	113	60.0	90.2	517	777
	9	138	207	122	184	105	158	64.8	97.4	51.5	77.4	508	763
	10	127	190	112	169	96.6	145	54.5	81.9	42.8	64.3	497	747
	11	115	173	102	153	87.4	131	45.2	68.0	35.4	53.1	486	730
	12	104	156	91.7	138	78.2	118	38.0	57.1	29.7	44.7	473	711
	13	93.1	140	81.8	123	69.3	104	32.4	48.7	25.3	38.1	460	692
	14	82.6	124	72.3	109	60.9	91.5	27.9	42.0	21.8	32.8	447	672
	15	72.6	109	63.4	95.3	53.1	79.9	24.3	36.6	19.0	28.6	433	650
	16	63.8	95.9	55.7	83.8	46.7	70.2	21.4	32.1	16.7	25.1	418	629
	17	56.5	85.0	49.4	74.2	41.4	62.2	18.9	28.5	14.8	22.3	403	606
	18	50.4	75.8	44.0	66.2	36.9	55.5	16.9	25.4			388	583
	19	45.2	68.0	39.5	59.4	33.1	49.8					372	560
	20	40.8	61.4	35.7	53.6	29.9	44.9					357	536
	22	33.7	50.7	29.5	44.3	24.7	37.1					325	488
	24	28.4	42.6	24.8	37.2	20.8	31.2					294	441
	26	24.2	36.3									263	395
	28											233	351
	30											205	308
	32											180	271
	34											160	240
	36											143	214
	38											128	192
	40											115	174
Properties													
P_{wo}, kips		16.0	23.9	13.0	19.5	10.4	15.6	10.7	16.1	7.71	11.6	60.4	90.6
P_{wi}, kips/in.		6.20	9.30	5.70	8.55	5.40	8.10	5.10	7.65	4.60	6.90	12.2	18.3
P_{wb}, kips		30.0	45.1	23.3	35.0	19.9	29.9	16.7	25.1	12.3	18.5	274	411
P_{fb}, kips		29.8	44.8	23.2	34.9	16.6	25.0	19.8	29.8	12.6	18.9	110	165
A_g, in.^{2}		11.0		9.86		8.71		7.55		6.36		30.9	
I_x, in.^{4}		380		334		285		240		193		925	
I_y, in.^{4}		26.7		23.3		19.6		8.90		6.99		301	
r_y, in.		1.56		1.54		1.50		1.09		1.05		3.13	
r_x/r_y		3.76		3.78		3.81		5.17		5.25		1.75	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		10500		9230		7880		6630		5330		25600	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		738		644		542		246		193		8320	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W12

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W12×											
lb/ft		96		87		79		72		65		58	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	501	753	454	683	411	618	374	562	338	508	300	451
	6	481	724	436	656	394	593	358	538	323	486	282	424
	7	474	713	430	646	389	584	353	530	318	479	276	415
	8	467	701	423	635	382	574	347	522	313	471	269	405
	9	458	688	415	623	375	563	340	511	307	462	262	393
	10	448	673	406	610	367	551	333	500	301	452	253	381
	11	438	658	396	595	358	538	325	488	293	441	244	367
	12	427	641	386	580	349	524	316	475	286	429	235	353
	13	415	623	375	564	339	509	307	462	277	417	225	339
	14	402	605	364	547	328	494	298	448	269	404	215	324
	15	390	585	352	529	318	477	288	433	260	391	205	308
	16	376	565	340	511	306	461	278	418	251	377	194	292
	17	363	545	327	492	295	444	267	402	241	363	184	276
	18	349	524	315	473	283	426	257	386	232	348	173	261
	19	334	503	302	453	272	408	246	370	222	333	163	245
	20	320	481	289	434	260	390	235	354	212	319	152	229
	22	291	438	262	394	236	354	213	321	192	289	132	199
	24	263	395	236	355	212	319	192	288	173	260	113	170
	26	235	353	211	317	189	284	171	257	154	231	96.5	145
	28	208	313	187	281	167	251	151	227	136	204	83.2	125
	30	183	275	164	246	146	220	132	198	119	178	72.5	109
	32	161	242	144	216	129	193	116	174	104	157	63.7	95.7
	34	142	214	128	192	114	171	103	155	92.3	139	56.4	84.8
	36	127	191	114	171	102	153	91.7	138	82.3	124	50.3	75.6
	38	114	171	102	153	91.2	137	82.3	124	73.9	111	45.2	67.9
	40	103	155	92.1	138	82.3	124	74.3	112	66.7	100	40.8	61.3
Properties													
P_{wo}, kips		49.5	74.3	41.7	62.6	34.5	51.8	28.8	43.2	23.6	35.4	23.0	34.6
P_{wi}, kips/in.		11.0	16.5	10.3	15.5	9.40	14.1	8.60	12.9	7.80	11.7	7.20	10.8
P_{wb}, kips		201	302	165	249	125	188	95.5	144	71.7	108	56.3	84.6
P_{fb}, kips		90.9	137	73.7	111	60.7	91.2	50.4	75.8	41.1	61.8	46.0	69.1
A_g, in.^{2}		27.9		25.3		22.9		20.8		18.8		16.7	
I_x, in.^{4}		824		731		654		588		524		467	
I_y, in.^{4}		270		241		216		195		174		107	
r_y, in.		3.11		3.09		3.07		3.06		3.05		2.53	
r_x/r_y		1.75		1.74		1.74		1.74		1.73		2.09	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		22800		20200		18100		16200		14500		12900	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		7460		6660		5970		5390		4810		2960	
ASD	LRFD	[c1] Shape is slender for compression with F_y = 30 ksi.											
Ω_c = 1.67	ϕ_c = 0.90	Note: Heavy line indicates KL/r_y equal to or greater than 200.											

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W12

Shape		W12×											
lb/ft		53		50		45		40		35 [c1]		30 [c1]	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	275	413	259	389	232	348	207	311	185	277	150	226
	6	258	388	234	352	210	315	187	281	157	236	131	196
	7	252	379	226	340	202	304	180	271	148	222	124	186
	8	246	370	217	326	194	291	173	260	138	208	116	175
	9	239	359	207	311	185	278	165	248	128	192	108	162
	10	231	347	196	295	175	263	156	235	117	176	98.6	148
	11	223	335	185	278	165	248	147	221	106	160	89.5	134
	12	214	322	174	261	155	233	138	208	95.8	144	80.4	121
	13	205	308	162	244	145	217	129	194	85.5	128	71.6	108
	14	196	294	150	226	134	202	120	180	75.6	114	63.2	95.0
	15	186	280	139	209	124	186	110	166	66.2	99.6	55.4	83.2
	16	176	265	127	192	113	170	101	152	58.2	87.5	48.7	73.1
	17	167	250	116	175	103	155	92.2	139	51.6	77.5	43.1	64.8
	18	157	236	106	159	93.8	141	83.6	126	46.0	69.1	38.4	57.8
	19	147	221	95.4	143	84.6	127	75.4	113	41.3	62.1	34.5	51.9
	20	137	206	86.1	129	76.4	115	68.1	102	37.3	56.0	31.1	46.8
	22	119	178	71.2	107	63.1	94.9	56.3	84.6	30.8	46.3	25.7	38.7
	24	101	152	59.8	89.9	53.0	79.7	47.3	71.1	25.9	38.9	21.6	32.5
	26	86.3	130	51.0	76.6	45.2	67.9	40.3	60.6				
	28	74.4	112	43.9	66.0	39.0	58.6	34.7	52.2				
	30	64.8	97.4	38.3	57.5	33.9	51.0	30.3	45.5				
	32	57.0	85.6	33.6	50.6	29.8	44.8	26.6	40.0				
	34	50.5	75.9										
	36	45.0	67.7										
	38	40.4	60.7										
	40	36.5	54.8										
Properties													
P_{wo}, kips		19.8	29.8	23.7	35.5	19.3	28.9	15.2	22.8	15.6	23.4	11.4	17.2
P_{wi}, kips/in.		6.90	10.4	7.40	11.1	6.70	10.1	5.90	8.85	6.00	9.00	5.20	7.80
P_{wb}, kips		49.4	74.2	61.1	91.8	45.2	68.0	31.1	46.8	31.0	46.6	20.3	30.5
P_{fb}, kips		37.1	55.8	46.0	69.1	37.1	55.8	29.8	44.8	30.4	45.6	21.7	32.7
A_g, in.^{2}		15.3		14.4		12.9		11.5		10.3		8.72	
I_x, in.^{4}		417		385		342		303		283		236	
I_y, in.^{4}		95.7		56.3		49.9		44.8		24.5		20.3	
r_y, in.		2.50		1.98		1.97		1.97		1.54		1.53	
r_x/r_y		2.09		2.62		2.61		2.60		3.41		3.40	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		11500		10600		9450		8370		7820		6520	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		2640		1560		1380		1240		677		561	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W12-W10

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W12×										W10×	
lb/ft		26 [c1]		22 [c1]		19 [c1]		16 [c1]		14 [c1]		88	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	126	190	109	164	89.4	134	72.6	109	61.0	91.8	462	694
	6	110	165	67.3	101	55.9	84.0	43.8	65.9	36.8	55.3	437	656
	7	104	156	55.4	83.3	45.5	68.3	34.7	52.2	29.2	43.9	428	643
	8	97.9	147	44.3	66.6	35.9	53.9	26.8	40.4	22.5	33.8	418	628
	9	91.2	137	35.1	52.7	28.3	42.6	21.2	31.9	17.8	26.7	407	612
	10	84.1	126	28.4	42.7	23.0	34.5	17.2	25.8	14.4	21.6	395	594
	11	76.5	115	23.5	35.3	19.0	28.5	14.2	21.3	11.9	17.9	383	575
	12	68.6	103	19.7	29.6	15.9	24.0	11.9	17.9	10.0	15.0	369	555
	13	60.9	91.6	16.8	25.3	13.6	20.4					355	534
	14	53.6	80.5	14.5	21.8							340	512
	15	46.8	70.4									325	489
	16	41.1	61.8									310	466
	17	36.4	54.8									295	443
	18	32.5	48.9									279	419
	19	29.2	43.9									263	396
	20	26.3	39.6									248	373
	22	21.8	32.7									218	327
	24	18.3	27.5									189	283
	26											162	243
	28											139	210
	30											121	183
	32											107	160
	34											94.5	142
	36											84.3	127
	38											75.7	114
	40											68.3	103
Properties													
P_{wo}, kips		8.74	13.1	11.1	16.6	8.23	12.3	5.83	8.75	4.50	6.75	59.9	89.8
P_{wi}, kips/in.		4.60	6.90	5.20	7.80	4.70	7.05	4.40	6.60	4.00	6.00	12.1	18.2
P_{wb}, kips		14.0	21.1	20.2	30.4	14.9	22.3	12.2	18.4	9.20	13.8	331	497
P_{fb}, kips		16.2	24.4	20.3	30.5	13.8	20.7	7.88	11.9	5.68	8.54	110	165
A_g, in.^{2}		7.57		6.41		5.50		4.64		4.08		25.7	
I_x, in.^{4}		202		154		127		100		86.1		530	
I_y, in.^{4}		17.3		4.65		3.76		2.82		2.35		179	
r_y, in.		1.51		0.852		0.827		0.779		0.760		2.64	
r_x/r_y		3.42		5.75		5.82		5.97		6.04		1.72	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		5580		4260		3510		2760		2380		14600	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		478		129		104		78		65		4950	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W10

Shape		W10×											
lb/ft		77		68		60		54		49		45	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	402	605	356	535	313	470	280	421	255	383	234	351
	6	380	571	336	505	295	443	264	397	240	361	212	319
	7	372	560	329	494	289	434	259	389	235	354	205	308
	8	364	547	321	482	282	423	252	379	229	345	197	296
	9	354	532	312	470	274	412	245	369	223	335	188	283
	10	344	516	303	455	266	399	238	357	216	325	179	269
	11	332	500	293	440	257	386	230	345	209	314	169	255
	12	321	482	282	424	247	372	221	333	201	302	159	239
	13	308	463	271	408	237	357	212	319	193	290	149	224
	14	295	444	260	390	227	341	203	305	184	277	139	209
	15	282	424	248	373	217	326	194	291	176	264	128	193
	16	269	404	236	355	206	310	184	277	167	251	118	178
	17	255	383	224	336	195	293	174	262	158	238	108	163
	18	241	363	212	318	184	277	165	248	149	224	98.8	148
	19	228	342	199	300	174	261	155	233	140	211	89.5	135
	20	214	322	187	282	163	245	145	219	132	198	80.9	122
	22	187	282	164	246	142	214	127	190	115	172	66.9	101
	24	162	244	141	212	122	184	109	164	98.4	148	56.2	84.5
	26	139	209	121	182	105	157	93.0	140	84.0	126	47.9	72.0
	28	120	180	104	157	90.1	135	80.2	121	72.4	109	41.3	62.1
	30	104	157	90.7	136	78.5	118	69.9	105	63.1	94.8	36.0	54.1
	32	91.6	138	79.8	120	69.0	104	61.4	92.3	55.5	83.3	31.6	47.5
	34	81.2	122	70.7	106	61.1	91.9	54.4	81.7	49.1	73.8		
	36	72.4	109	63.0	94.7	54.5	82.0	48.5	72.9	43.8	65.9		
	38	65.0	97.7	56.6	85.0	48.9	73.6	43.5	65.4	39.3	59.1		
	40	58.6	88.1	51.0	76.7	44.2	66.4	39.3	59.1	35.5	53.3		
Properties													
P_{wo}, kips		46.1	69.2	36.2	54.3	28.6	42.8	22.8	34.1	19.0	28.6	21.7	32.6
P_{wi}, kips/in.		10.6	15.9	9.40	14.1	8.40	12.6	7.40	11.1	6.80	10.2	7.00	10.5
P_{wb}, kips		221	333	154	232	110	166	75.2	113	58.4	87.8	63.7	95.8
P_{fb}, kips		85.0	128	66.6	100	51.9	78.0	42.5	63.8	35.2	52.9	43.2	64.9
A_g, in.^{2}		22.4		19.8		17.4		15.6		14.2		13.0	
I_x, in.^{4}		451		390		337		299		268		244	
I_y, in.^{4}		154		133		116		103		93.4		53.3	
r_y, in.		2.62		2.60		2.58		2.57		2.56		2.02	
r_x/r_y		1.71		1.71		1.71		1.70		1.70		2.14	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		12500		10800		9310		8260		7410		6740	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		4260		3680		3210		2850		2580		1470	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W10

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W10×											
lb/ft		39		33		30		26		22 [c1]		19	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	203	305	170	256	157	237	135	203	114	171	99.5	150
	6	184	277	154	231	128	193	110	165	92.4	139	60.1	90.4
	7	178	267	148	223	119	179	102	153	85.3	128	50.1	75.4
	8	171	257	142	214	109	164	93.5	141	77.8	117	40.6	61.1
	9	163	245	136	204	99.3	149	84.7	127	70.1	105	32.3	48.6
	10	155	233	129	193	89.1	134	75.9	114	62.4	93.8	26.2	39.3
	11	146	220	121	182	79.1	119	67.3	101	54.9	82.5	21.6	32.5
	12	137	207	114	171	69.4	104	58.9	88.5	47.7	71.6	18.2	27.3
	13	128	193	106	159	60.2	90.4	51.0	76.6	40.9	61.5	15.5	23.3
	14	119	179	98.1	147	51.9	78.1	44.0	66.1	35.3	53.1	13.4	20.1
	15	110	166	90.4	136	45.2	68.0	38.3	57.6	30.8	46.2		
	16	101	152	82.8	124	39.8	59.8	33.7	50.6	27.0	40.6		
	17	92.8	139	75.4	113	35.2	52.9	29.8	44.9	23.9	36.0		
	18	84.4	127	68.4	103	31.4	47.2	26.6	40.0	21.4	32.1		
	19	76.3	115	61.6	92.6	28.2	42.4	23.9	35.9	19.2	28.8		
	20	69.0	104	55.6	83.6	25.4	38.3	21.6	32.4	17.3	26.0		
	22	57.0	85.6	46.0	69.1	21.0	31.6	17.8	26.8	14.3	21.5		
	24	47.9	72.0	38.6	58.0								
	26	40.8	61.3	32.9	49.5								
	28	35.2	52.9	28.4	42.6								
	30	30.6	46.1	24.7	37.2								
	32	26.9	40.5	21.7	32.7								
	34												
	36												
	38												
	40												
Properties													
P_{wo}, kips		16.7	25.0	12.6	18.9	15.3	23.0	11.4	17.2	8.64	13.0	9.88	14.8
P_{wi}, kips/in.		6.30	9.45	5.80	8.70	6.00	9.00	5.20	7.80	4.80	7.20	5.00	7.50
P_{wb}, kips		46.5	69.8	36.3	54.5	37.5	56.4	24.6	36.9	19.2	28.9	21.9	32.9
P_{fb}, kips		31.5	47.4	21.2	31.9	29.2	43.9	21.7	32.7	14.6	21.9	17.5	26.3
A_g, in.^{2}		11.3		9.49		8.76		7.53		6.41		5.54	
I_x, in.^{4}		205		166		168		143		117		94.6	
I_y, in.^{4}		45.0		36.6		16.7		14.1		11.4		4.29	
r_y, in.		2.00		1.96		1.38		1.37		1.33		0.880	
r_x/r_y		2.14		2.14		3.17		3.18		3.20		4.69	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		5670		4590		4640		3950		3230		2610	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		1240		1010		462		390		315		119	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W10-W8

Shape		W10×						W8×					
lb/ft		17 [c1]		15 [c1]		12 [c1]		67		58		48	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	86.9	131	75.2	113	55.5	83.4	350	527	305	459	251	378
	6	51.5	77.4	43.4	65.2	33.5	50.3	321	483	280	420	230	346
	7	42.4	63.7	35.1	52.8	26.8	40.2	312	468	271	407	223	335
	8	33.9	50.9	27.6	41.4	20.8	31.3	301	452	261	392	215	323
	9	26.8	40.3	21.8	32.7	16.4	24.7	289	434	250	376	206	309
	10	21.7	32.6	17.6	26.5	13.3	20.0	276	415	239	359	196	295
	11	17.9	27.0	14.6	21.9	11.0	16.5	262	394	227	341	186	280
	12	15.1	22.6	12.2	18.4	9.24	13.9	248	373	214	322	176	264
	13	12.8	19.3	10.4	15.7	7.88	11.8	234	352	202	303	165	249
	14	11.1	16.6					219	330	189	284	155	232
	15							205	308	176	264	144	216
	16							190	286	163	245	133	200
	17							176	264	150	226	123	185
	18							162	243	138	207	113	169
	19							148	222	126	189	103	154
	20							135	203	114	172	93.2	140
	22							112	168	94.5	142	77.1	116
	24							93.7	141	79.4	119	64.8	97.4
	26							79.9	120	67.7	102	55.2	83.0
	28							68.9	103	58.4	87.7	47.6	71.5
	30							60.0	90.2	50.8	76.4	41.5	62.3
	32							52.7	79.2	44.7	67.1	36.4	54.8
	34							46.7	70.2	39.6	59.5	32.3	48.5
	36												
	38												
	40												
Properties													
P_{wo}, kips		7.92	11.9	6.21	9.32	3.99	5.99	53.3	79.9	41.3	62.0	27.4	41.1
P_{wi}, kips/in.		4.80	7.20	4.60	6.90	3.80	5.70	11.4	17.1	10.2	15.3	8.00	12.0
P_{wb}, kips		19.3	29.0	17.0	25.5	9.56	14.4	342	514	245	368	118	178
P_{fb}, kips		12.2	18.4	8.18	12.3	4.95	7.44	98.2	148	73.7	111	52.7	79.2
A_g, in.^{2}		4.91		4.33		3.46		19.5		17.0		14.0	
I_x, in.^{4}		80.2		67.2		52.2		270		226		182	
I_y, in.^{4}		3.56		2.89		2.18		88.6		75.1		60.9	
r_y, in.		0.851		0.817		0.794		2.13		2.10		2.09	
r_x/r_y		4.75		4.82		4.89		1.75		1.74		1.73	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		2220		1860		1440		7460		6250		5030	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		98.4		79.9		60.2		2450		2080		1680	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W8

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W8×											
lb/ft		40		35		31		28		24		21	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	208	313	183	275	161	243	146	219	125	187	109	164
	6	190	286	167	251	147	221	126	189	107	161	85.9	129
	7	184	276	161	243	142	213	119	179	102	153	78.7	118
	8	177	266	155	234	136	205	112	169	95.7	144	71.2	107
	9	169	255	149	223	131	196	105	157	89.2	134	63.5	95.4
	10	161	243	142	213	124	187	96.9	146	82.5	124	55.9	84.0
	11	153	230	134	202	117	177	88.9	134	75.6	114	48.5	72.9
	12	144	217	126	190	111	166	81.0	122	68.8	103	41.6	62.5
	13	135	203	119	178	104	156	73.1	110	62.0	93.3	35.5	53.3
	14	126	190	111	166	96.5	145	65.5	98.5	55.5	83.4	30.6	46.0
	15	117	176	103	154	89.4	134	58.2	87.5	49.2	74.0	26.6	40.0
	16	108	163	94.7	142	82.4	124	51.4	77.2	43.4	65.3	23.4	35.2
	17	99.6	150	87.0	131	75.5	114	45.5	68.4	38.5	57.8	20.7	31.2
	18	91.1	137	79.5	119	68.9	104	40.6	61.0	34.3	51.6	18.5	27.8
	19	82.9	125	72.2	109	62.5	93.9	36.4	54.7	30.8	46.3	16.6	25.0
	20	75.1	113	65.4	98.3	56.5	84.9	32.9	49.4	27.8	41.8	15.0	22.5
	22	62.1	93.3	54.0	81.2	46.7	70.2	27.2	40.8	23.0	34.5		
	24	52.1	78.4	45.4	68.3	39.2	59.0	22.8	34.3	19.3	29.0		
	26	44.4	66.8	38.7	58.2	33.4	50.3	19.5	29.2	16.4	24.7		
	28	38.3	57.6	33.4	50.1	28.8	43.3						
	30	33.4	50.2	29.1	43.7	25.1	37.8						
	32	29.3	44.1	25.5	38.4	22.1	33.2						
	34	26.0	39.1	22.6	34.0								
	36												
	38												
	40												
Properties													
P_{wo}, kips		20.2	30.2	15.3	23.0	12.4	18.6	13.3	19.9	9.80	14.7	10.0	15.0
P_{wi}, kips/in.		7.20	10.8	6.20	9.30	5.70	8.55	5.70	8.55	4.90	7.35	5.00	7.50
P_{wb}, kips		86.2	130	55.0	82.7	42.8	64.3	42.8	64.3	27.2	40.8	27.5	41.4
P_{fb}, kips		35.2	52.9	27.5	41.3	21.2	31.9	24.3	36.5	18.0	27.0	18.0	27.0
A_g, in.^{2}		11.6		10.2		8.99		8.11		6.94		6.09	
I_x, in.^{4}		145		125		108		96.4		81.1		74.2	
I_y, in.^{4}		49.1		42.6		37.1		21.6		18.3		9.77	
r_y, in.		2.06		2.05		2.03		1.63		1.62		1.27	
r_x/r_y		1.71		1.71		1.71		2.12		2.11		2.75	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		4010		3450		2980		2660		2240		2050	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		1360		1180		1030		597		506		270	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W8-W6

Shape		W8×								W6×			
lb/ft		18		15		13		10 [c1]		25		20	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	93.2	140	78.3	118	67.5	102	49.2	74.0	131	197	105	157
	6	72.3	109	47.5	71.5	39.5	59.3	30.3	45.5	111	166	88.1	132
	7	66.0	99.2	39.7	59.7	32.5	48.9	24.9	37.5	104	157	82.8	124
	8	59.4	89.3	32.2	48.5	26.0	39.1	19.9	29.9	97.2	146	77.1	116
	9	52.7	79.2	25.7	38.6	20.6	30.9	15.8	23.7	89.9	135	71.1	107
	10	46.1	69.3	20.8	31.2	16.7	25.0	12.8	19.2	82.3	124	65.0	97.7
	11	39.7	59.7	17.2	25.8	13.8	20.7	10.6	15.9	74.7	112	58.8	88.4
	12	33.8	50.8	14.4	21.7	11.6	17.4	8.87	13.3	67.2	101	52.7	79.3
	13	28.8	43.3	12.3	18.5	9.85	14.8	7.56	11.4	59.8	89.9	46.8	70.4
	14	24.8	37.3	10.6	15.9	8.50	12.8	6.52	9.79	52.8	79.3	41.2	61.9
	15	21.6	32.5							46.2	69.5	36.0	54.1
	16	19.0	28.6							40.6	61.1	31.6	47.5
	17	16.8	25.3							36.0	54.1	28.0	42.1
	18	15.0	22.6							32.1	48.2	25.0	37.6
	19	13.5	20.3							28.8	43.3	22.4	33.7
	20	12.2	18.3							26.0	39.1	20.2	30.4
	22									21.5	32.3	16.7	25.1
	24									18.1	27.1	14.1	21.1
	26												
	28												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
P_{wo}, kips		7.59	11.4	7.72	11.6	5.87	8.80	3.49	5.23	14.6	21.8	9.49	14.2
P_{wi}, kips/in.		4.60	6.90	4.90	7.35	4.60	6.90	3.40	5.10	6.40	9.60	5.20	7.80
P_{wb}, kips		21.4	32.2	25.9	38.9	21.4	32.2	8.65	13.0	78.9	119	42.3	63.6
P_{fb}, kips		12.2	18.4	11.1	16.7	7.30	11.0	4.72	7.09	23.2	34.9	15.0	22.5
A_g, in.^{2}		5.19		4.36		3.76		2.89		7.28		5.82	
I_x, in.^{4}		60.9		47.0		38.5		29.8		53.0		41.0	
I_y, in.^{4}		7.97		3.41		2.73		2.09		17.1		13.3	
r_y, in.		1.24		0.884		0.852		0.851		1.53		1.51	
r_x/r_y		2.77		3.71		3.76		3.77		1.76		1.75	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		1680		1300		1060		824		1460		1130	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		220		94.2		75.4		57.8		473		368	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

W6-W5

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

F_y = 30 ksi

Shape		W6×								W5×			
lb/ft		16		15		12		9		19		18.9	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	84.3	127	78.5	118	62.9	94.5	47.1	70.7	98.4	148	98.4	148
	6	55.8	83.8	65.4	98.3	39.9	59.9	29.5	44.3	77.9	117	77.0	116
	7	48.0	72.2	61.2	92.0	33.8	50.8	24.9	37.5	71.6	108	70.5	106
	8	40.4	60.8	56.7	85.2	28.0	42.0	20.5	30.8	64.9	97.5	63.6	95.6
	9	33.3	50.0	52.0	78.2	22.6	33.9	16.5	24.8	58.1	87.3	56.6	85.1
	10	27.0	40.6	47.2	71.0	18.3	27.5	13.4	20.1	51.3	77.2	49.7	74.8
	11	22.3	33.6	42.4	63.8	15.1	22.7	11.0	16.6	44.8	67.3	43.1	64.8
	12	18.8	28.2	37.8	56.7	12.7	19.1	9.27	13.9	38.5	57.9	36.8	55.4
	13	16.0	24.0	33.3	50.0	10.8	16.3	7.90	11.9	32.9	49.5	31.4	47.2
	14	13.8	20.7	29.0	43.6	9.32	14.0	6.81	10.2	28.4	42.7	27.1	40.7
	15	12.0	18.1	25.3	38.0	8.12	12.2	5.94	8.92	24.7	37.2	23.6	35.5
	16	10.6	15.9	22.2	33.4					21.7	32.7	20.7	31.2
	17			19.7	29.6					19.3	28.9	18.4	27.6
	18			17.5	26.4					17.2	25.8	16.4	24.6
	19			15.7	23.7					15.4	23.2	14.7	22.1
	20			14.2	21.4					13.9	20.9	13.3	19.9
	22			11.7	17.7								
	24			9.87	14.8								
	26												
	28												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
P_{wo}, kips		10.5	15.8	5.98	8.97	6.44	9.66	3.66	5.48	11.6	17.4	13.1	19.7
P_{wi}, kips/in.		5.20	7.80	4.60	6.90	4.60	6.90	3.40	5.10	5.40	8.10	6.32	9.48
P_{wb}, kips		42.3	63.6	29.3	44.0	29.3	44.0	11.8	17.8	60.4	90.8	99.7	150
P_{fb}, kips		18.4	27.7	7.59	11.4	8.80	13.2	5.19	7.80	20.8	31.2	19.4	29.2
A_g, in.^{2}		4.69		4.37		3.50		2.62		5.48		5.48	
I_x, in.^{4}		31.8		28.7		21.7		16.0		25.9		23.8	
I_y, in.^{4}		4.43		9.32		2.99		2.19		9.13		8.69	
r_y, in.		0.972		1.46		0.925		0.914		1.29		1.26	
r_x/r_y		2.67		1.75		2.69		2.70		1.68		1.66	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		879		793		600		442		716		658	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		122		258		82.6		60.5		252		240	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-1 (continued)
Available Strength in Axial Compression, kips
W-Shapes (Welded)

W5-W4

Shape		W5×		W4×	
lb/ft		16		13	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	83.2	125	67.7	102
	6	65.3	98.2	46.2	69.4
	7	59.8	89.9	40.2	60.5
	8	54.1	81.3	34.3	51.6
	9	48.3	72.5	28.6	43.1
	10	42.5	63.9	23.5	35.3
	11	36.9	55.5	19.4	29.1
	12	31.6	47.5	16.3	24.5
	13	27.0	40.5	13.9	20.9
	14	23.2	34.9	12.0	18.0
	15	20.3	30.4	10.4	15.7
	16	17.8	26.8	9.17	13.8
	17	15.8	23.7		
	18	14.1	21.1		
	19	12.6	19.0		
	20	11.4	17.1		
	22				
	24				
	26				
	28				
	30				
	32				
	34				
	36				
	38				
	40				
Properties					
P_{wo}, kips		8.64	13.0	9.66	14.5
P_{wi}, kips/in.		4.80	7.20	5.60	8.40
P_{wb}, kips		42.4	63.8	83.3	125
P_{fb}, kips		14.6	21.9	13.4	20.1
A_g, in.^{2}		4.63		3.77	
I_x, in.^{4}		21.1		11.2	
I_y, in.^{4}		7.50		3.85	
r_y, in.		1.27		1.01	
r_x/r_y		1.68		1.70	
$P_{ex}(KL)^2/10^4$, k-in.^{2}		583		310	
$P_{ey}(KL)^2/10^4$, k-in.^{2}		207		106	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS16-HSS14

Table 4-2
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS16×8×								HSS14×10×			
		0.500		0.375 [c1]		0.312 [c1]		0.250 [c1]		0.500		0.375	
t_{design}, in.		0.500		0.375		0.312		0.250		0.500		0.375	
lb/ft		76.9		59.2		49.5		40.2		76.9		59.2	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	399	599	304	456	231	347	164	247	399	599	307	462
	6	385	578	296	445	226	340	161	242	389	585	300	451
	7	380	571	293	440	224	337	160	240	386	580	298	447
	8	374	562	289	434	222	333	159	238	382	574	295	443
	9	368	553	284	427	219	330	157	236	378	568	291	438
	10	361	542	279	419	217	326	155	234	373	560	288	433
	11	353	531	274	411	214	321	154	231	368	552	284	427
	12	345	519	268	402	210	316	151	228	362	544	280	420
	13	337	506	261	393	207	311	149	224	356	535	275	414
	14	328	493	255	383	203	305	147	221	349	525	270	406
	15	318	479	248	372	199	299	144	217	343	515	265	399
	16	309	464	240	361	195	292	142	213	336	504	260	391
	17	299	449	233	350	190	285	139	209	328	493	255	383
	18	288	433	225	338	185	278	136	204	321	482	249	374
	19	278	418	217	327	180	271	133	200	313	470	243	365
	20	267	402	209	315	175	263	130	195	305	458	237	356
	21	256	385	201	302	169	254	126	190	296	445	231	346
	22	246	369	193	290	162	244	123	184	288	433	224	337
	23	235	353	185	278	156	234	119	179	279	420	218	327
	24	224	337	177	266	149	224	115	173	271	407	211	317
	25	213	321	169	253	142	213	111	167	262	393	205	307
	26	203	305	161	241	135	203	107	161	253	380	198	297
	27	192	289	153	229	129	193	103	155	244	367	191	287
	28	182	273	145	218	122	184	98.6	148	235	353	184	277
	29	172	258	137	206	116	174	94.2	142	226	340	178	267
	30	162	243	129	195	109	164	89.6	135	217	327	171	257
	32	143	215	115	173	97.3	146	80.3	121	200	301	158	237
	34	127	191	102	153	86.2	130	71.2	107	183	275	145	218
	36	113	170	90.9	137	76.9	116	63.5	95.5	167	250	132	199
	38	102	153	81.6	123	69.0	104	57.0	85.7	151	227	120	180
	40	91.6	138	73.6	111	62.3	93.6	51.4	77.3	136	205	109	163
Properties													
A_g, in.^{2}		22.2		17.1		14.3		11.6		22.2		17.1	
I_x, in.^{4}		711		565		476		393		600		476	
I_y, in.^{4}		241		193		163		135		357		284	
r_y, in.		3.29		3.36		3.38		3.41		4.01		4.08	
r_x/r_y		1.72		1.71		1.71		1.71		1.30		1.29	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS14

Shape		HSS14×10×				HSS14×8×							
		0.312 [c1]		0.250 [c1]		0.500		0.375		0.312 [c1]		0.250 [c1]	
t_{design}, in.		0.312		0.250		0.500		0.375		0.312		0.250	
lb/ft		49.5		40.2		70.0		54.0		45.2		36.7	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	250	376	181	272	363	545	280	421	227	341	163	245
	6	246	370	178	268	350	526	270	406	221	333	159	239
	7	244	367	177	266	345	519	267	401	219	329	158	237
	8	243	365	176	264	340	511	263	395	217	326	156	235
	9	241	362	175	262	334	502	259	389	214	322	155	233
	10	238	358	173	260	327	492	254	382	211	317	153	230
	11	236	354	171	258	321	482	249	374	208	312	151	227
	12	233	350	170	255	313	471	243	365	203	305	148	223
	13	230	346	168	252	305	459	237	356	198	298	146	220
	14	226	340	166	249	297	446	231	347	193	290	143	216
	15	222	334	164	246	288	433	224	337	188	282	141	211
	16	218	327	161	243	279	419	218	327	182	274	138	207
	17	213	320	159	239	270	405	211	316	176	265	135	202
	18	208	313	156	235	260	391	203	306	170	256	131	197
	19	204	306	154	231	251	377	196	295	164	247	128	192
	20	199	298	151	227	241	362	189	284	158	238	124	187
	21	193	291	148	222	231	347	181	272	152	229	120	181
	22	188	283	145	218	221	332	174	261	146	219	117	175
	23	183	275	142	213	211	317	166	250	140	210	113	169
	24	177	266	138	208	201	302	159	238	133	201	108	163
	25	172	258	135	203	191	287	151	227	127	191	104	156
	26	166	250	132	198	181	273	144	216	121	182	100	150
	27	161	241	128	192	172	258	136	205	115	173	94.6	142
	28	155	233	124	187	162	244	129	194	109	164	89.7	135
	29	149	225	121	181	153	230	122	183	103	155	84.9	128
	30	144	216	117	176	144	217	115	173	97.4	146	80.3	121
	32	133	200	109	163	127	191	102	153	86.4	130	71.3	107
	34	122	183	100	150	113	169	90.2	136	76.6	115	63.2	94.9
	36	111	167	91.5	137	100	151	80.5	121	68.3	103	56.3	84.7
	38	101	152	83.3	125	90.2	136	72.2	109	61.3	92.1	50.6	76.0
	40	91.7	138	75.5	113	81.4	122	65.2	98.0	55.3	83.1	45.6	68.6
Properties													
A_g, in.^{2}		14.3		11.6		20.2		15.6		13.0		10.6	
I_x, in.^{4}		401		331		509		407		343		284	
I_y, in.^{4}		240		198		213		171		145		120	
r_y, in.		4.10		4.13		3.25		3.31		3.34		3.36	
r_x/r_y		1.29		1.29		1.54		1.54		1.54		1.54	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS14-HSS12

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS14×6×								HSS12×10×			
		0.500		0.375		0.312 [c1]		0.250 [c1]		0.500		0.375	
t_{design}, in.		0.500		0.375		0.312		0.250		0.500		0.375	
lb/ft		63.1		48.8		40.8		33.3		70.0		54.0	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	327	491	253	381	206	309	145	218	363	545	280	421
	6	307	461	238	358	197	296	140	210	354	532	273	411
	7	299	450	233	350	194	291	138	207	351	527	271	407
	8	292	438	227	341	190	286	135	204	347	521	268	403
	9	283	425	220	331	185	278	133	200	343	515	265	399
	10	273	411	213	321	179	269	130	196	338	508	262	394
	11	263	396	206	309	173	260	127	191	333	501	258	388
	12	253	380	198	297	166	250	124	187	328	493	254	382
	13	242	363	189	285	160	240	121	181	322	484	250	376
	14	230	346	181	272	153	229	117	176	316	475	245	369
	15	219	328	172	259	145	218	113	170	310	466	241	362
	16	207	311	163	245	138	207	109	163	303	456	236	354
	17	195	293	154	232	130	196	104	157	296	445	230	346
	18	183	275	145	218	123	185	100	150	289	435	225	338
	19	171	257	136	205	116	174	94.7	142	282	423	219	330
	20	160	240	127	191	108	163	89.4	134	274	412	214	321
	21	148	223	119	178	101	152	83.6	126	266	400	208	312
	22	137	207	110	166	94.0	141	77.9	117	258	388	202	303
	23	127	191	102	153	87.2	131	72.3	109	250	376	196	294
	24	117	175	94.1	141	80.6	121	67.0	101	242	364	190	285
	25	108	162	86.7	130	74.3	112	61.8	92.9	234	352	184	276
	26	99.4	149	80.2	121	68.7	103	57.2	85.9	226	339	177	266
	27	92.2	139	74.4	112	63.7	95.8	53.0	79.7	218	327	171	257
	28	85.7	129	69.1	104	59.3	89.1	49.3	74.1	209	315	165	248
	29	79.9	120	64.5	96.9	55.2	83.0	46.0	69.1	201	302	159	238
	30	74.7	112	60.2	90.5	51.6	77.6	42.9	64.5	193	290	152	229
	32	65.6	98.6	52.9	79.6	45.4	68.2	37.7	56.7	177	266	140	211
	34	58.1	87.4	46.9	70.5	40.2	60.4	33.4	50.3	161	242	128	193
	36	51.9	77.9	41.8	62.9	35.8	53.9	29.8	44.8	146	220	117	175
	38	46.5	70.0	37.5	56.4	32.2	48.4	26.8	40.2	132	198	105	158
	40	42.0	63.1	33.9	50.9	29.0	43.6	24.2	36.3	119	179	95.2	143
Properties													
A_g, in.^{2}		18.2		14.1		11.8		9.59		20.2		15.6	
I_x, in.^{4}		417		337		284		237		413		330	
I_y, in.^{4}		110		89.1		76.0		63.4		312		249	
r_y, in.		2.46		2.51		2.54		2.57		3.93		4.00	
r_x/r_y		1.95		1.95		1.93		1.93		1.15		1.15	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS12

Shape		HSS12×10×				HSS12×8×							
		0.312		0.250 [c1]		0.500		0.375		0.312		0.250 [c1]	
t_{design}, in.		0.312		0.250		0.500		0.375		0.312		0.250	
lb/ft		45.2		36.7		63.1		48.8		40.8		33.3	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	234	351	179	269	327	491	253	381	212	319	161	241
	6	228	343	176	264	315	473	244	367	204	307	157	235
	7	226	340	174	262	310	466	241	362	202	303	155	233
	8	224	336	173	260	305	459	237	357	199	299	153	231
	9	221	333	172	258	300	451	233	350	195	294	151	228
	10	218	328	170	256	294	442	229	344	192	288	149	225
	11	215	324	168	253	287	432	224	336	188	282	147	221
	12	212	319	166	250	280	422	219	328	183	276	145	217
	13	209	314	164	247	273	410	213	320	179	269	142	213
	14	205	308	162	243	265	399	207	311	174	262	139	209
	15	201	302	160	240	257	387	201	302	169	254	136	204
	16	197	296	157	236	249	374	195	293	164	246	133	199
	17	193	289	154	232	240	361	188	283	158	238	129	194
	18	188	283	151	228	232	348	182	273	153	230	125	188
	19	184	276	148	223	223	335	175	263	147	221	121	181
	20	179	269	145	218	214	321	168	253	142	213	116	174
	21	174	262	142	213	204	307	161	242	136	204	111	167
	22	169	254	138	208	195	294	154	232	130	196	107	160
	23	164	247	134	202	186	280	147	221	124	187	102	153
	24	159	239	130	196	177	266	140	211	119	178	97.5	146
	25	154	231	126	189	168	253	133	201	113	170	92.8	140
	26	149	224	122	183	159	239	127	190	107	161	88.3	133
	27	144	216	118	177	150	226	120	180	102	153	83.8	126
	28	138	208	113	171	142	213	113	170	96.2	145	79.3	119
	29	133	200	109	164	134	201	107	161	90.9	137	75.0	113
	30	128	193	105	158	125	188	101	151	85.6	129	70.7	106
	32	118	177	96.8	146	110	166	88.7	133	75.6	114	62.6	94.1
	34	108	162	88.7	133	97.8	147	78.6	118	67.0	101	55.5	83.4
	36	98.4	148	80.9	122	87.2	131	70.1	105	59.8	89.8	49.5	74.4
	38	89.1	134	73.4	110	78.3	118	62.9	94.6	53.6	80.6	44.4	66.7
	40	80.5	121	66.3	100	70.6	106	56.8	85.4	48.4	72.8	40.1	60.2
Properties													
A_g, in.^{2}		13.0		10.6		18.2		14.1		11.8		9.59	
I_x, in.^{4}		278		230		347		279		236		196	
I_y, in.^{4}		211		174		185		149		127		105	
r_y, in.		4.03		4.05		3.19		3.25		3.28		3.31	
r_x/r_y		1.15		1.15		1.37		1.37		1.36		1.37	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS12

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS12×6×								HSS12×4×			
		0.500		0.375		0.312		0.250 [c1]		0.500		0.375	
t_{design}, in.		0.500		0.375		0.312		0.250		0.500		0.375	
lb/ft		56.1		43.6		36.5		29.8		49.2		38.4	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	291	437	226	340	189	284	143	214	255	383	199	300
	6	272	409	212	319	177	266	137	206	219	329	173	260
	7	266	399	208	312	173	261	135	202	207	312	164	247
	8	258	388	202	304	169	254	132	199	195	292	155	233
	9	250	376	196	295	164	247	129	195	181	272	145	218
	10	241	363	190	285	159	239	126	190	167	251	135	202
	11	232	349	183	275	153	230	123	185	153	230	124	186
	12	222	334	176	264	147	221	119	180	139	208	113	170
	13	212	319	168	253	141	212	116	174	125	187	103	154
	14	202	303	160	241	135	202	111	166	111	167	92.3	139
	15	191	287	152	229	128	193	105	158	98.4	148	82.3	124
	16	181	271	144	217	121	183	100	150	86.6	130	72.9	110
	17	170	255	136	204	115	172	94.6	142	76.8	115	64.6	97.1
	18	159	239	128	192	108	162	89.2	134	68.5	103	57.6	86.6
	19	148	223	120	180	101	152	83.8	126	61.4	92.4	51.7	77.7
	20	138	207	112	168	94.8	142	78.4	118	55.5	83.3	46.7	70.1
	21	128	192	104	156	88.3	133	73.1	110	50.3	75.6	42.3	63.6
	22	118	177	96.5	145	82.0	123	68.0	102	45.8	68.9	38.6	58.0
	23	108	163	89.1	134	75.9	114	63.0	94.7	41.9	63.0	35.3	53.0
	24	99.7	150	82.1	123	70.0	105	58.2	87.5	38.5	57.9	32.4	48.7
	25	91.9	138	75.7	114	64.6	97.1	53.7	80.7	35.5	53.3	29.9	44.9
	26	84.9	128	70.0	105	59.7	89.7	49.6	74.6	32.8	49.3	27.6	41.5
	27	78.8	118	64.9	97.5	55.4	83.2	46.0	69.2			25.6	38.5
	28	73.2	110	60.3	90.7	51.5	77.4	42.8	64.3				
	29	68.3	103	56.2	84.5	48.0	72.1	39.9	60.0				
	30	63.8	95.9	52.5	79.0	44.9	67.4	37.3	56.0				
	32	56.1	84.3	46.2	69.4	39.4	59.2	32.8	49.2				
	34	49.7	74.6	40.9	61.5	34.9	52.5	29.0	43.6				
	36	44.3	66.6	36.5	54.8	31.1	46.8	25.9	38.9				
	38	39.8	59.8	32.7	49.2	28.0	42.0	23.2	34.9				
	40	35.9	53.9	29.6	44.4	25.2	37.9	21.0	31.5				
Properties													
A_g, in.^{2}		16.2		12.6		10.5		8.59		14.2		11.1	
I_x, in.^{4}		281		228		193		161		215		178	
I_y, in.^{4}		94.4		77.2		65.9		55.2		36.2		30.5	
r_y, in.		2.41		2.48		2.51		2.53		1.60		1.66	
r_x/r_y		1.73		1.71		1.71		1.71		2.43		2.41	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS12-HSS10

Shape		HSS12×4×						HSS10×8×					
		0.312		0.250 [c1]		0.180 [c1]		0.500		0.375		0.312	
t_{design}, in.		0.312		0.250		0.180		0.500		0.375		0.312	
lb/ft		32.2		26.3		19.2		56.1		43.6		36.5	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	167	251	125	187	74.0	111	291	437	226	340	189	284
	6	145	218	114	171	69.1	104	280	420	218	327	182	273
	7	138	208	110	166	67.3	101	275	414	215	323	179	269
	8	130	196	106	159	65.2	98.1	271	407	211	318	176	265
	9	122	184	101	152	63.0	94.6	266	399	207	312	173	260
	10	114	171	94.1	141	60.4	90.8	260	391	203	305	170	255
	11	105	157	87.1	131	57.6	86.6	254	382	199	299	166	250
	12	95.9	144	80.0	120	54.6	82.1	248	372	194	291	162	244
	13	87.1	131	72.9	110	51.3	77.2	241	362	189	284	158	237
	14	78.6	118	66.0	99.1	47.8	71.9	234	351	183	275	153	231
	15	70.3	106	59.2	89.0	44.1	66.2	226	340	178	267	149	224
	16	62.4	93.8	52.8	79.4	40.1	60.2	218	328	172	258	144	217
	17	55.3	83.1	46.9	70.4	35.8	53.8	211	316	166	249	139	209
	18	49.3	74.1	41.8	62.8	32.0	48.0	202	304	160	240	134	202
	19	44.3	66.5	37.5	56.4	28.7	43.1	194	292	153	231	129	194
	20	40.0	60.1	33.9	50.9	25.9	38.9	186	279	147	221	124	186
	21	36.2	54.5	30.7	46.2	23.5	35.3	178	267	141	211	119	178
	22	33.0	49.6	28.0	42.1	21.4	32.1	169	254	134	202	113	170
	23	30.2	45.4	25.6	38.5	19.6	29.4	161	242	128	192	108	163
	24	27.7	41.7	23.5	35.3	18.0	27.0	153	229	122	183	103	155
	25	25.6	38.4	21.7	32.6	16.6	24.9	144	217	115	173	97.8	147
	26	23.6	35.5	20.0	30.1	15.3	23.0	136	205	109	164	92.7	139
	27	21.9	33.0	18.6	27.9	14.2	21.3	129	193	103	155	87.6	132
	28	20.4	30.6	17.3	26.0	13.2	19.8	121	182	97.2	146	82.7	124
	29					12.3	18.5	113	170	91.4	137	77.9	117
	30							106	160	85.8	129	73.2	110
	32							93.4	140	75.5	113	64.5	96.9
	34							82.7	124	66.8	100	57.1	85.8
	36							73.8	111	59.6	89.6	50.9	76.6
	38							66.2	99.5	53.5	80.4	45.7	68.7
	40							59.8	89.8	48.3	72.6	41.3	62.0
Properties													
A_g, in.^{2}		9.28		7.59		5.54		16.2		12.6		10.5	
I_x, in.^{4}		151		127		94.5		222		180		152	
I_y, in.^{4}		26.3		22.3		16.9		157		127		108	
r_y, in.		1.68		1.71		1.75		3.11		3.17		3.21	
r_x/r_y		2.40		2.39		2.36		1.19		1.19		1.18	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS10

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS10×8×		HSS10×6×									
		0.250		0.500		0.375		0.312		0.250		0.180 [c1]	
t_{design}, in.		0.250		0.500		0.375		0.312		0.250		0.180	
lb/ft		29.8		49.2		38.4		32.2		26.3		19.2	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	154	232	255	383	199	300	167	251	136	205	85.9	129
	6	149	223	238	357	187	281	156	235	128	192	82.4	124
	7	147	220	232	349	182	274	153	229	125	188	81.2	122
	8	144	217	225	339	177	266	149	223	122	183	79.8	120
	9	142	213	218	328	172	258	144	216	118	178	78.2	118
	10	139	209	210	316	166	249	139	209	114	172	76.4	115
	11	136	205	202	303	160	240	134	201	110	166	74.5	112
	12	133	200	193	290	153	230	129	193	106	159	72.4	109
	13	130	195	184	276	146	220	123	185	101	153	70.2	105
	14	126	189	174	262	139	209	117	176	96.8	145	67.8	102
	15	122	184	165	247	132	198	111	167	92.0	138	65.2	98.0
	16	118	178	155	233	125	187	105	158	87.2	131	62.6	94.0
	17	115	172	145	219	117	176	98.9	149	82.3	124	59.7	89.8
	18	110	166	136	204	110	165	92.9	140	77.4	116	56.8	85.4
	19	106	160	126	190	103	155	86.9	131	72.6	109	53.8	80.8
	20	102	153	117	176	95.7	144	81.0	122	67.8	102	50.3	75.6
	21	97.9	147	108	163	88.8	133	75.2	113	63.1	94.8	46.9	70.5
	22	93.6	141	100	150	82.0	123	69.6	105	58.5	88.0	43.6	65.5
	23	89.4	134	91.2	137	75.5	114	64.2	96.4	54.1	81.3	40.4	60.7
	24	85.2	128	83.8	126	69.4	104	59.0	88.7	49.9	74.9	37.2	56.0
	25	81.0	122	77.2	116	64.0	96.2	54.4	81.7	45.9	69.1	34.3	51.6
	26	76.8	115	71.4	107	59.2	88.9	50.3	75.6	42.5	63.8	31.8	47.7
	27	72.7	109	66.2	100	54.9	82.5	46.6	70.1	39.4	59.2	29.4	44.3
	28	68.7	103	61.6	92.5	51.0	76.7	43.4	65.2	36.6	55.0	27.4	41.2
	29	64.8	97.4	57.4	86.2	47.6	71.5	40.4	60.7	34.1	51.3	25.5	38.4
	30	60.9	91.6	53.6	80.6	44.4	66.8	37.8	56.8	31.9	48.0	23.9	35.9
	32	53.7	80.8	47.1	70.8	39.1	58.7	33.2	49.9	28.0	42.1	21.0	31.5
	34	47.6	71.5	41.7	62.7	34.6	52.0	29.4	44.2	24.8	37.3	18.6	27.9
	36	42.5	63.8	37.2	56.0	30.9	46.4	26.2	39.4	22.2	33.3	16.6	24.9
	38	38.1	57.3	33.4	50.2	27.7	41.6	23.5	35.4	19.9	29.9	14.9	22.3
	40	34.4	51.7			25.0	37.6	21.2	31.9	17.9	27.0	13.4	20.2
Properties													
A_g, in.^{2}		8.59		14.2		11.1		9.28		7.59		5.54	
I_x, in.^{4}		127		176		145		123		103		76.8	
I_y, in.^{4}		90.2		79.3		65.4		55.8		46.9		35.1	
r_y, in.		3.24		2.36		2.43		2.45		2.49		2.52	
r_x/r_y		1.19		1.49		1.49		1.49		1.48		1.48	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS10

Shape		HSS10×4×								HSS10×2×			
		0.500		0.375		0.312		0.250		0.375		0.250	
t_{design}, in.		0.500		0.375		0.312		0.250		0.375		0.250	
lb/ft		42.3		33.2		27.8		22.9		28.0		19.4	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	219	329	172	259	144	217	118	178	145	218	100	151
	6	187	281	149	223	125	188	103	155	75.8	114	57.0	85.7
	7	177	266	141	212	119	179	98.3	148	60.0	90.1	46.5	69.8
	8	165	249	133	199	112	169	92.9	140	46.3	69.5	36.7	55.2
	9	154	231	124	186	105	158	87.1	131	36.6	54.9	29.0	43.6
	10	141	212	114	172	97.4	146	81.0	122	29.6	44.5	23.5	35.3
	11	129	194	105	158	89.6	135	74.8	112	24.5	36.8	19.4	29.2
	12	116	175	95.7	144	81.9	123	68.6	103	20.6	30.9	16.3	24.5
	13	104	157	86.4	130	74.2	112	62.4	93.7			13.9	20.9
	14	92.6	139	77.4	116	66.7	100	56.3	84.6				
	15	81.5	123	68.7	103	59.5	89.5	50.4	75.8				
	16	71.7	108	60.7	91.2	52.7	79.3	44.8	67.4				
	17	63.5	95.4	53.7	80.8	46.7	70.2	39.7	59.7				
	18	56.6	85.1	47.9	72.0	41.7	62.6	35.4	53.3				
	19	50.8	76.4	43.0	64.7	37.4	56.2	31.8	47.8				
	20	45.9	68.9	38.8	58.4	33.8	50.7	28.7	43.2				
	21	41.6	62.5	35.2	52.9	30.6	46.0	26.0	39.1				
	22	37.9	57.0	32.1	48.2	27.9	41.9	23.7	35.7				
	23	34.7	52.1	29.4	44.1	25.5	38.4	21.7	32.6				
	24	31.9	47.9	27.0	40.5	23.4	35.2	19.9	30.0				
	25	29.4	44.1	24.9	37.4	21.6	32.5	18.4	27.6				
	26	27.1	40.8	23.0	34.5	20.0	30.0	17.0	25.5				
	27			21.3	32.0	18.5	27.8	15.8	23.7				
	28							14.6	22.0				
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		12.2		9.58		8.03		6.59		8.08		5.59	
I_x, in.^{4}		131		110		93.6		79.3		75.4		55.5	
I_y, in.^{4}		30.1		25.5		22.1		18.8		4.85		3.85	
r_y, in.		1.57		1.63		1.66		1.69		0.775		0.830	
r_x/r_y		2.09		2.08		2.05		2.05		3.94		3.80	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS10-HSS9

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS10×2×		HSS9×5×						HSS9×3×			
		0.180 [c1]		0.500		0.375		0.250		0.500		0.375	
t_{design}, in.		0.180		0.500		0.375		0.250		0.500		0.375	
lb/ft		14.2		42.3		33.2		22.9		35.3		28.0	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	60.0	90.2	219	329	172	259	118	178	183	275	145	218
	6	42.8	64.3	198	297	156	235	108	162	136	204	111	166
	7	36.0	54.1	191	286	151	227	105	157	122	183	100	151
	8	28.9	43.4	183	274	145	218	101	151	107	162	89.7	135
	9	22.9	34.4	174	262	138	208	96.5	145	93.3	140	78.9	119
	10	18.5	27.9	165	248	132	198	91.9	138	79.6	120	68.4	103
	11	15.3	23.0	155	233	124	187	87.2	131	66.8	100	58.4	87.8
	12	12.9	19.4	145	219	117	176	82.3	124	56.2	84.4	49.3	74.1
	13	11.0	16.5	135	204	109	164	77.2	116	47.9	71.9	42.0	63.1
	14	9.46	14.2	125	188	102	153	72.1	108	41.3	62.0	36.2	54.4
	15			115	173	94.1	141	67.0	101	36.0	54.0	31.6	47.4
	16			106	159	86.6	130	62.0	93.1	31.6	47.5	27.7	41.7
	17			96.2	145	79.3	119	57.0	85.7	28.0	42.1	24.6	36.9
	18			87.1	131	72.2	108	52.2	78.4	25.0	37.5	21.9	32.9
	19			78.4	118	65.4	98.2	47.5	71.4	22.4	33.7	19.7	29.6
	20			70.8	106	59.0	88.7	43.1	64.7			17.7	26.7
	21			64.2	96.5	53.6	80.5	39.1	58.7				
	22			58.5	87.9	48.8	73.3	35.6	53.5				
	23			53.5	80.4	44.6	67.1	32.6	49.0				
	24			49.1	73.9	41.0	61.6	29.9	45.0				
	25			45.3	68.1	37.8	56.8	27.6	41.4				
	26			41.9	62.9	34.9	52.5	25.5	38.3				
	27			38.8	58.4	32.4	48.7	23.6	35.5				
	28			36.1	54.3	30.1	45.3	22.0	33.0				
	29			33.7	50.6	28.1	42.2	20.5	30.8				
	30			31.5	47.3	26.2	39.4	19.1	28.8				
	32			27.6	41.5	23.1	34.7	16.8	25.3				
	34							14.9	22.4				
	36												
	38												
	40												
Properties													
A_g, in.^{2}		4.10		12.2		9.58		6.59		10.2		8.08	
I_x, in.^{4}		42.1		117		97.8		70.3		80.9		69.9	
I_y, in.^{4}		3.04		46.3		38.8		28.2		13.3		11.7	
r_y, in.		0.861		1.95		2.01		2.07		1.14		1.20	
r_x/r_y		3.72		1.59		1.59		1.58		2.47		2.45	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS9-HSS8

Shape		HSS9×3×				HSS8×6×							
		0.250		0.180 [c1]		0.500		0.375		0.312		0.250	
t_{design}, in.		0.250		0.180		0.500		0.375		0.312		0.250	
lb/ft		19.4		14.2		42.3		33.2		27.8		22.9	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	100	151	65.8	98.8	219	329	172	259	144	217	118	178
	6	78.5	118	56.2	84.4	203	306	160	241	135	202	111	166
	7	71.9	108	52.8	79.3	198	298	156	235	131	198	108	163
	8	64.9	97.5	48.6	73.0	192	289	152	228	128	192	105	158
	9	57.8	86.8	43.5	65.3	185	279	147	221	124	186	102	153
	10	50.7	76.3	38.4	57.7	178	268	142	213	119	179	98.4	148
	11	44.0	66.1	33.5	50.3	171	257	136	204	115	172	94.6	142
	12	37.6	56.5	28.8	43.3	163	245	130	195	110	165	90.7	136
	13	32.0	48.2	24.6	37.0	155	232	124	186	105	157	86.6	130
	14	27.6	41.5	21.2	31.9	146	220	118	177	99.5	149	82.4	124
	15	24.1	36.2	18.5	27.8	138	207	111	167	94.1	141	78.1	117
	16	21.2	31.8	16.3	24.4	129	194	105	157	88.8	133	73.7	111
	17	18.7	28.2	14.4	21.7	121	181	98.1	147	83.4	125	69.4	104
	18	16.7	25.1	12.8	19.3	112	169	91.6	138	78.0	117	65.0	97.7
	19	15.0	22.5	11.5	17.3	104	156	85.3	128	72.7	109	60.7	91.2
	20	13.5	20.3	10.4	15.6	95.9	144	79.0	119	67.5	102	56.5	84.9
	21	12.3	18.5	9.44	14.2	88.1	132	73.0	110	62.5	93.9	52.4	78.7
	22					80.7	121	67.1	101	57.6	86.6	48.3	72.7
	23					73.8	111	61.5	92.5	52.9	79.5	44.5	66.9
	24					67.8	102	56.5	85.0	48.6	73.0	40.9	61.5
	25					62.5	93.9	52.1	78.3	44.8	67.3	37.7	56.6
	26					57.8	86.8	48.2	72.4	41.4	62.2	34.8	52.4
	27					53.6	80.5	44.7	67.1	38.4	57.7	32.3	48.6
	28					49.8	74.8	41.5	62.4	35.7	53.7	30.0	45.1
	29					46.4	69.8	38.7	58.2	33.3	50.0	28.0	42.1
	30					43.4	65.2	36.2	54.4	31.1	46.7	26.2	39.3
	32					38.1	57.3	31.8	47.8	27.3	41.1	23.0	34.6
	34					33.8	50.8	28.2	42.3	24.2	36.4	20.4	30.6
	36					30.1	45.3	25.1	37.8	21.6	32.5	18.2	27.3
	38					27.0	40.6	22.5	33.9	19.4	29.1	16.3	24.5
	40											14.7	22.1
Properties													
A_g, in.^{2}		5.59		4.10		12.2		9.58		8.03		6.59	
I_x, in.^{4}		51.1		38.6		101		83.7		71.2		60.1	
I_y, in.^{4}		8.84		6.81		64.1		53.5		45.7		38.6	
r_y, in.		1.26		1.29		2.29		2.36		2.39		2.42	
r_x/r_y		2.40		2.38		1.26		1.25		1.25		1.25	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS8

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS8×6×		HSS8×4×									
		0.180 [c1]		0.500		0.375		0.312		0.250		0.180 [c1]	
t_{design}, in.		0.180		0.500		0.375		0.312		0.250		0.180	
lb/ft		16.7		35.3		28.0		23.5		19.4		14.2	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	84.2	127	183	275	145	218	122	183	100	151	71.3	107
	6	80.1	120	155	233	125	187	105	158	87.0	131	64.1	96.4
	7	78.7	118	146	220	118	177	99.5	150	82.6	124	61.0	91.7
	8	77.0	116	136	205	111	166	93.5	141	77.8	117	57.6	86.6
	9	74.8	112	126	189	103	155	87.2	131	72.7	109	54.0	81.1
	10	72.3	109	115	173	95.1	143	80.6	121	67.4	101	50.2	75.4
	11	69.6	105	105	157	87.0	131	73.9	111	62.0	93.2	46.3	69.6
	12	66.8	100	94.1	141	78.9	119	67.2	101	56.6	85.1	42.4	63.7
	13	63.8	95.9	83.8	126	71.0	107	60.6	91.1	51.3	77.0	38.5	57.9
	14	60.8	91.4	74.0	111	63.3	95.2	54.2	81.5	46.0	69.2	34.7	52.2
	15	57.7	86.7	64.8	97.3	56.0	84.2	48.1	72.3	41.0	61.6	31.0	46.7
	16	54.5	82.0	56.9	85.5	49.3	74.1	42.4	63.7	36.3	54.5	27.6	41.4
	17	51.4	77.2	50.4	75.8	43.7	65.6	37.6	56.5	32.1	48.3	24.4	36.7
	18	48.2	72.5	45.0	67.6	39.0	58.6	33.5	50.4	28.7	43.1	21.8	32.8
	19	45.1	67.8	40.4	60.7	35.0	52.6	30.1	45.2	25.7	38.7	19.6	29.4
	20	42.1	63.2	36.4	54.7	31.6	47.4	27.1	40.8	23.2	34.9	17.7	26.5
	21	39.1	58.7	33.0	49.7	28.6	43.0	24.6	37.0	21.1	31.6	16.0	24.1
	22	36.1	54.3	30.1	45.2	26.1	39.2	22.4	33.7	19.2	28.8	14.6	21.9
	23	33.3	50.1	27.5	41.4	23.9	35.9	20.5	30.8	17.6	26.4	13.3	20.1
	24	30.6	46.1	25.3	38.0	21.9	32.9	18.8	28.3	16.1	24.2	12.3	18.4
	25	28.2	42.5	23.3	35.0	20.2	30.4	17.4	26.1	14.9	22.3	11.3	17.0
	26	26.1	39.3			18.7	28.1	16.1	24.1	13.7	20.6	10.4	15.7
	27	24.2	36.4					14.9	22.4	12.7	19.1	9.69	14.6
	28	22.5	33.8									9.01	13.5
	29	21.0	31.6										
	30	19.6	29.5										
	32	17.2	25.9										
	34	15.3	23.0										
	36	13.6	20.5										
	38	12.2	18.4										
	40	11.0	16.6										
Properties													
A_g, in.^{2}		4.82		10.2		8.08		6.78		5.59		4.10	
I_x, in.^{4}		45.0		72.3		61.9		52.8		45.1		34.0	
I_y, in.^{4}		29.0		23.9		20.6		17.8		15.3		11.6	
r_y, in.		2.45		1.53		1.60		1.62		1.65		1.68	
r_x/r_y		1.25		1.74		1.73		1.72		1.72		1.71	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS8

Shape		HSS8×4×		HSS8×2×									
		0.120 [c1]		0.375		0.312		0.250		0.180 [c1]		0.120 [c1]	
t_{design}, in.		0.120		0.375		0.312		0.250		0.180		0.120	
lb/ft		9.67		22.8		19.2		15.9		11.7		8.01	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	38.5	57.9	118	178	99.3	149	82.5	124	58.4	87.7	29.9	45.0
	6	35.6	53.5	60.7	91.2	53.2	79.9	46.1	69.3	35.4	53.2	22.5	33.9
	7	34.6	51.9	47.7	71.7	42.4	63.8	37.4	56.2	29.1	43.8	19.9	29.9
	8	33.4	50.2	36.7	55.2	32.9	49.5	29.4	44.1	23.3	34.9	16.8	25.2
	9	32.0	48.2	29.0	43.6	26.0	39.1	23.2	34.9	18.4	27.7	13.4	20.2
	10	30.6	46.0	23.5	35.3	21.1	31.7	18.8	28.2	14.9	22.4	10.9	16.3
	11	29.0	43.6	19.4	29.2	17.4	26.2	15.5	23.3	12.3	18.5	8.98	13.5
	12	27.3	41.0	16.3	24.5	14.6	22.0	13.0	19.6	10.3	15.6	7.55	11.3
	13	25.5	38.3			12.5	18.7	11.1	16.7	8.82	13.3	6.43	9.66
	14	23.5	35.4							7.60	11.4	5.54	8.33
	15	21.5	32.3										
	16	19.4	29.1										
	17	17.2	25.9										
	18	15.4	23.1										
	19	13.8	20.7										
	20	12.4	18.7										
	21	11.3	17.0										
	22	10.3	15.5										
	23	9.41	14.1										
	24	8.64	13.0										
	25	7.97	12.0										
	26	7.36	11.1										
	27	6.83	10.3										
	28	6.35	9.54										
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		2.79		6.58		5.53		4.59		3.38		2.31	
I_x, in.^{4}		23.7		40.1		34.3		30.1		23.0		16.3	
I_y, in.^{4}		8.16		3.85		3.45		3.08		2.44		1.78	
r_y, in.		1.71		0.765		0.790		0.819		0.850		0.878	
r_x/r_y		1.70		3.23		3.15		3.13		3.07		3.03	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS7

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS7×5×								HSS7×4×			
		0.500		0.375		0.250		0.180		0.500		0.375	
t_{design}, in.		0.500		0.375		0.250		0.180		0.500		0.375	
lb/ft		35.3		28.0		19.4		14.2		31.9		25.4	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	183	275	145	218	100	151	73.7	111	165	248	132	198
	6	164	247	131	197	91.2	137	67.1	101	139	209	112	169
	7	158	237	126	190	88.1	132	64.8	97.4	131	196	106	160
	8	151	226	121	182	84.6	127	62.3	93.7	122	183	99.4	149
	9	143	215	115	173	80.8	121	59.6	89.7	112	169	92.2	139
	10	135	203	109	164	76.8	115	56.8	85.3	103	154	84.8	128
	11	126	190	103	155	72.6	109	53.7	80.8	92.8	139	77.4	116
	12	118	177	96.3	145	68.2	103	50.6	76.1	83.2	125	69.9	105
	13	109	164	89.7	135	63.8	95.9	47.4	71.3	73.9	111	62.6	94.2
	14	100	151	83.0	125	59.4	89.2	44.2	66.5	65.0	97.7	55.6	83.6
	15	91.9	138	76.4	115	54.9	82.5	41.0	61.6	56.8	85.3	49.0	73.6
	16	83.6	126	70.0	105	50.5	76.0	37.8	56.8	49.9	75.0	43.1	64.7
	17	75.5	114	63.7	95.7	46.3	69.5	34.7	52.2	44.2	66.4	38.1	57.3
	18	67.9	102	57.7	86.7	42.1	63.3	31.7	47.6	39.4	59.2	34.0	51.1
	19	60.9	91.6	51.9	78.1	38.1	57.3	28.8	43.2	35.4	53.2	30.5	45.9
	20	55.0	82.7	46.9	70.4	34.5	51.8	26.0	39.1	31.9	48.0	27.6	41.4
	21	49.9	75.0	42.5	63.9	31.2	47.0	23.6	35.5	29.0	43.5	25.0	37.6
	22	45.5	68.3	38.7	58.2	28.5	42.8	21.5	32.3	26.4	39.7	22.8	34.2
	23	41.6	62.5	35.4	53.3	26.1	39.2	19.7	29.6	24.1	36.3	20.8	31.3
	24	38.2	57.4	32.5	48.9	23.9	36.0	18.1	27.2	22.2	33.3	19.1	28.8
	25	35.2	52.9	30.0	45.1	22.0	33.1	16.7	25.0	20.4	30.7	17.6	26.5
	26	32.5	48.9	27.7	41.7	20.4	30.6	15.4	23.1			16.3	24.5
	27	30.2	45.4	25.7	38.7	18.9	28.4	14.3	21.5				
	28	28.1	42.2	23.9	35.9	17.6	26.4	13.3	20.0				
	29	26.2	39.3	22.3	33.5	16.4	24.6	12.4	18.6				
	30	24.4	36.7	20.8	31.3	15.3	23.0	11.6	17.4				
	32			18.3	27.5	13.5	20.2	10.2	15.3				
	34							9.01	13.5				
	36												
	38												
	40												
Properties													
A_g, in.^{2}		10.2		8.08		5.59		4.10		9.18		7.33	
I_x, in.^{4}		61.4		52.2		38.0		28.7		50.8		44.0	
I_y, in.^{4}		36.1		30.8		22.6		17.1		20.8		18.1	
r_y, in.		1.88		1.95		2.01		2.04		1.51		1.57	
r_x/r_y		1.30		1.30		1.30		1.30		1.56		1.56	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS7-HSS6

Shape		HSS7×4×		HSS7×3×								HSS6×4×	
		0.250		0.500		0.375		0.250		0.180		0.500	
t_{design}, in.		0.250		0.500		0.375		0.250		0.180		0.500	
lb/ft		17.6		28.4		22.8		15.9		11.7		28.4	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	91.4	137	147	221	118	178	82.5	124	60.7	91.3	147	221
	6	79.0	119	107	161	88.9	134	63.7	95.8	47.5	71.4	123	184
	7	74.9	113	95.5	144	80.2	121	58.1	87.2	43.5	65.3	115	173
	8	70.4	106	83.7	126	71.2	107	52.1	78.4	39.2	59.0	107	160
	9	65.7	98.8	72.1	108	62.3	93.6	46.2	69.4	34.9	52.5	97.9	147
	10	60.8	91.4	61.0	91.7	53.6	80.5	40.3	60.6	30.7	46.1	89.0	134
	11	55.8	83.9	50.8	76.4	45.4	68.2	34.7	52.1	26.6	40.0	80.1	120
	12	50.8	76.4	42.7	64.2	38.2	57.4	29.4	44.2	22.7	34.2	71.4	107
	13	45.9	69.0	36.4	54.7	32.5	48.9	25.1	37.7	19.4	29.1	63.0	94.6
	14	41.1	61.8	31.4	47.2	28.0	42.1	21.6	32.5	16.7	25.1	55.0	82.7
	15	36.5	54.9	27.3	41.1	24.4	36.7	18.8	28.3	14.6	21.9	47.9	72.1
	16	32.2	48.4	24.0	36.1	21.5	32.3	16.6	24.9	12.8	19.2	42.1	63.3
	17	28.6	42.9	21.3	32.0	19.0	28.6	14.7	22.0	11.3	17.0	37.3	56.1
	18	25.5	38.3	19.0	28.5	17.0	25.5	13.1	19.7	10.1	15.2	33.3	50.0
	19	22.9	34.4			15.2	22.9	11.7	17.6	9.07	13.6	29.9	44.9
	20	20.6	31.0					10.6	15.9	8.19	12.3	27.0	40.5
	21	18.7	28.1							7.42	11.2	24.5	36.8
	22	17.0	25.6									22.3	33.5
	23	15.6	23.4									20.4	30.6
	24	14.3	21.5									18.7	28.1
	25	13.2	19.8										
	26	12.2	18.3										
	27	11.3	17.0										
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		5.09		8.18		6.58		4.59		3.38		8.18	
I_x, in.^{4}		32.3		40.2		35.7		26.6		20.3		33.8	
I_y, in.^{4}		13.5		10.1		9.08		6.95		5.38		17.7	
r_y, in.		1.63		1.11		1.17		1.23		1.26		1.47	
r_x/r_y		1.55		2.00		1.99		1.96		1.94		1.38	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS6

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS6×4×										HSS6×3×	
		0.375		0.312		0.250		0.180		0.120 [c1]		0.500	
t_{design}, in.		0.375		0.312		0.250		0.180		0.120		0.500	
lb/ft		22.8		19.2		15.9		11.7		8.01		24.9	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	118	178	99.3	149	82.5	124	60.7	91.3	37.8	56.7	129	194
	6	100	151	84.6	127	70.8	106	52.4	78.8	34.1	51.2	92.9	140
	7	94.5	142	79.9	120	67.0	101	49.7	74.7	32.8	49.3	82.5	124
	8	88.2	133	74.7	112	62.9	94.5	46.8	70.3	31.3	47.1	72.0	108
	9	81.6	123	69.3	104	58.5	88.0	43.6	65.6	29.7	44.7	61.6	92.6
	10	74.9	113	63.6	95.7	54.0	81.2	40.4	60.7	27.9	42.0	51.8	77.9
	11	68.0	102	58.0	87.1	49.4	74.3	37.1	55.7	25.8	38.8	43.0	64.7
	12	61.2	92.0	52.3	78.6	44.8	67.4	33.7	50.7	23.6	35.4	36.1	54.3
	13	54.6	82.1	46.8	70.4	40.3	60.6	30.5	45.8	21.4	32.1	30.8	46.3
	14	48.3	72.6	41.5	62.4	36.0	54.1	27.3	41.0	19.2	28.9	26.6	39.9
	15	42.3	63.6	36.5	54.9	31.8	47.8	24.3	36.5	17.1	25.7	23.1	34.8
	16	37.2	55.9	32.1	48.2	28.0	42.1	21.4	32.2	15.2	22.8	20.3	30.6
	17	32.9	49.5	28.4	42.7	24.8	37.3	19.0	28.5	13.4	20.2	18.0	27.1
	18	29.4	44.2	25.3	38.1	22.1	33.3	16.9	25.4	12.0	18.0	16.1	24.1
	19	26.4	39.6	22.7	34.2	19.9	29.9	15.2	22.8	10.8	16.2		
	20	23.8	35.8	20.5	30.9	17.9	26.9	13.7	20.6	9.71	14.6		
	21	21.6	32.5	18.6	28.0	16.3	24.4	12.4	18.7	8.81	13.2		
	22	19.7	29.6	17.0	25.5	14.8	22.3	11.3	17.0	8.03	12.1		
	23	18.0	27.1	15.5	23.3	13.6	20.4	10.4	15.6	7.34	11.0		
	24	16.5	24.8	14.3	21.4	12.4	18.7	9.51	14.3	6.74	10.1		
	25	15.2	22.9	13.1	19.7	11.5	17.2	8.77	13.2	6.21	9.34		
	26			12.1	18.3	10.6	15.9	8.11	12.2	5.75	8.64		
	27							7.52	11.3	5.33	8.01		
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		6.58		5.53		4.59		3.38		2.31		7.18	
I_x, in.^{4}		29.7		25.5		22.1		16.8		11.8		26.2	
I_y, in.^{4}		15.6		13.5		11.7		8.99		6.36		8.53	
r_y, in.		1.54		1.56		1.60		1.63		1.66		1.09	
r_x/r_y		1.38		1.38		1.37		1.37		1.36		1.75	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS6

Shape		HSS6×3×										HSS6×2×	
		0.375		0.312		0.250		0.180		0.120 [c1]		0.375	
t_{design}, in.		0.375		0.312		0.250		0.180		0.120		0.375	
lb/ft		20.2		17.0		14.2		10.5		7.18		17.6	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	105	157	88.2	133	73.5	110	54.3	81.5	33.4	50.3	91.3	137
	6	78.4	118	66.7	100	56.3	84.6	42.1	63.3	28.2	42.4	45.4	68.3
	7	70.6	106	60.2	90.5	51.1	76.8	38.4	57.7	26.4	39.6	35.3	53.1
	8	62.6	94.0	53.6	80.6	45.8	68.8	34.6	51.9	24.2	36.4	27.1	40.7
	9	54.6	82.0	47.0	70.6	40.3	60.6	30.7	46.1	21.6	32.4	21.4	32.2
	10	46.8	70.4	40.5	60.9	35.1	52.7	26.8	40.3	19.0	28.5	17.3	26.1
	11	39.5	59.4	34.4	51.7	30.0	45.1	23.1	34.8	16.5	24.8	14.3	21.5
	12	33.2	50.0	29.0	43.5	25.4	38.1	19.7	29.6	14.1	21.2	12.0	18.1
	13	28.3	42.6	24.7	37.1	21.6	32.5	16.8	25.2	12.1	18.1		
	14	24.4	36.7	21.3	32.0	18.6	28.0	14.5	21.7	10.4	15.6		
	15	21.3	32.0	18.5	27.9	16.2	24.4	12.6	18.9	9.05	13.6		
	16	18.7	28.1	16.3	24.5	14.3	21.5	11.1	16.6	7.96	12.0		
	17	16.6	24.9	14.4	21.7	12.6	19.0	9.80	14.7	7.05	10.6		
	18	14.8	22.2	12.9	19.4	11.3	17.0	8.75	13.1	6.29	9.45		
	19	13.3	19.9	11.6	17.4	10.1	15.2	7.85	11.8	5.64	8.48		
	20					9.13	13.7	7.08	10.6	5.09	7.66		
	21									4.62	6.94		
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		5.83		4.91		4.09		3.02		2.07		5.08	
I_x, in.^{4}		23.8		20.5		17.9		13.8		9.76		17.8	
I_y, in.^{4}		7.78		6.82		6.00		4.66		3.34		2.84	
r_y, in.		1.16		1.18		1.21		1.24		1.27		0.748	
r_x/r_y		1.74		1.73		1.73		1.73		1.71		2.50	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS6-HSS5

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS6×2×								HSS5×4×			
		0.312		0.250		0.180		0.120 [c1]		0.500		0.375	
t_{design}, in.		0.312		0.250		0.180		0.120		0.500		0.375	
lb/ft		14.9		12.4		9.23		6.35		24.9		20.2	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	76.9	116	64.5	96.9	47.8	71.8	29.1	43.8	129	194	105	157
	6	40.0	60.1	35.2	52.9	27.2	40.9	19.4	29.1	107	160	88.1	132
	7	31.5	47.4	28.2	42.5	22.2	33.4	16.0	24.1	99.5	150	82.7	124
	8	24.3	36.6	22.0	33.1	17.6	26.4	12.8	19.3	91.9	138	77.0	116
	9	19.2	28.9	17.4	26.1	13.9	20.8	10.2	15.3	84.0	126	70.9	107
	10	15.6	23.4	14.1	21.2	11.2	16.9	8.24	12.4	75.9	114	64.7	97.2
	11	12.9	19.3	11.6	17.5	9.29	14.0	6.81	10.2	67.9	102	58.5	87.9
	12	10.8	16.2	9.78	14.7	7.80	11.7	5.72	8.60	60.1	90.4	52.3	78.7
	13			8.34	12.5	6.65	10.0	4.88	7.33	52.7	79.2	46.4	69.8
	14							4.20	6.32	45.7	68.7	40.8	61.2
	15									39.8	59.8	35.6	53.5
	16									35.0	52.6	31.3	47.0
	17									31.0	46.6	27.7	41.6
	18									27.7	41.6	24.7	37.1
	19									24.8	37.3	22.2	33.3
	20									22.4	33.7	20.0	30.1
	21									20.3	30.5	18.2	27.3
	22									18.5	27.8	16.5	24.9
	23									16.9	25.5	15.1	22.7
	24											13.9	20.9
	25											12.8	19.2
	26												
	27												
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		4.28		3.59		2.66		1.83		7.18		5.83	
I_x, in.^{4}		15.4		13.8		10.7		7.68		20.9		18.7	
I_y, in.^{4}		2.55		2.31		1.84		1.35		14.7		13.2	
r_y, in.		0.772		0.802		0.832		0.859		1.43		1.50	
r_x/r_y		2.46		2.44		2.42		2.39		1.20		1.19	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS5

Shape		HSS5×4×								HSS5×3×			
		0.312		0.250		0.180		0.120 [c1]		0.500		0.375	
t_{design}, in.		0.312		0.250		0.180		0.120		0.500		0.375	
lb/ft		17.0		14.2		10.5		7.18		21.4		17.6	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	88.2	133	73.5	110	54.3	81.5	37.1	55.8	111	167	91.3	137
	1	87.8	132	73.1	110	54.0	81.2	37.0	55.6	110	165	90.5	136
	2	86.6	130	72.2	108	53.3	80.2	36.6	55.0	107	161	88.2	133
	3	84.6	127	70.6	106	52.2	78.5	35.8	53.9	102	153	84.5	127
	4	81.8	123	68.4	103	50.7	76.1	34.8	52.3	95.1	143	79.7	120
	5	78.4	118	65.7	98.8	48.7	73.3	33.5	50.4	87.2	131	73.8	111
	6	74.5	112	62.6	94.1	46.5	69.9	32.0	48.2	78.5	118	67.2	101
	7	70.1	105	59.1	88.8	44.0	66.1	30.4	45.7	69.2	104	60.2	90.5
	8	65.3	98.2	55.3	83.0	41.2	62.0	28.6	42.9	59.9	90.0	53.0	79.7
	9	60.3	90.7	51.2	77.0	38.3	57.6	26.6	40.0	50.8	76.4	45.9	69.0
	10	55.2	82.9	47.1	70.7	35.3	53.1	24.6	37.0	42.3	63.6	39.1	58.7
	11	50.0	75.2	42.9	64.4	32.3	48.5	22.6	33.9	35.0	52.6	32.7	49.2
	12	44.9	67.5	38.7	58.2	29.3	44.0	20.5	30.8	29.4	44.2	27.5	41.3
	13	39.9	60.0	34.6	52.0	26.3	39.5	18.5	27.8	25.1	37.7	23.4	35.2
	14	35.2	52.9	30.7	46.1	23.4	35.2	16.6	24.9	21.6	32.5	20.2	30.4
	15	30.8	46.2	27.0	40.6	20.7	31.1	14.7	22.1	18.8	28.3	17.6	26.4
	16	27.0	40.6	23.7	35.7	18.2	27.4	12.9	19.5	16.6	24.9	15.5	23.2
	17	24.0	36.0	21.0	31.6	16.1	24.2	11.5	17.2	14.7	22.0	13.7	20.6
	18	21.4	32.1	18.7	28.2	14.4	21.6	10.2	15.4			12.2	18.4
	19	19.2	28.8	16.8	25.3	12.9	19.4	9.18	13.8				
	20	17.3	26.0	15.2	22.8	11.6	17.5	8.29	12.5				
	21	15.7	23.6	13.8	20.7	10.6	15.9	7.52	11.3				
	22	14.3	21.5	12.5	18.9	9.63	14.5	6.85	10.3				
	23	13.1	19.7	11.5	17.3	8.81	13.2	6.27	9.42				
	24	12.0	18.1	10.5	15.8	8.09	12.2	5.76	8.65				
	25	11.1	16.6	9.72	14.6	7.45	11.2	5.30	7.97				
	26					6.89	10.4	4.90	7.37				
	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		4.91		4.09		3.02		2.07		6.18		5.08	
I_x, in.^{4}		16.2		14.1		10.8		7.67		15.8		14.7	
I_y, in.^{4}		11.4		9.98		7.68		5.45		6.95		6.48	
r_y, in.		1.52		1.56		1.59		1.62		1.06		1.13	
r_x/r_y		1.20		1.19		1.19		1.19		1.51		1.50	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS5

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS5×3×								HSS5×2×			
		0.312		0.250		0.180		0.120 [c1]		0.250		0.180	
t_{design}, in.		0.312		0.250		0.180		0.120		0.250		0.180	
lb/ft		14.9		12.4		9.23		6.35		10.7		7.98	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	76.9	116	64.5	96.9	47.8	71.8	32.8	49.3	55.5	83.4	41.3	62.1
	1	76.3	115	64.0	96.2	47.4	71.3	32.6	49.0	54.5	82.0	40.7	61.1
	2	74.4	112	62.5	94.0	46.4	69.8	32.0	48.1	51.8	77.8	38.7	58.2
	3	71.4	107	60.2	90.5	44.8	67.3	30.9	46.4	47.4	71.3	35.8	53.7
	4	67.4	101	57.1	85.8	42.5	63.9	29.4	44.2	42.0	63.1	31.9	48.0
	5	62.6	94.2	53.3	80.1	39.8	59.9	27.6	41.5	35.9	53.9	27.6	41.5
	6	57.2	86.0	49.0	73.6	36.8	55.3	25.6	38.5	29.6	44.5	23.2	34.8
	7	51.5	77.3	44.3	66.6	33.4	50.3	23.4	35.2	23.6	35.5	18.8	28.2
	8	45.5	68.4	39.5	59.4	30.0	45.1	21.1	31.7	18.3	27.5	14.8	22.2
	9	39.6	59.5	34.7	52.2	26.5	39.8	18.7	28.2	14.5	21.7	11.7	17.6
	10	33.9	50.9	30.0	45.1	23.1	34.7	16.4	24.7	11.7	17.6	9.46	14.2
	11	28.5	42.9	25.6	38.4	19.8	29.8	14.2	21.3	9.68	14.5	7.82	11.8
	12	24.0	36.1	21.5	32.4	16.8	25.2	12.1	18.2	8.13	12.2	6.57	9.87
	13	20.4	30.7	18.4	27.6	14.3	21.5	10.3	15.5	6.93	10.4	5.60	8.41
	14	17.6	26.5	15.8	23.8	12.3	18.5	8.90	13.4				
	15	15.4	23.1	13.8	20.7	10.7	16.1	7.75	11.7				
	16	13.5	20.3	12.1	18.2	9.44	14.2	6.82	10.2				
	17	12.0	18.0	10.7	16.1	8.36	12.6	6.04	9.07				
	18	10.7	16.0	9.57	14.4	7.46	11.2	5.39	8.09				
	19	9.6	14.4	8.59	12.9	6.69	10.1	4.83	7.26				
	20					6.04	9.08	4.36	6.56				
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		4.28		3.59		2.66		1.83		3.09		2.30	
I_x, in.^{4}		12.7		11.3		8.74		6.24		8.48		6.64	
I_y, in.^{4}		5.69		5.05		3.95		2.84		1.92		1.55	
r_y, in.		1.15		1.19		1.22		1.25		0.788		0.821	
r_x/r_y		1.50		1.49		1.48		1.48		2.11		2.07	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS5-HSS4

Shape		HSS5×2×		HSS4×3×								HSS4×2×	
		0.120 [c1]		0.250		0.180		0.120		0.080 [c1]		0.375	
t_{design}, in.		0.120		0.250		0.180		0.120		0.080		0.375	
lb/ft		5.51		10.7		7.98		5.51		3.75		12.4	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	28.5	42.8	55.5	83.4	41.3	62.1	28.6	42.9	17.7	26.6	64.3	96.7
	1	28.1	42.3	55.1	82.7	41.0	61.6	28.4	42.6	17.6	26.5	63.0	94.6
	2	26.9	40.4	53.7	80.7	40.1	60.2	27.7	41.7	17.3	26.1	59.1	88.8
	3	24.9	37.5	51.6	77.5	38.6	58.0	26.7	40.2	16.9	25.4	53.1	79.9
	4	22.4	33.7	48.7	73.2	36.6	54.9	25.4	38.1	16.3	24.5	45.8	68.9
	5	19.6	29.4	45.2	68.0	34.1	51.3	23.7	35.7	15.5	23.3	37.9	56.9
	6	16.6	24.9	41.3	62.1	31.4	47.1	21.9	32.9	14.6	21.9	30.0	45.1
	7	13.6	20.5	37.2	55.8	28.4	42.7	19.9	29.9	13.5	20.3	22.8	34.3
	8	10.9	16.3	32.9	49.4	25.3	38.1	17.8	26.7	12.3	18.4	17.4	26.2
	9	8.59	12.9	28.6	43.0	22.2	33.4	15.7	23.6	10.9	16.3	13.8	20.7
	10	6.96	10.5	24.5	36.8	19.2	28.9	13.6	20.5	9.48	14.2	11.2	16.8
	11	5.75	8.65	20.6	31.0	16.4	24.6	11.7	17.5	8.16	12.3	9.23	13.9
	12	4.83	7.26	17.3	26.0	13.8	20.7	9.86	14.8	6.92	10.4		
	13	4.12	6.19	14.8	22.2	11.8	17.7	8.41	12.6	5.90	8.87		
	14	3.55	5.34	12.7	19.1	10.1	15.2	7.25	10.9	5.09	7.65		
	15			11.1	16.7	8.83	13.3	6.31	9.49	4.43	6.66		
	16			9.74	14.6	7.76	11.7	5.55	8.34	3.89	5.85		
	17			8.63	13.0	6.88	10.3	4.92	7.39	3.45	5.19		
	18			7.70	11.6	6.13	9.22	4.38	6.59	3.08	4.63		
	19			6.91	10.4	5.51	8.27	3.93	5.91	2.76	4.15		
	20							3.55	5.34	2.49	3.75		
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		1.59		3.09		2.30		1.59		1.08		3.58	
I_x, in.^{4}		4.81		6.45		5.05		3.65		2.54		5.75	
I_y, in.^{4}		1.14		4.10		3.23		2.34		1.64		1.83	
r_y, in.		0.847		1.15		1.19		1.21		1.23		0.715	
r_x/r_y		2.05		1.25		1.24		1.26		1.24		1.78	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS4

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS4×2×										HSS4×1.5×	
		0.312		0.250		0.180		0.120		0.080 [c1]		0.250	
t_{design}, in.		0.312		0.250		0.180		0.120		0.080		0.250	
lb/ft		10.5		8.98		6.74		4.68		3.19		8.11	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	54.6	82.1	46.5	69.9	34.9	52.4	24.3	36.5	14.9	22.3	42.0	63.2
	1	53.5	80.5	45.7	68.7	34.3	51.5	23.9	35.9	14.7	22.1	40.6	61.1
	2	50.4	75.8	43.3	65.0	32.6	49.0	22.8	34.2	14.3	21.4	36.8	55.2
	3	45.6	68.6	39.5	59.3	30.0	45.0	21.0	31.6	13.5	20.3	31.1	46.7
	4	39.7	59.7	34.8	52.2	26.6	40.0	18.8	28.3	12.5	18.8	24.6	36.9
	5	33.2	49.8	29.5	44.3	22.9	34.4	16.4	24.6	11.3	16.9	18.2	27.3
	6	26.6	40.0	24.1	36.3	19.0	28.6	13.7	20.7	9.61	14.4	12.8	19.2
	7	20.5	30.9	19.0	28.6	15.3	23.0	11.2	16.8	7.89	11.9	9.40	14.1
	8	15.7	23.7	14.7	22.1	11.9	17.9	8.85	13.3	6.29	9.46	7.20	10.8
	9	12.4	18.7	11.6	17.4	9.42	14.2	6.99	10.5	4.98	7.48	5.69	8.55
	10	10.1	15.1	9.39	14.1	7.63	11.5	5.66	8.51	4.03	6.06		
	11	8.33	12.5	7.76	11.7	6.31	9.48	4.68	7.03	3.33	5.01		
	12	7.00	10.5	6.52	9.81	5.30	7.97	3.93	5.91	2.80	4.21		
	13					4.52	6.79	3.35	5.03	2.39	3.59		
	14									2.06	3.09		
	15												
	16												
	17												
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Properties						
A_g, in.^{2}	3.04	2.59	1.94	1.35	0.921	2.34
I_x, in.^{4}	5.04	4.69	3.73	2.74	1.93	3.81
I_y, in.^{4}	1.65	1.54	1.25	0.927	0.660	0.755
r_y, in.	0.737	0.771	0.803	0.829	0.847	0.568
r_x/r_y	1.75	1.75	1.73	1.71	1.71	2.25

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS4-HSS3

Shape		HSS4×1.5×								HSS3×2×			
		0.180		0.120		0.083 [c1]		0.063 [c1]		0.250		0.180	
t_{design}, in.		0.180		0.120		0.083		0.063		0.250		0.180	
lb/ft		6.11		4.26		3.02		2.30		7.24		5.49	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	31.6	47.5	22.1	33.2	14.2	21.3	9.14	13.7	37.5	56.4	28.4	42.7
	1	30.7	46.1	21.5	32.3	13.9	21.0	9.01	13.5	36.8	55.3	27.9	41.9
	2	28.0	42.1	19.8	29.7	13.2	19.9	8.63	13.0	34.7	52.2	26.4	39.7
	3	24.1	36.2	17.2	25.9	12.1	18.1	7.99	12.0	31.5	47.3	24.1	36.3
	4	19.5	29.3	14.2	21.3	10.3	15.4	7.12	10.7	27.4	41.2	21.3	31.9
	5	14.9	22.3	11.0	16.6	8.11	12.2	6.03	9.06	23.0	34.5	18.1	27.1
	6	10.7	16.1	8.14	12.2	6.07	9.13	4.72	7.10	18.5	27.8	14.8	22.2
	7	7.86	11.8	5.98	8.99	4.47	6.72	3.48	5.24	14.3	21.5	11.7	17.6
	8	6.02	9.05	4.58	6.89	3.42	5.14	2.67	4.01	11.0	16.5	9.02	13.6
	9	4.76	7.15	3.62	5.44	2.70	4.06	2.11	3.17	8.67	13.0	7.13	10.7
	10			2.93	4.41	2.19	3.29	1.71	2.57	7.02	10.6	5.78	8.7
	11									5.80	8.72	4.77	7.17
	12									4.88	7.33	4.01	6.03
	13												
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Properties						
A_g, in.^{2}	1.76	1.23	0.871	0.662	2.09	1.58
I_x, in.^{4}	3.08	2.29	1.68	1.29	2.21	1.80
I_y, in.^{4}	0.631	0.481	0.359	0.280	1.15	0.947
r_y, in.	0.599	0.625	0.642	0.650	0.742	0.774
r_x/r_y	2.20	2.18	2.17	2.15	1.39	1.38

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS3

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS3×2×				HSS3×1.5×							
		0.120		0.080		0.250		0.180		0.120		0.083	
t_{design}, in.		0.120		0.080		0.250		0.180		0.120		0.083	
lb/ft		3.85		2.64		6.38		4.86		3.43		2.45	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	19.9	30.0	13.7	20.5	33.1	49.7	25.1	37.8	17.8	26.7	12.7	19.0
	1	19.6	29.5	13.5	20.2	31.9	47.9	24.4	36.6	17.3	26.0	12.3	18.5
	2	18.6	28.0	12.8	19.3	28.6	43.0	22.1	33.2	15.8	23.8	11.3	17.0
	3	17.1	25.8	11.8	17.8	23.9	36.0	18.8	28.3	13.7	20.5	9.87	14.8
	4	15.2	22.9	10.6	15.9	18.6	28.0	15.0	22.6	11.1	16.7	8.14	12.2
	5	13.1	19.7	9.14	13.7	13.5	20.3	11.3	16.9	8.55	12.8	6.34	9.54
	6	10.9	16.4	7.65	11.5	9.43	14.2	8.01	12.0	6.20	9.32	4.68	7.03
	7	8.75	13.2	6.21	9.33	6.93	10.4	5.89	8.85	4.56	6.85	3.44	5.17
	8	6.82	10.3	4.88	7.33	5.31	7.98	4.51	6.77	3.49	5.24	2.63	3.96
	9	5.39	8.10	3.85	5.79	4.19	6.30	3.56	5.35	2.76	4.14	2.08	3.13
	10	4.37	6.56	3.12	4.69					2.23	3.36	1.69	2.53
	11	3.61	5.43	2.58	3.88								
	12	3.03	4.56	2.17	3.26								
	13	2.58	3.88	1.85	2.78								
	14												
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	30												
Properties													
A_g, in.^{2}		1.11		0.761		1.84		1.40		0.990		0.705	
I_x, in.^{4}		1.35		0.957		1.73		1.44		1.10		0.814	
I_y, in.^{4}		0.715		0.512		0.557		0.473		0.366		0.276	
r_y, in.		0.803		0.820		0.550		0.581		0.608		0.626	
r_x/r_y		1.37		1.37		1.76		1.74		1.73		1.71	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS3-HSS2.5

Shape		HSS3×1.5×		HSS3×1×								HSS2.5×1.5×	
		0.060 [c1]		0.180		0.120		0.080		0.060 [c1]		0.250	
t_{design}, in.		0.060		0.180		0.120		0.080		0.060		0.250	
lb/ft		1.79		4.24		3.02		2.08		1.58		5.51	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	8.39	12.6	21.9	32.9	15.6	23.5	10.8	16.2	7.31	11.0	28.6	42.9
	1	8.24	12.4	20.3	30.5	14.6	22.0	10.2	15.3	7.04	10.6	27.5	41.3
	2	7.79	11.7	16.2	24.3	12.0	18.0	8.46	12.7	6.24	9.38	24.6	36.9
	3	7.06	10.6	11.0	16.6	8.60	12.9	6.24	9.38	4.82	7.25	20.4	30.6
	4	6.03	9.06	6.61	9.94	5.42	8.14	4.08	6.13	3.19	4.80	15.7	23.5
	5	4.73	7.12	4.23	6.36	3.47	5.21	2.61	3.93	2.05	3.08	11.2	16.8
	6	3.52	5.30	2.94	4.42	2.41	3.62	1.81	2.73	1.42	2.14	7.77	11.7
	7	2.59	3.89					1.33	2.00	1.05	1.57	5.71	8.58
	8	1.98	2.98									4.37	6.57
	9	1.57	2.36										
	10	1.27	1.91										
	11												
	12												
	13												
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Properties													
A_g, in.^{2}		0.516		1.22		0.870		0.601		0.456		1.59	
I_x, in.^{4}		0.606		1.08		0.847		0.616		0.477		1.05	
I_y, in.^{4}		0.208		0.173		0.142		0.107		0.084		0.458	
r_y, in.		0.635		0.377		0.404		0.422		0.429		0.537	
r_x/r_y		1.70		2.50		2.44		2.39		2.38		1.51	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS2.5

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS2.5×1.5×								HSS2.5×1×			
		0.180		0.120		0.083		0.063		0.120		0.083	
t_{design}, in.		0.180		0.120		0.083		0.063		0.120		0.083	
lb/ft		4.24		3.02		2.16		1.64		2.60		1.87	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	21.9	32.9	15.6	23.5	11.2	16.8	8.51	12.8	13.5	20.3	9.68	14.6
	1	21.2	31.9	15.2	22.8	10.9	16.3	8.28	12.4	12.6	18.9	9.09	13.7
	2	19.2	28.8	13.8	20.8	10.0	15.0	7.61	11.4	10.2	15.4	7.52	11.3
	3	16.2	24.3	11.9	17.9	8.62	13.0	6.61	9.94	7.26	10.9	5.48	8.24
	4	12.8	19.2	9.59	14.4	7.04	10.6	5.43	8.16	4.51	6.78	3.52	5.30
	5	9.46	14.2	7.29	11.0	5.43	8.17	4.22	6.34	2.89	4.34	2.25	3.39
	6	6.67	10.0	5.24	7.87	3.96	5.95	3.10	4.66	2.00	3.01	1.57	2.35
	7	4.90	7.37	3.85	5.78	2.91	4.37	2.28	3.42				
	8	3.75	5.64	2.95	4.43	2.23	3.35	1.74	2.62				
	9	2.97	4.46	2.33	3.50	1.76	2.65	1.38	2.07				
	10					1.43	2.14	1.12	1.68				
	11												
	12												
	13												
	14												
	15												
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Properties													
A_g, in.^{2}		1.22		0.870		0.622		0.474		0.750		0.539	
I_x, in.^{4}		0.892		0.692		0.518		0.403		0.522		0.397	
I_y, in.^{4}		0.394		0.309		0.234		0.183		0.118		0.092	
r_y, in.		0.568		0.596		0.613		0.621		0.397		0.414	
r_x/r_y		1.51		1.50		1.49		1.48		2.10		2.07	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

HSS2.5-HSS2

Shape		HSS2.5×1×		HSS2×1.5×						HSS2×1×			
		0.063		0.120		0.080		0.060		0.180		0.120	
t_{design}, in.		0.063		0.120		0.080		0.060		0.180		0.120	
lb/ft		1.43		2.60		1.81		1.37		2.99		2.18	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	7.40	11.1	13.5	20.3	9.36	14.1	7.11	10.7	15.5	23.3	11.3	17.0
	1	6.96	10.5	13.0	19.6	9.08	13.6	6.91	10.4	14.2	21.4	10.5	15.8
	2	5.80	8.72	11.8	17.8	8.29	12.5	6.32	9.50	11.1	16.7	8.49	12.8
	3	4.28	6.43	10.1	15.2	7.12	10.7	5.45	8.19	7.30	11.0	5.92	8.90
	4	2.80	4.20	8.05	12.1	5.75	8.65	4.43	6.66	4.26	6.40	3.62	5.44
	5	1.79	2.69	6.02	9.05	4.38	6.58	3.39	5.10	2.73	4.10	2.31	3.48
	6	1.24	1.87	4.28	6.43	3.15	4.73	2.46	3.69			1.61	2.42
	7	0.914	1.37	3.14	4.72	2.31	3.48	1.81	2.71				
	8			2.41	3.62	1.77	2.66	1.38	2.08				
	9			1.90	2.86	1.40	2.10	1.09	1.64				
	10							0.884	1.33				
	11												
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Properties													
A_g, in.^{2}		0.412		0.750		0.521		0.396		0.862		0.630	
I_x, in.^{4}		0.310		0.396		0.291		0.226		0.349		0.290	
I_y, in.^{4}		0.073		0.252		0.186		0.145		0.112		0.095	
r_y, in.		0.422		0.580		0.597		0.605		0.360		0.388	
r_x/r_y		2.05		1.25		1.25		1.25		1.77		1.75	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS2-HSS1.5

Table 4-2 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS2×1×				HSS1.5×1×					
		0.080		0.060		0.120		0.080		0.060	
t_{design}, in.		0.080		0.060		0.120		0.080		0.060	
lb/ft		1.53		1.16		1.77		1.25		0.957	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	7.92	11.9	6.04	9.07	9.16	13.8	6.49	9.75	4.96	7.45
	1	7.42	11.1	5.67	8.52	8.48	12.7	6.04	9.08	4.63	6.97
	2	6.09	9.15	4.69	7.04	6.73	10.1	4.89	7.35	3.79	5.69
	3	4.38	6.59	3.42	5.14	4.58	6.88	3.44	5.17	2.70	4.06
	4	2.77	4.17	2.20	3.30	2.74	4.11	2.12	3.18	1.69	2.54
	5	1.77	2.67	1.41	2.11	1.75	2.63	1.35	2.04	1.08	1.63
	6	1.23	1.85	0.976	1.47	1.22	1.83	0.940	1.41	0.752	1.13
	7										
	8										
	9										
	10										
	11										
	12										
	13										
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	21										
	22										
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	24										
	25										
	26										
	27										
	28										
	29										
	30										
Properties											
A_g, in.^{2}		0.441		0.336		0.510		0.361		0.276	
I_x, in.^{4}		0.217		0.170		0.137		0.105		0.083	
I_y, in.^{4}		0.073		0.058		0.072		0.056		0.044	
r_y, in.		0.406		0.414		0.375		0.392		0.401	
r_x/r_y		1.73		1.72		1.38		1.38		1.37	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS32-HSS24

Table 4-3
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

F_y = 30 ksi

Shape		HSS32×16×		HSS32×8×		HSS28×8×				HSS24×16×			
		0.375 [c1]		0.375 [c1]		0.375 [c1]		0.312 [c1]		0.375 [c1]		0.312 [c1]	
t_{design}, in.		0.375		0.375		0.375		0.312		0.375		0.312	
lb/ft		121		100		90.0		75.4		100		84.1	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	433	650	325	488	322	485	239	360	427	641	302	454
	6	431	648	321	482	317	477	236	355	424	638	301	452
	7	430	647	319	479	316	474	235	353	423	636	301	452
	8	429	645	317	477	314	471	234	351	422	635	300	451
	9	428	644	315	474	311	468	232	349	421	633	300	450
	10	427	642	313	470	309	464	230	346	420	631	299	449
	11	426	641	310	466	306	460	228	343	419	629	298	448
	12	425	639	307	462	303	455	226	340	417	627	298	447
	13	424	637	304	458	299	450	224	337	415	624	297	446
	14	422	635	301	453	296	444	222	333	414	622	296	445
	15	421	633	298	447	292	438	219	329	412	619	295	444
	16	419	630	294	442	288	432	216	325	410	616	294	442
	17	418	628	290	436	283	426	214	321	408	613	293	441
	18	416	625	286	430	278	418	210	316	405	609	292	439
	19	414	622	281	423	273	411	207	311	403	605	291	438
	20	412	619	277	416	268	403	204	306	400	602	290	436
	21	410	616	272	409	263	395	200	301	398	598	289	434
	22	408	613	267	401	257	387	197	295	395	593	287	432
	23	405	609	262	393	251	378	193	290	392	589	286	430
	24	403	605	256	385	245	368	189	283	389	585	285	428
	25	400	602	250	376	239	359	184	277	386	580	283	426
	26	398	598	244	367	232	349	180	271	383	575	282	423
	27	395	594	238	358	225	338	176	264	379	570	280	421
	28	392	590	232	348	218	328	171	257	376	565	278	418
	29	389	585	225	338	210	316	166	250	372	559	276	416
	30	386	581	218	328	203	305	161	242	368	554	275	413
	32	380	572	204	306	187	281	151	227	361	542	271	407
	34	374	562	188	283	169	255	140	210	353	530	267	401
	36	367	551	172	258	152	228	128	192	344	517	262	394
	38	360	541	154	232	136	205	116	174	335	504	258	387
	40	352	529	139	209	123	185	104	157	326	490	252	379
Properties													
A_g, in.^{2}		35.0		29.0		26.0		21.7		29.0		24.2	
I_x, in.^{4}		4790		3280		2320		1960		2390		2020	
I_y, in.^{4}		1660		365		322		274		1290		1090	
r_y, in.		6.89		3.55		3.52		3.55		6.67		6.71	
r_x/r_y		1.70		2.99		2.68		2.68		1.36		1.36	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

HSS24-HSS20

Shape		HSS24×8×				HSS20×16×							
		0.375 [c1]		0.312 [c1]		0.625		0.500		0.375 [c1]		0.312 [c1]	
t_{design}, in.		0.375		0.312		0.625		0.500		0.375		0.312	
lb/ft		79.6		66.7		146		118		90.0		75.4	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	319	479	237	357	756	1140	613	921	422	634	299	450
	6	313	471	234	351	749	1130	607	912	419	630	298	448
	7	311	468	232	349	747	1120	605	909	418	628	297	447
	8	309	464	231	347	744	1120	603	906	417	626	297	446
	9	306	460	229	344	740	1110	600	902	415	624	296	445
	10	303	456	227	341	737	1110	597	897	414	622	296	444
	11	300	451	225	338	733	1100	594	892	412	620	295	443
	12	296	445	222	334	728	1090	590	887	411	617	294	442
	13	293	440	220	331	723	1090	586	881	409	614	293	441
	14	288	433	217	326	718	1080	582	875	407	611	292	439
	15	284	427	214	322	713	1070	578	869	405	608	291	438
	16	279	420	211	317	707	1060	573	862	402	604	290	436
	17	274	412	208	312	701	1050	569	855	400	601	289	435
	18	269	404	204	307	694	1040	563	847	397	597	288	433
	19	263	396	201	302	688	1030	558	839	394	593	287	431
	20	257	387	197	296	681	1020	552	830	391	588	285	429
	21	251	377	193	290	673	1010	547	822	388	584	284	427
	22	245	368	189	283	666	1000	541	813	385	579	282	424
	23	238	358	184	277	658	989	534	803	382	574	281	422
	24	231	347	180	270	650	977	528	794	378	569	279	419
	25	224	336	175	263	641	964	521	784	375	563	277	417
	26	216	325	170	255	633	951	515	773	371	558	276	414
	27	208	313	165	248	624	938	508	763	367	552	274	411
	28	200	301	160	240	615	924	500	752	363	546	272	408
	29	192	289	154	232	606	911	493	741	359	540	270	405
	30	183	276	148	223	596	897	486	730	355	534	268	402
	32	165	248	137	206	577	868	470	707	347	521	263	395
	34	147	221	124	187	558	838	455	683	337	507	258	388
	36	131	197	111	167	537	808	438	659	328	493	253	380
	38	118	177	100	150	517	777	422	634	318	478	248	372
	40	106	160	90.2	136	496	745	405	609	307	462	242	363
Properties													
A_g, in.^{2}		23.0		19.2		42.1		34.1		26.0		21.7	
I_x, in.^{4}		1550		1320		2430		2010		1550		1310	
I_y, in.^{4}		278		237		1730		1430		1110		936	
r_y, in.		3.48		3.51		6.41		6.48		6.53		6.57	
r_x/r_y		2.36		2.36		1.19		1.19		1.18		1.18	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS20

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

F_y = 30 ksi

Shape		HSS20×12×										HSS20×8×	
		0.625		0.500		0.375 [c1]		0.312 [c1]		0.250 [c1]		0.625	
t_{design}, in.		0.625		0.500		0.375		0.312		0.250		0.625	
lb/ft		129		105		79.6		66.7		53.9		111	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	666	1000	541	813	368	553	279	420	193	290	577	867
	6	656	986	532	800	364	547	277	416	192	288	556	836
	7	652	980	529	795	363	545	276	414	191	288	549	826
	8	647	973	526	790	361	542	275	413	191	287	541	814
	9	643	966	522	784	359	540	273	411	190	286	532	800
	10	637	957	517	778	357	537	272	409	190	285	522	785
	11	631	948	513	771	355	533	270	406	189	284	512	769
	12	625	939	507	763	352	530	269	404	188	283	500	752
	13	618	928	502	754	350	526	267	401	187	282	488	733
	14	610	917	496	745	347	521	265	398	187	280	475	714
	15	602	905	490	736	344	517	263	395	186	279	462	694
	16	594	892	483	726	341	512	261	392	184	277	448	673
	17	585	879	476	716	337	507	258	388	183	276	433	651
	18	576	865	469	705	333	501	256	384	182	274	419	629
	19	566	851	461	693	330	495	253	380	181	272	404	606
	20	556	836	453	681	326	489	250	376	180	270	388	584
	21	546	821	445	669	321	483	247	372	178	268	373	560
	22	536	805	437	657	317	477	244	367	177	266	357	537
	23	525	789	428	644	313	470	241	363	175	263	342	514
	24	514	772	420	631	308	463	238	358	174	261	326	490
	25	503	756	411	617	303	455	235	353	172	258	311	467
	26	491	738	401	603	298	448	231	348	170	256	295	444
	27	480	721	392	590	293	440	228	342	168	253	280	421
	28	468	703	383	575	287	432	224	337	166	250	266	399
	29	456	685	373	561	282	423	220	331	164	246	251	377
	30	444	667	364	547	276	415	216	325	161	242	237	356
	32	420	631	344	518	264	397	208	313	156	234	210	315
	34	396	595	325	488	251	378	199	300	150	226	186	279
	36	371	558	306	459	237	356	190	286	144	217	166	249
	38	347	522	286	430	222	334	181	272	138	208	149	223
	40	324	487	267	402	208	312	172	258	132	198	134	202
Properties													
A_g, in.^{2}		37.1		30.1		23.0		19.2		15.5		32.1	
I_x, in.^{4}		1960		1630		1260		1070		873		1490	
I_y, in.^{4}		892		742		579		491		401		352	
r_y, in.		4.90		4.96		5.02		5.06		5.09		3.31	
r_x/r_y		1.48		1.48		1.47		1.48		1.47		2.06	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

HSS20

Shape		HSS20×8×								HSS20×4×			
		0.500		0.375 [c1]		0.312 [c1]		0.250 [c1]		0.375 [c1]		0.312 [c1]	
t_{design}, in.		0.500		0.375		0.312		0.250		0.375		0.312	
lb/ft		90.7		69.2		58.1		46.9		58.8		49.4	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	469	705	314	472	234	352	167	251	260	391	191	288
	6	453	681	307	462	230	346	164	247	240	361	179	269
	7	447	673	305	458	228	343	163	245	233	350	175	262
	8	441	663	302	454	227	341	162	243	225	338	169	255
	9	434	652	299	449	225	338	161	242	215	324	164	246
	10	426	641	296	444	222	334	159	239	205	308	157	236
	11	418	628	292	438	220	330	158	237	193	291	150	225
	12	409	614	288	432	217	326	156	234	179	269	142	214
	13	399	600	283	425	214	322	154	232	163	245	133	201
	14	389	585	278	418	211	317	152	229	148	222	124	187
	15	378	569	273	410	208	312	150	226	133	199	114	171
	16	367	552	268	402	204	307	148	222	118	178	103	154
	17	356	535	262	393	200	301	145	219	105	158	91.4	137
	18	344	517	256	384	196	295	143	215	93.6	141	81.5	123
	19	332	499	249	374	192	288	140	211	84.0	126	73.2	110
	20	320	481	242	364	187	282	137	207	75.8	114	66.0	99.3
	21	308	463	235	353	183	275	135	202	68.8	103	59.9	90.0
	22	295	444	228	342	178	267	131	198	62.7	94.2	54.6	82.0
	23	283	425	220	331	173	260	128	193	57.3	86.2	49.9	75.1
	24	271	407	211	317	168	252	125	188	52.7	79.2	45.9	68.9
	25	258	388	201	303	162	244	122	183	48.5	72.9	42.3	63.5
	26	246	370	192	289	156	235	118	178	44.9	67.4	39.1	58.7
	27	234	352	183	275	151	226	115	172	41.6	62.5	36.2	54.5
	28	222	334	174	261	145	217	111	167	38.7	58.2	33.7	50.6
	29	210	316	165	248	138	208	107	161			31.4	47.2
	30	199	299	156	235	132	199	103	155				
	32	176	265	139	209	119	178	94.9	143				
	34	156	235	123	186	106	159	86.3	130				
	36	140	210	110	166	94.1	141	77.4	116				
	38	125	188	98.9	149	84.5	127	69.5	104				
	40	113	170	89.2	134	76.2	115	62.7	94.3				
Properties													
A_g, in.^{2}		26.1		20.0		16.7		13.5		17.0		14.3	
I_x, in.^{4}		1250		976		829		678		687		587	
I_y, in.^{4}		297		234		200		164		49.8		43.3	
r_y, in.		3.37		3.42		3.46		3.49		1.71		1.74	
r_x/r_y		2.05		2.04		2.04		2.03		3.72		3.68	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS20-HSS18

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

F_y = 30 ksi

Shape		HSS20×4×		HSS18×6×									
		0.250 [c1]		0.625		0.500		0.375 [c1]		0.312 [c1]		0.250 [c1]	
t_{design}, in.		0.250		0.625		0.500		0.375		0.312		0.250	
lb/ft		40.0		94.0		76.8		58.8		49.4		40.0	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	131	197	487	732	397	597	283	426	212	318	148	222
	6	124	186	456	686	373	561	272	410	205	308	144	216
	7	121	183	446	670	365	549	269	404	202	304	142	214
	8	119	178	434	652	356	535	264	397	199	299	140	211
	9	115	173	421	632	346	520	259	389	196	294	138	208
	10	112	168	406	611	335	503	253	380	192	288	136	205
	11	108	162	391	588	323	485	247	371	188	282	134	201
	12	103	155	375	564	311	467	240	361	183	275	131	197
	13	98.4	148	359	539	298	447	231	348	178	268	128	193
	14	93.2	140	342	514	284	427	221	333	173	260	125	188
	15	87.6	132	324	487	270	406	211	317	168	252	122	183
	16	81.5	123	307	461	257	386	201	302	162	243	118	178
	17	74.9	113	289	434	242	364	190	286	155	233	114	172
	18	67.8	102	271	408	228	343	179	270	149	223	111	166
	19	60.9	91.5	254	381	214	322	169	254	142	213	106	160
	20	55.0	82.6	236	355	201	302	158	238	134	202	102	153
	21	49.9	74.9	220	330	187	281	148	223	126	189	97.5	147
	22	45.4	68.3	203	305	174	261	138	207	118	177	92.8	139
	23	41.6	62.5	187	282	161	242	128	193	109	164	87.9	132
	24	38.2	57.4	172	259	149	223	119	178	101	152	82.7	124
	25	35.2	52.9	159	239	137	206	110	165	93.7	141	77.3	116
	26	32.5	48.9	147	221	127	190	101	152	86.6	130	71.8	108
	27	30.2	45.3	136	205	117	177	94.0	141	80.3	121	66.6	100
	28	28.0	42.1	127	190	109	164	87.4	131	74.7	112	61.9	93.1
	29	26.1	39.3	118	177	102	153	81.5	122	69.6	105	57.7	86.7
	30			110	166	95.2	143	76.1	114	65.0	97.8	53.9	81.1
	32			96.9	146	83.6	126	66.9	101	57.2	85.9	47.4	71.2
	34			85.9	129	74.1	111	59.3	89.1	50.6	76.1	42.0	63.1
	36			76.6	115	66.1	99.3	52.9	79.5	45.2	67.9	37.5	56.3
	38			68.7	103	59.3	89.1	47.4	71.3	40.5	60.9	33.6	50.5
	40			62.0	93.2	53.5	80.4	42.8	64.4	36.6	55.0	30.3	45.6
Properties													
A_g, in.^{2}		11.5		27.1		22.1		17.0		14.3		11.5	
I_x, in.^{4}		483		949		800		632		539		442	
I_y, in.^{4}		36.2		163		140		112		96.1		79.5	
r_y, in.		1.77		2.45		2.52		2.57		2.59		2.63	
r_x/r_y		3.66		2.42		2.39		2.37		2.37		2.36	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

HSS16

Shape		HSS16×12×										HSS16×4×	
		0.625		0.500		0.375 [c1]		0.312 [c1]		0.250 [c1]		0.375 [c1]	
t_{design}, in.		0.625		0.500		0.375		0.312		0.250		0.375	
lb/ft		111		90.7		69.2		58.1		46.9		48.4	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	577	867	469	705	359	540	275	413	191	287	251	378
	6	567	852	461	693	353	531	272	408	189	285	219	330
	7	563	847	458	689	351	528	271	407	189	284	209	314
	8	559	841	455	684	349	525	269	405	188	283	197	297
	9	555	834	452	679	346	520	268	402	188	282	185	278
	10	550	826	448	673	343	516	266	400	187	281	172	259
	11	544	818	443	666	340	511	264	397	186	280	159	239
	12	538	809	439	659	336	506	262	394	185	278	146	219
	13	532	800	433	651	333	500	260	391	184	277	132	199
	14	525	789	428	643	329	494	258	388	183	275	120	180
	15	518	779	422	635	324	487	255	384	182	273	107	161
	16	510	767	416	626	320	481	253	380	181	272	95.2	143
	17	503	755	410	616	315	473	250	376	179	269	84.4	127
	18	494	743	403	606	310	466	247	371	178	267	75.3	113
	19	486	730	396	596	305	458	244	367	176	265	67.6	102
	20	477	716	389	585	299	450	241	362	175	263	61.0	91.7
	21	467	703	382	574	294	442	237	357	173	260	55.3	83.2
	22	458	688	374	563	288	433	234	351	171	257	50.4	75.8
	23	448	674	367	551	282	424	230	346	169	255	46.1	69.3
	24	438	659	359	539	276	416	226	340	167	252	42.4	63.7
	25	428	644	351	527	270	406	222	334	165	249	39.0	58.7
	26	418	628	343	515	264	397	218	328	163	245	36.1	54.2
	27	408	612	334	502	258	388	214	322	160	241	33.5	50.3
	28	397	597	326	490	251	378	210	315	158	237	31.1	46.8
	29	386	581	317	477	245	368	205	309	155	232		
	30	376	565	309	464	239	359	201	302	152	228		
	32	354	532	291	438	225	339	190	286	145	219		
	34	333	500	274	412	212	319	179	269	139	209		
	36	311	468	257	386	199	299	168	253	132	199		
	38	290	436	240	360	186	280	158	237	125	188		
	40	269	405	223	335	173	261	147	221	118	177		
Properties													
A_g, in.^{2}		32.1		26.1		20.0		16.7		13.5		14.0	
I_x, in.^{4}		1140		948		741		629		514		374	
I_y, in.^{4}		730		610		477		406		332		39.9	
r_y, in.		4.77		4.83		4.88		4.93		4.96		1.69	
r_x/r_y		1.25		1.25		1.25		1.25		1.24		3.06	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS16-HSS14

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

F_y = 30 ksi

Shape		HSS16×4×						HSS14×10×					
		0.312 [c1]		0.250 [c1]		0.180 [c1]		0.625		0.500		0.375	
t_{design}, in.		0.312		0.250		0.180		0.625		0.500		0.375	
lb/ft		40.8		33.1		24.1		94.0		76.8		58.8	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	187	281	129	195	75.9	114	487	732	397	597	305	459
	6	172	259	121	182	71.9	108	475	714	387	582	298	448
	7	167	250	118	177	70.5	106	471	707	384	577	296	445
	8	160	241	114	172	68.9	104	466	700	380	572	293	440
	9	154	231	110	166	67.0	101	460	692	376	565	290	435
	10	146	219	106	159	65.0	97.7	454	683	371	558	286	430
	11	136	205	101	152	62.7	94.3	448	673	366	550	282	424
	12	125	188	95.6	144	60.3	90.6	440	662	360	542	278	418
	13	114	172	89.8	135	57.6	86.6	433	651	354	532	273	411
	14	103	155	83.5	125	54.8	82.3	425	639	348	523	269	404
	15	93.0	140	76.7	115	51.7	77.7	416	626	341	513	264	396
	16	83.0	125	69.3	104	48.5	72.8	408	613	334	502	258	388
	17	73.7	111	61.7	92.7	45.0	67.6	398	599	327	491	253	380
	18	65.7	98.8	55.0	82.7	41.2	62.0	389	584	319	480	247	371
	19	59.0	88.7	49.4	74.2	37.3	56.0	379	569	311	468	241	362
	20	53.3	80.0	44.6	67.0	33.6	50.6	369	554	303	456	235	353
	21	48.3	72.6	40.4	60.8	30.5	45.9	358	539	295	443	229	344
	22	44.0	66.1	36.8	55.4	27.8	41.8	348	523	287	431	223	334
	23	40.3	60.5	33.7	50.7	25.4	38.2	337	507	278	418	216	325
	24	37.0	55.6	31.0	46.5	23.4	35.1	326	490	269	405	210	315
	25	34.1	51.2	28.5	42.9	21.5	32.4	315	474	261	392	203	305
	26	31.5	47.4	26.4	39.6	19.9	29.9	304	458	252	378	196	295
	27	29.2	43.9	24.5	36.8	18.5	27.7	293	441	243	365	190	285
	28	27.2	40.8	22.7	34.2	17.2	25.8	282	424	234	352	183	275
	29			21.2	31.9	16.0	24.0	271	408	225	339	176	265
	30							261	392	216	325	170	255
	32							239	359	199	299	156	235
	34							218	328	182	274	143	215
	36							198	297	166	249	131	197
	38							179	269	150	226	119	178
	40							161	242	136	204	107	161

Properties						
A_g, in.^{2}	11.8	9.54	6.96	27.1	22.1	17.0
I_x, in.^{4}	321	266	198	711	598	470
I_y, in.^{4}	34.8	29.1	22.0	422	356	281
r_y, in.	1.72	1.75	1.78	3.95	4.01	4.07
r_x/r_y	3.03	3.02	2.99	1.30	1.30	1.29

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

HSS14

Shape		HSS14×10×				HSS14×6×							
		0.312 [c1]		0.250 [c1]		0.625		0.500		0.375		0.312 [c1]	
t_{design}, in.		0.312		0.250		0.625		0.500		0.375		0.312	
lb/ft		49.4		40.0		76.6		62.9		48.4		40.8	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	251	377	181	272	397	597	325	489	251	378	206	310
	6	247	371	178	268	371	558	305	458	236	355	197	296
	7	245	368	177	266	362	544	298	447	231	347	194	292
	8	243	365	176	265	352	529	290	435	225	339	190	286
	9	241	362	175	263	341	512	281	422	219	329	185	278
	10	239	359	173	260	329	494	271	408	212	318	179	269
	11	236	355	172	258	316	475	261	393	204	307	173	260
	12	234	351	170	255	303	455	251	377	196	295	166	250
	13	230	346	168	252	289	434	240	360	188	283	160	240
	14	226	340	166	249	275	413	228	343	180	270	153	229
	15	222	334	164	246	260	391	217	326	171	257	145	218
	16	218	327	161	243	245	369	205	308	162	243	138	207
	17	213	320	159	239	231	346	193	290	153	230	130	196
	18	208	313	156	235	216	324	181	272	144	217	123	185
	19	204	306	154	231	201	303	169	255	135	203	116	174
	20	199	298	151	227	187	281	158	237	126	190	108	163
	21	193	291	148	222	173	260	147	220	118	177	101	152
	22	188	283	145	218	160	240	136	204	109	164	94.0	141
	23	183	275	142	213	147	221	125	188	101	152	87.2	131
	24	177	266	138	208	135	203	115	173	93.4	140	80.6	121
	25	172	258	135	203	124	187	106	159	86.1	129	74.3	112
	26	166	250	131	198	115	173	98.1	147	79.6	120	68.7	103
	27	161	241	128	192	107	160	90.9	137	73.8	111	63.7	95.8
	28	155	233	124	187	99.1	149	84.6	127	68.6	103	59.3	89.1
	29	149	225	120	181	92.4	139	78.8	118	64.0	96.2	55.2	83.0
	30	144	216	117	175	86.3	130	73.7	111	59.8	89.9	51.6	77.6
	32	133	200	108	163	75.9	114	64.7	97.3	52.6	79.0	45.4	68.2
	34	122	183	100	150	67.2	101	57.3	86.2	46.6	70.0	40.2	60.4
	36	111	167	91.0	137	59.9	90.1	51.2	76.9	41.5	62.4	35.8	53.9
	38	101	152	82.9	125	53.8	80.8	45.9	69.0	37.3	56.0	32.2	48.4
	40	91.7	138	75.2	113	48.5	73.0	41.4	62.3	33.6	50.6	29.0	43.6
Properties													
A_g, in.^{2}		14.3		11.5		22.1		18.1		14.0		11.8	
I_x, in.^{4}		401		328		487		415		331		284	
I_y, in.^{4}		240		197		127		109		88.0		75.9	
r_y, in.		4.10		4.14		2.40		2.45		2.51		2.54	
r_x/r_y		1.29		1.29		1.95		1.96		1.94		1.93	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS14-HSS12

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

F_y = 30 ksi

Shape		HSS14×6×				HSS12×8×							
		0.250 [c1]		0.180 [c1]		0.625		0.500		0.375		0.312	
t_{design}, in.		0.250		0.180		0.625		0.500		0.375		0.312	
lb/ft		33.1		24.1		76.6		62.9		48.4		40.8	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	146	219	88.3	133	397	597	325	489	251	378	212	319
	6	141	211	85.6	129	382	573	313	470	242	364	204	307
	7	139	208	84.6	127	376	565	309	464	239	359	202	303
	8	136	205	83.5	126	370	556	304	457	235	354	199	299
	9	134	201	82.3	124	363	546	298	448	231	348	195	293
	10	131	197	80.9	122	355	534	292	439	227	341	192	288
	11	128	193	79.4	119	347	522	286	430	222	334	188	282
	12	125	188	77.7	117	339	509	279	419	217	326	183	275
	13	121	182	75.9	114	329	495	272	408	211	317	179	268
	14	117	176	74.0	111	320	480	264	397	205	309	174	261
	15	113	170	72.0	108	310	465	256	385	199	300	169	254
	16	109	164	69.8	105	299	450	248	372	193	290	164	246
	17	104	157	67.6	102	288	433	239	359	187	281	158	238
	18	100	150	65.2	98.0	277	417	230	346	180	271	153	229
	19	94.7	142	62.7	94.3	266	400	221	333	173	260	147	221
	20	88.9	134	60.1	90.4	255	383	212	319	166	250	141	212
	21	83.1	125	57.4	86.3	244	366	203	306	160	240	136	204
	22	77.5	116	54.6	82.1	232	349	194	292	153	229	130	195
	23	72.0	108	51.7	77.8	221	332	185	278	146	219	124	186
	24	66.6	100	48.7	73.3	210	316	176	265	139	209	118	178
	25	61.5	92.5	45.6	68.6	199	299	167	251	132	198	113	169
	26	56.9	85.5	42.4	63.8	188	283	158	238	125	188	107	161
	27	52.7	79.3	39.4	59.2	177	266	150	225	119	178	101	152
	28	49.0	73.7	36.6	55.0	167	251	141	212	112	168	95.8	144
	29	45.7	68.7	34.1	51.3	157	235	133	200	106	159	90.4	136
	30	42.7	64.2	31.9	47.9	147	221	125	187	99.3	149	85.2	128
	32	37.5	56.4	28.0	42.1	129	194	110	165	87.6	132	75.2	113
	34	33.3	50.0	24.8	37.3	114	172	97.2	146	77.6	117	66.6	100
	36	29.7	44.6	22.2	33.3	102	153	86.7	130	69.2	104	59.4	89.3
	38	26.6	40.0	19.9	29.9	91.5	138	77.8	117	62.1	93.3	53.3	80.1
	40	24.0	36.1	17.9	27.0	82.6	124	70.2	106	56.0	84.2	48.1	72.3
Properties													
A_g, in.^{2}		9.54		6.96		22.1		18.1		14.0		11.8	
I_x, in.^{4}		234		174		406		345		275		235	
I_y, in.^{4}		62.9		47.1		216		184		147		126	
r_y, in.		2.57		2.60		3.13		3.19		3.24		3.27	
r_x/r_y		1.93		1.92		1.37		1.37		1.37		1.36	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

HSS12

Shape		HSS12×8×				HSS12×4×							
		0.250 [c1]		0.180 [c1]		0.375		0.312		0.250 [c1]		0.180 [c1]	
t_{design}, in.		0.250		0.180		0.375		0.312		0.250		0.180	
lb/ft		33.1		24.1		38.0		32.1		26.1		19.1	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	162	243	98.9	149	198	297	166	250	126	189	74.6	112
	6	157	237	97.2	146	171	257	145	218	115	172	69.4	104
	7	156	234	96.6	145	163	244	138	207	111	167	67.6	102
	8	154	232	95.9	144	153	230	130	196	106	160	65.5	98.4
	9	152	229	95.1	143	143	215	122	183	100	151	63.1	94.9
	10	150	226	94.3	142	133	199	113	170	93.5	141	60.5	91.0
	11	148	222	93.1	140	122	183	105	157	86.5	130	57.6	86.6
	12	145	218	91.7	138	111	167	95.7	144	79.4	119	54.5	82.0
	13	142	214	90.3	136	101	152	86.9	131	72.4	109	51.2	76.9
	14	139	209	88.7	133	90.6	136	78.4	118	65.5	98.5	47.5	71.5
	15	136	205	87.0	131	80.7	121	70.1	105	58.8	88.4	43.7	65.7
	16	133	200	85.2	128	71.4	107	62.3	93.6	52.5	78.8	39.6	59.5
	17	129	193	83.4	125	63.2	95.0	55.2	82.9	46.6	70.0	35.3	53.0
	18	124	187	81.4	122	56.4	84.8	49.2	74.0	41.5	62.4	31.5	47.3
	19	120	180	79.3	119	50.6	76.1	44.2	66.4	37.3	56.0	28.2	42.5
	20	115	173	77.2	116	45.7	68.7	39.9	59.9	33.6	50.6	25.5	38.3
	21	111	166	75.0	113	41.4	62.3	36.2	54.4	30.5	45.9	23.1	34.8
	22	106	159	72.7	109	37.8	56.7	33.0	49.5	27.8	41.8	21.1	31.7
	23	101	152	70.3	106	34.5	51.9	30.1	45.3	25.4	38.2	19.3	29.0
	24	96.6	145	67.9	102	31.7	47.7	27.7	41.6	23.4	35.1	17.7	26.6
	25	92.0	138	65.4	98.2	29.2	43.9	25.5	38.4	21.5	32.4	16.3	24.5
	26	87.5	131	62.8	94.4	27.0	40.6	23.6	35.5	19.9	29.9	15.1	22.7
	27	83.0	125	60.2	90.4	25.1	37.7	21.9	32.9	18.5	27.7	14.0	21.0
	28	78.6	118	57.5	86.4			20.3	30.6	17.2	25.8	13.0	19.6
	29	74.2	112	54.7	82.3							12.1	18.2
	30	70.0	105	51.9	78.1								
	32	61.9	93.0	46.2	69.5								
	34	54.8	82.4	41.0	61.6								
	36	48.9	73.5	36.6	54.9								
	38	43.9	66.0	32.8	49.3								
	40	39.6	59.6	29.6	44.5								
Properties													
A_g, in.^{2}		9.54		6.96		11.0		9.26		7.54		5.52	
I_x, in.^{4}		194		144		173		150		125		93.6	
I_y, in.^{4}		104		77.7		30.0		26.2		22.1		16.8	
r_y, in.		3.30		3.34		1.65		1.68		1.71		1.74	
r_x/r_y		1.37		1.36		2.41		2.39		2.38		2.37	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS10

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

F_y = 30 ksi

Shape		HSS10×6×											
		0.625		0.500		0.375		0.312		0.250		0.180 [c1]	
t_{design}, in.		0.625		0.500		0.375		0.312		0.250		0.180	
lb/ft		59.3		49.0		38.0		32.1		26.1		19.1	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	307	462	253	381	198	297	166	250	135	204	86.4	130
	6	285	429	236	355	185	278	156	234	127	191	82.8	125
	7	278	418	230	346	180	271	152	229	124	187	81.6	123
	8	269	405	224	336	176	264	148	223	121	182	80.1	120
	9	260	391	217	326	170	256	144	216	117	177	78.5	118
	10	250	376	209	314	164	247	139	209	114	171	76.7	115
	11	240	360	201	301	158	237	134	201	109	164	74.7	112
	12	229	344	192	288	151	228	128	193	105	158	72.6	109
	13	217	327	183	275	145	217	123	184	101	151	70.3	106
	14	206	309	174	261	138	207	117	176	95.9	144	67.8	102
	15	194	291	164	247	130	196	111	167	91.1	137	65.2	98.0
	16	182	273	155	232	123	185	105	157	86.3	130	62.5	93.9
	17	170	255	145	218	116	174	98.7	148	81.4	122	59.6	89.6
	18	158	238	136	204	109	163	92.7	139	76.5	115	56.6	85.1
	19	147	220	126	190	101	152	86.7	130	71.7	108	53.3	80.1
	20	135	203	117	176	94.3	142	80.8	121	66.9	101	49.8	74.9
	21	124	187	108	163	87.4	131	75.0	113	62.3	93.6	46.4	69.8
	22	114	171	99.6	150	80.7	121	69.4	104	57.7	86.8	43.1	64.8
	23	104	157	91.4	137	74.3	112	64.0	96.2	53.3	80.2	39.9	60.0
	24	95.8	144	83.9	126	68.2	103	58.9	88.5	49.1	73.8	36.8	55.3
	25	88.3	133	77.3	116	62.9	94.5	54.3	81.6	45.3	68.0	34.0	51.0
	26	81.7	123	71.5	107	58.2	87.4	50.2	75.4	41.9	62.9	31.4	47.2
	27	75.7	114	66.3	99.6	53.9	81.0	46.5	69.9	38.8	58.3	29.1	43.8
	28	70.4	106	61.6	92.6	50.1	75.4	43.3	65.0	36.1	54.2	27.1	40.7
	29	65.6	98.6	57.5	86.4	46.7	70.3	40.3	60.6	33.6	50.6	25.2	37.9
	30	61.3	92.2	53.7	80.7	43.7	65.6	37.7	56.6	31.4	47.3	23.6	35.4
	32	53.9	81.0	47.2	70.9	38.4	57.7	33.1	49.8	27.6	41.5	20.7	31.1
	34	47.7	71.8	41.8	62.8	34.0	51.1	29.3	44.1	24.5	36.8	18.4	27.6
	36	42.6	64.0	37.3	56.0	30.3	45.6	26.2	39.3	21.8	32.8	16.4	24.6
	38	38.2	57.5	33.5	50.3	27.2	40.9	23.5	35.3	19.6	29.5	14.7	22.1
	40					24.6	36.9	21.2	31.9	17.7	26.6	13.3	19.9
Properties													
A_g, in.^{2}		17.1		14.1		11.0		9.26		7.54		5.52	
I_x, in.^{4}		202		175		142		123		102		76.2	
I_y, in.^{4}		90.5		78.9		64.3		55.7		46.4		34.9	
r_y, in.		2.30		2.37		2.42		2.45		2.48		2.51	
r_x/r_y		1.50		1.49		1.48		1.49		1.48		1.48	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

HSS10-HSS8

Shape		HSS10×6×		HSS8×4×									
		0.120 [c1]		0.375		0.312		0.250		0.180 [c1]		0.120 [c1]	
t_{design}, in.		0.120		0.375		0.312		0.250		0.180		0.120	
lb/ft		12.9		27.6		23.5		19.2		14.1		9.62	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	44.8	67.3	143	215	121	183	99.5	150	71.7	108	38.8	58.4
	6	43.7	65.7	122	184	105	157	86.2	130	63.8	95.9	35.8	53.8
	7	43.3	65.1	116	174	99.2	149	81.9	123	60.7	91.3	34.7	52.2
	8	42.9	64.4	109	163	93.2	140	77.1	116	57.3	86.2	33.5	50.4
	9	42.4	63.7	101	152	86.9	131	72.1	108	53.7	80.7	32.2	48.4
	10	41.8	62.8	93.0	140	80.4	121	66.8	100	49.9	75.0	30.7	46.1
	11	41.1	61.8	85.0	128	73.7	111	61.5	92.4	46.1	69.2	29.1	43.7
	12	40.4	60.8	77.0	116	67.0	101	56.1	84.3	42.2	63.4	27.3	41.1
	13	39.7	59.6	69.2	104	60.4	90.8	50.8	76.3	38.3	57.6	25.5	38.3
	14	38.8	58.3	61.7	92.7	54.1	81.3	45.6	68.6	34.5	51.9	23.5	35.3
	15	37.9	56.9	54.4	81.8	48.0	72.1	40.6	61.1	30.9	46.4	21.4	32.2
	16	36.9	55.4	47.9	72.0	42.3	63.6	36.0	54.0	27.4	41.2	19.3	28.9
	17	35.7	53.6	42.4	63.8	37.5	56.3	31.8	47.9	24.3	36.5	17.1	25.7
	18	34.3	51.5	37.9	56.9	33.4	50.2	28.4	42.7	21.7	32.6	15.3	22.9
	19	32.9	49.4	34.0	51.1	30.0	45.1	25.5	38.3	19.5	29.3	13.7	20.6
	20	31.4	47.2	30.7	46.1	27.1	40.7	23.0	34.6	17.6	26.4	12.4	18.6
	21	29.9	44.9	27.8	41.8	24.5	36.9	20.9	31.4	15.9	23.9	11.2	16.8
	22	28.3	42.6	25.3	38.1	22.4	33.6	19.0	28.6	14.5	21.8	10.2	15.3
	23	26.7	40.2	23.2	34.8	20.5	30.8	17.4	26.1	13.3	20.0	9.34	14.0
	24	25.1	37.7	21.3	32.0	18.8	28.2	16.0	24.0	12.2	18.3	8.58	12.9
	25	23.4	35.2	19.6	29.5	17.3	26.0	14.7	22.1	11.2	16.9	7.91	11.9
	26	21.7	32.6	18.1	27.3	16.0	24.1	13.6	20.5	10.4	15.6	7.31	11.0
	27	20.1	30.3			14.8	22.3	12.6	19.0	9.64	14.5	6.78	10.2
	28	18.7	28.2							8.96	13.5	6.30	9.48
	29	17.5	26.2										
	30	16.3	24.5										
	32	14.3	21.6										
	34	12.7	19.1										
	36	11.3	17.0										
	38	10.2	15.3										
	40	9.18	13.8										
Properties													
A_g, in.^{2}		3.73		7.95		6.76		5.54		4.08		2.77	
I_x, in.^{4}		52.5		59.9		52.5		44.2		33.6		23.5	
I_y, in.^{4}		24.1		20.1		17.7		15.0		11.5		8.10	
r_y, in.		2.54		1.59		1.62		1.65		1.68		1.71	
r_x/r_y		1.480		1.72		1.72		1.71		1.71		1.70	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS7-HSS6

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

F_y = 30 ksi

Shape		HSS7×4×										HSS6×3×	
		0.375		0.312		0.250		0.180		0.120 [c1]		0.250	
t_{design}, in.		0.375		0.312		0.250		0.180		0.120		0.250	
lb/ft		25.0		21.3		17.5		12.9		8.78		14.0	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	129	194	110	166	90.5	136	66.8	100	38.5	57.8	72.6	109
	6	110	166	94.5	142	78.0	117	58.0	87.2	35.1	52.8	55.6	83.6
	7	104	156	89.4	134	74.0	111	55.1	82.8	34.0	51.0	50.5	75.9
	8	97.3	146	83.8	126	69.5	104	52.0	78.1	32.6	49.0	45.2	67.9
	9	90.2	136	77.9	117	64.8	97.4	48.6	73.0	31.1	46.8	39.9	59.9
	10	82.9	125	71.9	108	59.9	90.1	45.1	67.8	29.5	44.3	34.6	52.0
	11	75.5	113	65.7	98.7	54.9	82.6	41.5	62.4	27.7	41.7	29.6	44.5
	12	68.1	102	59.5	89.4	50.0	75.1	37.9	57.0	25.8	38.8	25.1	37.7
	13	60.9	91.6	53.5	80.3	45.1	67.7	34.4	51.7	23.8	35.8	21.4	32.1
	14	54.0	81.2	47.6	71.6	40.3	60.6	30.9	46.5	21.6	32.5	18.4	27.7
	15	47.5	71.4	42.0	63.2	35.8	53.7	27.6	41.5	19.4	29.1	16.0	24.1
	16	41.8	62.8	37.0	55.6	31.5	47.4	24.4	36.7	17.2	25.9	14.1	21.2
	17	37.0	55.6	32.8	49.3	27.9	42.0	21.6	32.5	15.3	22.9	12.5	18.8
	18	33.0	49.6	29.2	43.9	24.9	37.4	19.3	29.0	13.6	20.5	11.1	16.7
	19	29.6	44.5	26.2	39.4	22.4	33.6	17.3	26.0	12.2	18.4	10.0	15.0
	20	26.7	40.2	23.7	35.6	20.2	30.3	15.6	23.5	11.0	16.6	9.02	13.6
	21	24.2	36.4	21.5	32.3	18.3	27.5	14.2	21.3	10.0	15.0		
	22	22.1	33.2	19.6	29.4	16.7	25.1	12.9	19.4	9.11	13.7		
	23	20.2	30.4	17.9	26.9	15.3	22.9	11.8	17.8	8.34	12.5		
	24	18.6	27.9	16.4	24.7	14.0	21.1	10.9	16.3	7.65	11.5		
	25	17.1	25.7	15.2	22.8	12.9	19.4	10.0	15.0	7.05	10.6		
	26	15.8	23.8	14.0	21.1	11.9	17.9	9.25	13.9	6.52	9.80		
	27					11.1	16.6	8.58	12.9	6.05	9.09		
	28									5.62	8.45		
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		7.20		6.14		5.04		3.72		2.53		4.04	
I_x, in.^{4}		42.5		37.4		31.7		24.2		16.9		17.4	
I_y, in.^{4}		17.6		15.6		13.3		10.2		7.19		5.88	
r_y, in.		1.56		1.59		1.62		1.66		1.69		1.21	
r_x/r_y		1.56		1.55		1.55		1.54		1.53		1.72	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-3 (continued)
Available Strength in Axial Compression, kips
Rectangular HSS (Press Braked)

HSS6

Shape		HSS6×3×				HSS6×2×					
		0.180		0.120 [c1]		0.250		0.180		0.120 [c1]	
t_{design}, in.		0.180		0.120		0.250		0.180		0.120	
lb/ft		10.4		7.12		12.3		9.15		6.29	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	53.9	81.0	33.7	50.6	63.6	95.6	47.4	71.3	29.4	44.2
	6	41.8	62.9	28.3	42.5	34.4	51.7	26.9	40.5	19.2	28.8
	7	38.2	57.3	26.4	39.7	27.6	41.4	21.9	33.0	15.9	23.8
	8	34.3	51.6	24.0	36.0	21.4	32.2	17.3	26.1	12.7	19.1
	9	30.5	45.8	21.4	32.1	16.9	25.5	13.7	20.6	10.1	15.2
	10	26.6	40.0	18.8	28.3	13.7	20.6	11.1	16.7	8.17	12.3
	11	23.0	34.5	16.3	24.6	11.3	17.0	9.17	13.8	6.75	10.1
	12	19.5	29.4	14.0	21.0	9.53	14.3	7.71	11.6	5.67	8.53
	13	16.7	25.0	11.9	17.9	8.12	12.2	6.57	9.87	4.83	7.26
	14	14.4	21.6	10.3	15.5					4.17	6.26
	15	12.5	18.8	8.97	13.5						
	16	11.0	16.5	7.88	11.8						
	17	9.74	14.6	6.98	10.5						
	18	8.69	13.1	6.23	9.36						
	19	7.80	11.7	5.59	8.40						
	20	7.04	10.6	5.04	7.58						
	21			4.58	6.88						
	22										
	23										
	24										
	25										
	26										
	27										
	28										
	29										
	30										
	32										
	34										
	36										
	38										
	40										
Properties											
A_g, in.^{2}		3.00		2.05		3.54		2.64		1.81	
I_x, in.^{4}		13.5		9.61		13.3		10.5		7.53	
I_y, in.^{4}		4.61		3.30		2.25		1.82		1.34	
r_y, in.		1.24		1.27		0.797		0.830		0.860	
r_x/r_y		1.71		1.71		2.43		2.40		2.37	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS12-HSS10

Table 4-4
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS12×12×								HSS10×10×			
		0.500		0.375		0.312		0.250 [c1]		0.500		0.375	
t_{design}, in.		0.500		0.375		0.312		0.250		0.500		0.375	
lb/ft		76.9		59.2		49.5		40.2		63.1		48.8	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	399	599	307	462	257	386	185	278	327	491	253	381
	6	392	589	302	454	252	379	183	276	318	479	247	371
	7	389	585	300	451	251	377	183	275	315	474	245	368
	8	386	580	298	447	249	374	182	274	312	469	242	364
	9	383	576	295	444	247	371	181	272	308	463	239	359
	10	379	570	293	440	245	368	180	271	304	456	236	355
	11	375	564	290	435	242	364	179	270	299	449	232	349
	12	371	558	286	430	240	360	178	268	294	442	229	344
	13	366	551	283	425	237	356	177	266	289	434	225	338
	14	361	543	279	420	234	351	176	264	283	425	220	331
	15	356	535	275	414	230	346	174	262	277	416	216	324
	16	351	527	271	407	227	341	173	260	271	407	211	317
	17	345	519	267	401	223	336	171	257	264	397	206	310
	18	339	510	262	394	220	330	170	255	257	387	201	302
	19	333	500	258	387	216	324	168	252	250	376	196	294
	20	326	491	253	380	212	318	166	249	243	366	190	286
	21	320	481	248	372	208	312	164	246	236	355	185	278
	22	313	470	243	364	203	306	162	243	229	344	179	270
	23	306	460	237	357	199	299	159	240	221	332	174	261
	24	299	449	232	348	195	292	157	236	214	321	168	253
	25	292	438	226	340	190	286	155	232	206	310	162	244
	26	284	427	221	332	185	279	151	227	198	298	156	235
	27	277	416	215	323	181	272	147	222	191	287	151	226
	28	269	405	209	315	176	265	144	216	183	275	145	218
	29	262	393	204	306	171	257	140	210	176	264	139	209
	30	254	382	198	297	166	250	136	204	168	253	133	201
	32	239	359	186	280	157	236	128	193	153	231	122	184
	34	223	336	175	263	147	221	120	181	139	209	111	167
	36	208	313	163	245	137	207	113	169	126	189	101	151
	38	193	291	152	228	128	192	105	158	113	170	90.6	136
	40	179	269	141	211	119	178	97.6	147	102	153	81.8	123
Properties													
A_g, in.^{2}		22.2		17.1		14.3		11.6		18.2		14.1	
$I_x = I_y$, in.^{4}		479		380		321		265		267		214	
$r_x = r_y$, in.		4.65		4.71		4.74		4.78		3.83		3.90	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

HSS10-HSS9

Shape		HSS10×10×				HSS9×9×							
		0.312		0.250		0.500		0.375		0.312		0.250	
t_{design}, in.		0.312		0.250		0.500		0.375		0.312		0.250	
lb/ft		40.8		33.3		56.1		43.6		36.5		29.8	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	212	319	172	259	291	437	226	340	189	284	154	232
	6	207	311	168	253	281	423	219	330	183	275	150	225
	7	205	308	167	250	278	418	217	326	181	272	148	222
	8	203	305	165	248	274	412	214	321	178	268	146	220
	9	200	301	163	245	270	406	211	317	176	264	144	216
	10	198	297	161	242	265	399	207	311	173	260	142	213
	11	195	293	159	238	260	391	203	306	170	255	139	209
	12	192	288	156	235	255	383	199	300	166	250	136	205
	13	188	283	153	231	249	374	195	293	163	245	134	201
	14	185	278	151	226	243	365	190	286	159	239	131	196
	15	181	272	148	222	236	355	185	279	155	233	127	191
	16	177	266	144	217	230	345	180	271	151	227	124	186
	17	173	260	141	212	223	335	175	263	146	220	121	181
	18	169	254	138	207	216	324	170	255	142	214	117	176
	19	165	247	134	202	208	313	164	247	138	207	113	170
	20	160	241	131	197	201	302	159	239	133	200	110	165
	21	156	234	127	191	193	291	153	230	128	193	106	159
	22	151	227	124	186	186	279	148	222	124	186	102	153
	23	146	220	120	180	178	268	142	213	119	179	98.2	148
	24	142	213	116	174	171	257	136	204	114	171	94.3	142
	25	137	206	112	168	163	245	130	196	109	164	90.4	136
	26	132	198	108	163	156	234	124	187	104	157	86.6	130
	27	127	191	104	157	148	223	119	179	100	150	82.7	124
	28	122	184	100	151	141	212	113	170	95.0	143	78.9	119
	29	118	177	96.6	145	134	201	108	162	90.4	136	75.2	113
	30	113	169	92.8	139	126	190	102	153	85.9	129	71.5	107
	32	103	155	85.2	128	113	169	91.5	138	77.0	116	64.3	96.6
	34	94.2	142	77.8	117	100	150	81.5	122	68.7	103	57.4	86.3
	36	85.4	128	70.7	106	89.2	134	72.7	109	61.3	92.1	51.3	77.0
	38	77.0	116	63.8	95.9	80.1	120	65.2	98.0	55.0	82.6	46.0	69.1
	40	69.5	104	57.6	86.6	72.3	109	58.9	88.5	49.6	74.6	41.5	62.4
Properties													
A_g, in.^{2}		11.8		9.59		16.2		12.6		10.5		8.59	
$I_x = I_y$, in.^{4}		182		151		189		154		130		109	
$r_x = r_y$, in.		3.93		3.97		3.42		3.50		3.52		3.56	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS8-HSS7

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS8×8×										HSS7×7×	
		0.500		0.375		0.312		0.250		0.180 [c1]		0.500	
t_{design}, in.		0.500		0.375		0.312		0.250		0.180		0.500	
lb/ft		49.2		38.4		32.2		26.3		19.2		42.3	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	255	383	199	300	167	251	136	205	94.8	142	219	329
	6	244	367	191	288	160	241	131	197	92.7	139	207	311
	7	241	362	189	283	158	237	129	194	91.9	138	203	305
	8	236	355	185	279	155	233	127	191	91.0	137	198	297
	9	232	348	182	273	152	229	125	188	90.0	135	192	289
	10	226	340	178	268	149	224	122	184	88.8	133	187	281
	11	221	332	174	261	146	219	119	180	87.4	131	181	271
	12	215	323	169	255	142	213	117	175	85.3	128	174	262
	13	208	313	165	247	138	207	113	170	83.0	125	167	251
	14	202	303	160	240	134	201	110	165	80.7	121	160	241
	15	195	293	154	232	130	195	107	160	78.2	118	153	230
	16	188	282	149	224	125	188	103	155	75.6	114	145	219
	17	181	271	144	216	121	181	99.4	149	73.0	110	138	207
	18	173	260	138	207	116	174	95.7	144	70.3	106	130	196
	19	166	249	132	199	111	167	91.9	138	67.6	102	123	185
	20	158	238	127	190	106	160	88.1	132	64.8	97.4	115	173
	21	151	226	121	182	102	153	84.2	127	62.0	93.3	108	162
	22	143	215	115	173	96.9	146	80.4	121	59.2	89.1	101	152
	23	135	204	109	164	92.2	139	76.5	115	56.5	84.9	93.9	141
	24	128	193	104	156	87.4	131	72.7	109	53.7	80.7	87.1	131
	25	121	182	98.1	147	82.8	124	68.9	104	50.9	76.6	80.5	121
	26	114	171	92.6	139	78.2	117	65.2	98.0	48.2	72.5	74.4	112
	27	107	160	87.2	131	73.7	111	61.5	92.4	45.6	68.5	69.0	104
	28	99.9	150	81.9	123	69.3	104	57.9	87.1	43.0	64.6	64.2	96.5
	29	93.3	140	76.8	115	65.0	97.7	54.4	81.8	40.4	60.7	59.8	89.9
	30	87.2	131	71.9	108	60.9	91.5	51.0	76.7	37.9	57.0	55.9	84.0
	32	76.7	115	63.2	94.9	53.5	80.4	44.9	67.5	33.4	50.2	49.1	73.9
	34	67.9	102	55.9	84.1	47.4	71.2	39.8	59.7	29.6	44.4	43.5	65.4
	36	60.6	91.0	49.9	75.0	42.3	63.5	35.5	53.3	26.4	39.6	38.8	58.4
	38	54.4	81.7	44.8	67.3	37.9	57.0	31.8	47.8	23.7	35.6	34.9	52.4
	40	49.1	73.7	40.4	60.8	34.2	51.4	28.7	43.2	21.4	32.1	31.5	47.3
Properties													
A_g, in.^{2}		14.2		11.1		9.28		7.59		5.54		12.2	
$I_x = I_y$, in.^{4}		129		106		89.7		75.1		56.0		82.5	
$r_x = r_y$, in.		3.01		3.09		3.11		3.15		3.18		2.60	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

HSS7-HSS6

Shape		HSS7×7×						HSS6×6×					
		0.375		0.312		0.250		0.500		0.375		0.312	
t_{design}, in.		0.375		0.312		0.250		0.500		0.375		0.312	
lb/ft		33.2		27.8		22.9		35.3		28.0		23.5	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	172	259	144	217	118	178	183	275	145	218	122	183
	6	163	245	137	206	112	169	169	254	135	202	113	170
	7	160	240	134	202	110	166	164	247	131	197	110	165
	8	156	235	131	197	108	162	159	238	127	191	107	160
	9	152	229	128	192	105	158	153	229	122	184	103	155
	10	148	222	124	187	102	154	146	220	118	177	99.1	149
	11	143	216	121	181	99.4	149	139	210	113	169	94.9	143
	12	138	208	116	175	96.2	145	132	199	107	161	90.5	136
	13	133	200	112	169	92.8	139	125	188	102	153	85.9	129
	14	128	192	108	162	89.2	134	118	177	96.1	144	81.2	122
	15	123	184	103	155	85.6	129	110	166	90.4	136	76.5	115
	16	117	176	98.6	148	81.8	123	103	154	84.7	127	71.8	108
	17	111	167	93.9	141	78.0	117	95.4	143	79.0	119	67.0	101
	18	106	159	89.1	134	74.2	111	88.1	132	73.4	110	62.4	93.7
	19	99.8	150	84.4	127	70.3	106	81.1	122	67.9	102	57.8	86.8
	20	94.1	141	79.6	120	66.5	99.9	74.2	112	62.6	94.1	53.3	80.1
	21	88.5	133	74.9	113	62.6	94.2	67.7	102	57.4	86.3	49.0	73.6
	22	82.9	125	70.3	106	58.9	88.5	61.7	92.7	52.5	78.9	44.8	67.4
	23	77.5	116	65.7	98.8	55.2	82.9	56.4	84.8	48.0	72.2	41.0	61.6
	24	72.2	108	61.3	92.1	51.6	77.5	51.8	77.9	44.1	66.3	37.7	56.6
	25	67.0	101	57.0	85.6	48.0	72.2	47.8	71.8	40.6	61.1	34.7	52.2
	26	62.1	93.4	52.8	79.4	44.6	67.1	44.2	66.4	37.6	56.5	32.1	48.2
	27	57.6	86.6	49.0	73.6	41.4	62.2	40.9	61.5	34.9	52.4	29.8	44.7
	28	53.6	80.5	45.6	68.5	38.5	57.9	38.1	57.2	32.4	48.7	27.7	41.6
	29	49.9	75.0	42.5	63.8	35.9	54.0	35.5	53.3	30.2	45.4	25.8	38.8
	30	46.7	70.1	39.7	59.7	33.5	50.4	33.2	49.9	28.2	42.4	24.1	36.2
	32	41.0	61.6	34.9	52.4	29.5	44.3	29.2	43.8	24.8	37.3	21.2	31.8
	34	36.3	54.6	30.9	46.4	26.1	39.3	25.8	38.8	22.0	33.0	18.8	28.2
	36	32.4	48.7	27.6	41.4	23.3	35.0	23.0	34.6	19.6	29.5	16.7	25.2
	38	29.1	43.7	24.7	37.2	20.9	31.4					15.0	22.6
	40	26.2	39.4	22.3	33.6	18.9	28.4						
Properties													
A_g, in.^{2}		9.58		8.03		6.59		10.2		8.08		6.78	
$I_x = I_y$, in.^{4}		68.7		58.6		49.4		48.9		41.6		35.6	
$r_x = r_y$, in.		2.68		2.70		2.74		2.19		2.27		2.29	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS6-HSS5

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS6×6×						HSS5×5×					
		0.250		0.180		0.120 [c1]		0.500		0.375		0.312	
t_{design}, in.		0.250		0.180		0.120		0.500		0.375		0.312	
lb/ft		19.4		14.2		9.67		28.4		22.8		19.2	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	100	151	73.7	111	42.6	64.1	147	221	118	178	99.3	149
	6	93.5	140	68.7	103	41.1	61.8	130	195	106	159	89.0	134
	7	91.1	137	67.0	101	40.6	61.0	124	187	101	152	85.5	128
	8	88.4	133	65.0	97.7	40.0	60.1	118	177	96.7	145	81.6	123
	9	85.4	128	62.9	94.6	39.3	59.0	111	167	91.7	138	77.5	116
	10	82.2	124	60.6	91.1	38.4	57.8	104	157	86.4	130	73.1	110
	11	78.9	119	58.2	87.5	37.5	56.4	97.2	146	80.9	122	68.6	103
	12	75.3	113	55.7	83.7	36.5	54.9	89.8	135	75.3	113	63.9	96.0
	13	71.7	108	53.0	79.7	35.4	53.2	82.4	124	69.6	105	59.2	88.9
	14	67.9	102	50.3	75.6	34.2	51.4	75.2	113	64.0	96.2	54.5	81.9
	15	64.1	96.3	47.5	71.5	32.7	49.2	68.1	102	58.4	87.8	49.8	74.9
	16	60.2	90.5	44.8	67.3	30.8	46.4	61.2	92.0	53.0	79.7	45.3	68.1
	17	56.4	84.8	42.0	63.1	29.0	43.5	54.7	82.2	47.8	71.9	41.0	61.6
	18	52.6	79.1	39.2	58.9	27.1	40.7	48.8	73.4	42.9	64.4	36.8	55.3
	19	48.9	73.4	36.5	54.8	25.3	38.0	43.8	65.8	38.5	57.8	33.0	49.7
	20	45.2	67.9	33.8	50.8	23.5	35.3	39.5	59.4	34.7	52.2	29.8	44.8
	21	41.6	62.6	31.2	46.9	21.7	32.6	35.9	53.9	31.5	47.3	27.0	40.6
	22	38.2	57.4	28.7	43.2	20.0	30.1	32.7	49.1	28.7	43.1	24.6	37.0
	23	35.0	52.6	26.3	39.6	18.4	27.6	29.9	44.9	26.3	39.5	22.5	33.9
	24	32.1	48.3	24.2	36.4	16.9	25.4	27.5	41.3	24.1	36.2	20.7	31.1
	25	29.6	44.5	22.3	33.5	15.6	23.4	25.3	38.0	22.2	33.4	19.1	28.7
	26	27.4	41.2	20.6	31.0	14.4	21.6	23.4	35.2	20.5	30.9	17.6	26.5
	27	25.4	38.2	19.1	28.7	13.3	20.0	21.7	32.6	19.1	28.6	16.4	24.6
	28	23.6	35.5	17.8	26.7	12.4	18.6	20.2	30.3	17.7	26.6	15.2	22.9
	29	22.0	33.1	16.6	24.9	11.6	17.4	18.8	28.3	16.5	24.8	14.2	21.3
	30	20.6	30.9	15.5	23.3	10.8	16.2			15.4	23.2	13.3	19.9
	32	18.1	27.2	13.6	20.5	9.50	14.3						
	34	16.0	24.1	12.1	18.1	8.41	12.6						
	36	14.3	21.5	10.8	16.2	7.50	11.3						
	38	12.8	19.3	9.65	14.5	6.73	10.1						
	40												
Properties													
A_g, in.^{2}		5.59		4.10		2.79		8.18		6.58		5.53	
$I_x = I_y$, in.^{4}		30.3		22.9		16.0		26.0		22.8		19.6	
$r_x = r_y$, in.		2.33		2.36		2.39		1.78		1.86		1.88	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

HSS5-HSS4

Shape		HSS5×5×						HSS4×4×					
		0.250		0.180		0.120 [c1]		0.500		0.375		0.312	
t_{design}, in.		0.250		0.180		0.120		0.500		0.375		0.312	
lb/ft		15.9		11.7		8.01		21.4		17.6		14.9	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	82.5	124	60.7	91.3	41.3	62.1	111	167	91.3	137	76.9	116
	6	74.2	111	54.8	82.4	37.6	56.5	90.2	136	75.8	114	64.2	96.5
	7	71.4	107	52.8	79.4	36.2	54.5	83.7	126	70.9	107	60.1	90.4
	8	68.3	103	50.6	76.0	34.8	52.3	76.7	115	65.6	98.6	55.8	83.8
	9	65.0	97.7	48.2	72.4	33.2	49.9	69.6	105	60.1	90.4	51.2	77.0
	10	61.5	92.4	45.7	68.6	31.5	47.3	62.3	93.7	54.5	81.9	46.6	70.0
	11	57.8	86.8	43.0	64.6	29.7	44.6	55.2	83.0	48.9	73.5	41.9	63.0
	12	54.0	81.2	40.3	60.5	27.9	41.9	48.3	72.7	43.4	65.3	37.3	56.1
	13	50.2	75.4	37.5	56.4	26.0	39.1	41.8	62.9	38.2	57.4	32.9	49.5
	14	46.3	69.7	34.7	52.2	24.1	36.3	36.1	54.3	33.3	50.0	28.8	43.2
	15	42.6	64.0	32.0	48.1	22.3	33.5	31.5	47.3	29.0	43.5	25.1	37.7
	16	38.9	58.4	29.3	44.0	20.5	30.7	27.6	41.6	25.5	38.3	22.0	33.1
	17	35.3	53.0	26.6	40.1	18.7	28.1	24.5	36.8	22.6	33.9	19.5	29.4
	18	31.8	47.8	24.1	36.3	16.9	25.5	21.8	32.8	20.1	30.2	17.4	26.2
	19	28.6	43.0	21.7	32.7	15.3	23.0	19.6	29.5	18.1	27.1	15.6	23.5
	20	25.8	38.8	19.6	29.5	13.8	20.8	17.7	26.6	16.3	24.5	14.1	21.2
	21	23.4	35.2	17.8	26.7	12.5	18.8	16.0	24.1	14.8	22.2	12.8	19.2
	22	21.3	32.1	16.2	24.4	11.4	17.2	14.6	22.0	13.5	20.2	11.7	17.5
	23	19.5	29.3	14.8	22.3	10.4	15.7			12.3	18.5	10.7	16.0
	24	17.9	26.9	13.6	20.5	9.59	14.4			11.3	17.0	9.80	14.7
	25	16.5	24.8	12.5	18.9	8.84	13.3						
	26	15.3	23.0	11.6	17.4	8.17	12.3						
	27	14.2	21.3	10.8	16.2	7.58	11.4						
	28	13.2	19.8	10.0	15.0	7.05	10.6						
	29	12.3	18.5	9.33	14.0	6.57	9.88						
	30	11.5	17.2	8.71	13.1	6.14	9.23						
	32			7.66	11.5	5.40	8.11						
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		4.59		3.38		2.31		6.18		5.08		4.28	
$I_x = I_y$, in.^{4}		16.9		12.9		9.10		11.6		10.7		9.29	
$r_x = r_y$, in.		1.92		1.95		1.98		1.37		1.45		1.47	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS4-HSS3.5

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS4×4×								HSS3.5×3.5×			
		0.250		0.180		0.120		0.083 [c1]		0.250		0.180	
t_{design}, in.		0.250		0.180		0.120		0.083		0.250		0.180	
lb/ft		12.4		9.23		6.35		4.46		10.7		7.98	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	64.5	96.9	47.8	71.8	32.9	49.4	20.3	30.4	55.5	83.4	41.3	62.1
	6	54.4	81.7	40.6	61.1	28.1	42.3	18.6	28.0	44.2	66.5	33.2	50.0
	7	51.1	76.8	38.3	57.6	26.6	39.9	18.0	27.0	40.7	61.2	30.7	46.2
	8	47.6	71.5	35.8	53.8	24.9	37.4	17.3	25.9	37.1	55.7	28.1	42.2
	9	43.9	66.0	33.2	49.8	23.1	34.8	16.4	24.6	33.3	50.0	25.3	38.1
	10	40.1	60.3	30.4	45.7	21.3	32.0	15.1	22.7	29.5	44.4	22.6	34.0
	11	36.3	54.5	27.7	41.6	19.4	29.2	13.8	20.7	25.9	38.9	19.9	29.9
	12	32.5	48.9	25.0	37.5	17.6	26.4	12.5	18.8	22.4	33.6	17.3	26.0
	13	28.9	43.4	22.3	33.5	15.8	23.7	11.2	16.9	19.1	28.8	14.9	22.4
	14	25.4	38.2	19.7	29.7	14.0	21.1	10.0	15.0	16.5	24.8	12.9	19.3
	15	22.2	33.4	17.3	26.0	12.4	18.6	8.83	13.3	14.4	21.6	11.2	16.8
	16	19.5	29.3	15.2	22.9	10.9	16.4	7.77	11.7	12.6	19.0	9.84	14.8
	17	17.3	26.0	13.5	20.3	9.65	14.5	6.89	10.3	11.2	16.8	8.72	13.1
	18	15.4	23.2	12.0	18.1	8.60	12.9	6.14	9.23	10.0	15.0	7.78	11.7
	19	13.8	20.8	10.8	16.2	7.72	11.6	5.51	8.29	8.96	13.5	6.98	10.5
	20	12.5	18.8	9.75	14.7	6.97	10.5	4.98	7.48	8.09	12.2	6.30	9.47
	21	11.3	17.0	8.84	13.3	6.32	9.50	4.51	6.78	7.34	11.0	5.71	8.59
	22	10.3	15.5	8.06	12.1	5.76	8.66	4.11	6.18			5.21	7.83
	23	9.44	14.2	7.37	11.1	5.27	7.92	3.76	5.65				
	24	8.67	13.0	6.77	10.2	4.84	7.27	3.45	5.19				
	25	7.99	12.0	6.24	9.38	4.46	6.70	3.18	4.79				
	26					4.12	6.20	2.94	4.42				
	27												
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		3.59		2.66		1.83		1.29		3.09		2.30	
$I_x = I_y$, in.^{4}		8.22		6.36		4.55		3.27		5.29		4.14	
$r_x = r_y$, in.		1.51		1.55		1.58		1.59		1.31		1.34	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

HSS3.5-HSS3

Shape		HSS3.5×3.5×				HSS3×3×							
		0.120		0.083 [c1]		0.375		0.250		0.180		0.120	
t_{design}, in.		0.120		0.083		0.375		0.250		0.180		0.120	
lb/ft		5.51		3.89		12.4		8.98		6.74		4.68	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	28.6	42.9	19.7	29.7	64.3	96.7	46.5	69.9	34.9	52.4	24.3	36.5
	6	23.2	34.9	16.4	24.7	44.8	67.4	33.7	50.7	25.8	38.8	18.2	27.4
	7	21.5	32.4	15.3	23.0	39.4	59.2	30.0	45.1	23.2	34.8	16.5	24.7
	8	19.7	29.7	14.1	21.1	33.9	50.9	26.2	39.4	20.4	30.7	14.6	22.0
	9	17.9	26.9	12.8	19.2	28.6	42.9	22.5	33.9	17.7	26.7	12.8	19.2
	10	16.0	24.1	11.5	17.3	23.6	35.5	19.0	28.6	15.1	22.8	11.0	16.5
	11	14.2	21.3	10.2	15.3	19.5	29.3	15.8	23.8	12.7	19.1	9.31	14.0
	12	12.4	18.7	8.97	13.5	16.4	24.7	13.3	20.0	10.7	16.1	7.83	11.8
	13	10.8	16.2	7.80	11.7	14.0	21.0	11.3	17.0	9.10	13.7	6.67	10.0
	14	9.29	14.0	6.74	10.1	12.1	18.1	9.76	14.7	7.85	11.8	5.75	8.65
	15	8.09	12.2	5.87	8.82	10.5	15.8	8.50	12.8	6.84	10.3	5.01	7.53
	16	7.11	10.7	5.16	7.75	9.23	13.9	7.47	11.2	6.01	9.03	4.40	6.62
	17	6.30	9.47	4.57	6.87	8.18	12.3	6.62	10.0	5.32	8.00	3.90	5.86
	18	5.62	8.45	4.08	6.13			5.90	8.87	4.75	7.14	3.48	5.23
	19	5.04	7.58	3.66	5.50							3.12	4.69
	20	4.55	6.84	3.30	4.96								
	21	4.13	6.21	2.99	4.50								
	22	3.76	5.65	2.73	4.10								
	23			2.50	3.75								
	24												
	25												
	26												
	27												
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		1.59		1.12		3.58		2.59		1.94		1.35	
$I_x = I_y$, in.^{4}		3.00		2.17		3.88		3.16		2.51		1.84	
$r_x = r_y$, in.		1.37		1.39		1.04		1.10		1.14		1.17	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS3-HSS2.5

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS3×3×		HSS2.5×2.5×									
		0.080		0.250		0.180		0.120		0.080		0.060	
t_{design}, in.		0.080		0.250		0.180		0.120		0.080		0.060	
lb/ft		3.19		7.24		5.49		3.85		2.64		2.00	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	16.5	24.9	37.5	56.4	28.4	42.7	19.9	30.0	13.7	20.5	10.3	15.6
	1	16.4	24.7	37.0	55.7	28.0	42.1	19.7	29.6	13.5	20.3	10.2	15.4
	2	16.0	24.1	35.6	53.5	27.0	40.6	19.0	28.6	13.1	19.6	9.90	14.9
	3	15.4	23.2	33.3	50.0	25.4	38.2	17.9	27.0	12.4	18.6	9.37	14.1
	4	14.6	22.0	30.3	45.5	23.3	35.0	16.5	24.9	11.4	17.2	8.67	13.0
	5	13.7	20.5	26.9	40.4	20.8	31.3	14.9	22.4	10.3	15.5	7.85	11.8
	6	12.6	18.9	23.2	34.8	18.2	27.3	13.1	19.7	9.13	13.7	6.96	10.5
	7	11.4	17.1	19.5	29.3	15.5	23.2	11.2	16.9	7.89	11.9	6.03	9.06
	8	10.1	15.2	15.9	23.9	12.8	19.3	9.44	14.2	6.67	10.0	5.11	7.68
	9	8.90	13.4	12.7	19.1	10.4	15.6	7.74	11.6	5.51	8.28	4.23	6.36
	10	7.70	11.6	10.3	15.5	8.43	12.7	6.28	9.44	4.49	6.74	3.45	5.19
	11	6.55	9.85	8.52	12.8	6.97	10.5	5.19	7.80	3.71	5.57	2.85	4.29
	12	5.53	8.31	7.16	10.8	5.85	8.80	4.36	6.56	3.12	4.68	2.40	3.60
	13	4.71	7.08	6.10	9.17	4.99	7.50	3.72	5.59	2.66	3.99	2.04	3.07
	14	4.06	6.10	5.26	7.90	4.30	6.46	3.20	4.82	2.29	3.44	1.76	2.65
	15	3.54	5.32			3.75	5.63	2.79	4.20	1.99	3.00	1.53	2.31
	16	3.11	4.67					2.45	3.69	1.75	2.63	1.35	2.03
	17	2.75	4.14										
	18	2.46	3.69										
	19	2.20	3.31										
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		0.921		2.09		1.58		1.11		0.761		0.576	
$I_x = I_y$, in.^{4}		1.30		1.69		1.38		1.03		0.736		0.566	
$r_x = r_y$, in.		1.19		0.899		0.935		0.963		0.983		0.991	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

HSS2-HSS1.75

Shape		HSS2×2×										HSS1.75×1.75×	
		0.250		0.180		0.120		0.080		0.060		0.180	
t_{design}, in.		0.250		0.180		0.120		0.080		0.060		0.180	
lb/ft		5.51		4.24		3.02		2.08		1.58		3.61	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	28.6	42.9	21.9	32.9	15.6	23.5	10.8	16.2	8.19	12.3	18.7	28.1
	1	27.9	42.0	21.5	32.3	15.3	23.1	10.6	15.9	8.05	12.1	18.2	27.3
	2	26.1	39.2	20.2	30.4	14.5	21.8	10.1	15.1	7.64	11.5	16.7	25.1
	3	23.3	35.1	18.2	27.4	13.2	19.8	9.19	13.8	7.00	10.5	14.6	21.9
	4	19.9	30.0	15.8	23.8	11.6	17.4	8.11	12.2	6.20	9.31	12.0	18.0
	5	16.3	24.5	13.2	19.8	9.78	14.7	6.91	10.4	5.30	7.96	9.36	14.1
	6	12.7	19.1	10.5	15.8	7.95	12.0	5.68	8.53	4.37	6.57	6.90	10.4
	7	9.54	14.3	8.07	12.1	6.23	9.37	4.50	6.76	3.48	5.24	5.08	7.63
	8	7.30	11.0	6.18	9.29	4.79	7.20	3.48	5.23	2.70	4.06	3.89	5.84
	9	5.77	8.67	4.88	7.34	3.79	5.69	2.75	4.13	2.13	3.21	3.07	4.61
	10	4.67	7.02	3.96	5.95	3.07	4.61	2.23	3.34	1.73	2.60	2.49	3.74
	11	3.86	5.80	3.27	4.91	2.53	3.81	1.84	2.76	1.43	2.15		
	12			2.75	4.13	2.13	3.20	1.55	2.32	1.20	1.80		
	13									1.02	1.54		
	14												
	15												
	16												
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												

Properties						
A_g, in.^{2}	1.59	1.22	0.870	0.601	0.456	1.04
$I_x = I_y$, in.^{4}	0.766	0.648	0.503	0.365	0.283	0.408
$r_x = r_y$, in.	0.694	0.729	0.760	0.779	0.788	0.626

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS1.75-HSS1.5

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS1.75×1.75×						HSS1.5×1.5×					
		0.120		0.083		0.063		0.250		0.180		0.120	
t_{design}, in.		0.120		0.083		0.063		0.250		0.180		0.120	
lb/ft		2.60		1.87		1.43		3.78		2.99		2.18	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	13.5	20.3	9.68	14.6	7.40	11.1	19.6	29.4	15.5	23.3	11.3	17.0
	1	13.1	19.7	9.46	14.2	7.23	10.9	18.7	28.1	14.9	22.4	10.9	16.4
	2	12.2	18.3	8.81	13.2	6.75	10.1	16.3	24.5	13.2	19.9	9.84	14.8
	3	10.8	16.2	7.83	11.8	6.01	9.03	13.0	19.5	10.8	16.3	8.26	12.4
	4	9.03	13.6	6.63	10.0	5.11	7.68	9.46	14.2	8.22	12.3	6.46	9.71
	5	7.21	10.8	5.36	8.06	4.15	6.23	6.34	9.52	5.75	8.65	4.71	7.08
	6	5.47	8.23	4.13	6.21	3.22	4.83	4.40	6.61	4.00	6.01	3.30	4.96
	7	4.04	6.08	3.08	4.62	2.40	3.61	3.23	4.86	2.94	4.41	2.43	3.65
	8	3.10	4.65	2.36	3.54	1.84	2.76	2.47	3.72	2.25	3.38	1.86	2.79
	9	2.45	3.68	1.86	2.80	1.45	2.18					1.47	2.21
	10	1.98	2.98	1.51	2.27	1.18	1.77						
	11			1.25	1.87	0.972	1.46						
	12												
	13												
	14												
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	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		0.750		0.539		0.412		1.09		0.862		0.630	
$I_x = I_y$, in.^{4}		0.325		0.247		0.193		0.260		0.236		0.195	
$r_x = r_y$, in.		0.658		0.677		0.684		0.488		0.523		0.556	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

HSS1.5-HSS1.25

Shape		HSS1.5×1.5×				HSS1.25×1.25×							
		0.080		0.060		0.180		0.120		0.080		0.060	
t_{design}, in.		0.080		0.060		0.180		0.120		0.080		0.060	
lb/ft		1.53		1.16		2.37		1.77		1.25		0.957	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	7.92	11.9	6.04	9.07	12.3	18.4	9.16	13.8	6.49	9.75	4.96	7.45
	1	7.67	11.5	5.85	8.79	11.5	17.3	8.69	13.1	6.18	9.29	4.73	7.11
	2	6.95	10.4	5.31	7.98	9.59	14.4	7.42	11.2	5.34	8.03	4.11	6.18
	3	5.90	8.87	4.53	6.80	7.07	10.6	5.71	8.58	4.19	6.30	3.25	4.89
	4	4.69	7.05	3.62	5.44	4.61	6.92	3.95	5.94	2.99	4.49	2.34	3.52
	5	3.49	5.25	2.71	4.08	2.95	4.43	2.57	3.86	1.97	2.96	1.56	2.34
	6	2.47	3.71	1.93	2.90	2.05	3.08	1.78	2.68	1.37	2.06	1.08	1.63
	7	1.82	2.73	1.42	2.13	1.51	2.26	1.31	1.97	1.01	1.51	0.795	1.20
	8	1.39	2.09	1.09	1.63							0.609	0.915
	9	1.10	1.65	0.857	1.29								
	10												
	11												
	12												
	13												
	14												
	15												
	16												
	17												
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	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		0.441		0.336		0.682		0.510		0.361		0.276	
$I_x = I_y$, in.^{4}		0.146		0.114		0.121		0.105		0.081		0.064	
$r_x = r_y$, in.		0.575		0.582		0.421		0.454		0.473		0.481	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS1

Table 4-4 (continued)
Available Strength in Axial Compression, kips
Square HSS (Roll Formed)

F_y = 30 ksi

Shape		HSS1×1×							
		0.180		0.120		0.080		0.060	
t_{design}, in.		0.180		0.120		0.080		0.060	
lb/ft		1.74		1.35		0.973		0.748	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	9.02	13.6	7.01	10.5	5.05	7.59	3.88	5.83
	1	8.10	12.2	6.42	9.65	4.67	7.01	3.60	5.41
	2	5.86	8.81	4.94	7.42	3.68	5.54	2.87	4.31
	3	3.42	5.14	3.19	4.79	2.49	3.74	1.97	2.96
	4	1.92	2.89	1.84	2.77	1.48	2.22	1.18	1.78
	5	1.23	1.85	1.18	1.77	0.944	1.42	0.757	1.14
	6					0.656	0.985	0.526	0.790
	7								
	8								
	9								
	10								
	11								
	12								
	13								
	14								
	15								
	16								
	17								
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	26								
	27								
	28								
	29								
	30								

Properties				
A_g, in.^{2}	0.502	0.390	0.281	0.216
$I_x = I_y$, in.^{4}	0.050	0.048	0.039	0.031
$r_x = r_y$, in.	0.317	0.352	0.371	0.379

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS20-HSS16

Table 4-5
Available Strength in Axial Compression, kips
Square HSS (Press Braked)

F_y = 30 ksi

Shape		HSS20×20×						HSS16×16×					
		0.625		0.500		0.375 [c1]		0.625		0.500		0.375	
t_{design}, in.		0.625		0.500		0.375		0.625		0.500		0.375	
lb/ft		163		132		100		129		105		79.6	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	846	1270	684	1030	430	647	666	1000	541	813	413	621
	6	841	1260	680	1020	429	645	660	992	535	805	409	615
	7	839	1260	679	1020	428	644	657	988	534	802	408	613
	8	837	1260	677	1020	428	643	655	984	531	799	406	610
	9	834	1250	675	1010	427	642	651	979	529	795	404	608
	10	831	1250	673	1010	427	641	648	974	526	791	402	604
	11	828	1240	670	1010	426	640	644	968	523	786	400	601
	12	825	1240	668	1000	425	639	640	962	520	781	397	597
	13	821	1230	665	999	424	637	636	955	516	776	395	593
	14	817	1230	662	994	423	636	631	948	512	770	392	589
	15	813	1220	658	989	422	634	626	940	508	764	389	584
	16	809	1220	655	984	421	632	620	932	504	758	386	580
	17	804	1210	651	979	420	631	614	924	500	751	382	574
	18	799	1200	647	973	418	629	608	915	495	744	379	569
	19	794	1190	643	967	417	627	602	905	490	736	375	563
	20	789	1190	639	960	415	624	596	895	485	728	371	558
	21	783	1180	634	953	414	622	589	885	479	720	367	551
	22	777	1170	630	946	412	620	582	874	474	712	363	545
	23	771	1160	625	939	411	617	574	863	468	703	358	538
	24	765	1150	620	931	409	615	567	852	462	694	354	532
	25	758	1140	614	923	407	612	559	840	456	685	349	525
	26	751	1130	609	915	405	609	551	828	449	675	344	518
	27	744	1120	603	907	403	606	543	816	443	666	339	510
	28	737	1110	598	898	401	603	535	804	436	656	334	503
	29	730	1100	592	890	399	600	526	791	429	646	329	495
	30	722	1090	586	881	397	596	518	778	423	635	324	487
	32	707	1060	573	862	392	589	500	751	408	614	314	471
	34	690	1040	561	842	387	582	482	724	394	592	303	455
	36	674	1010	547	822	382	574	463	696	379	570	291	438
	38	656	987	533	802	376	565	444	668	364	547	280	421
	40	639	960	519	780	370	556	425	639	349	524	268	403
Properties													
A_g, in.^{2}		47.1		38.1		29.0		37.1		30.1		23.0	
$I_x = I_y$, in.^{4}		2900		2390		1840		1430		1190		924	
$r_x = r_y$, in.		7.85		7.92		7.97		6.21		6.29		6.34	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Square HSS (Press Braked)

HSS16-HSS12

Shape		HSS16×16×		HSS14×14×								HSS12×12×	
		0.312 [c1]		0.625		0.500		0.375		0.312 [c1]		0.625	
t_{design}, in.		0.312		0.625		0.500		0.375		0.312		0.625	
lb/ft		66.7		111		90.7		69.2		58.1		94.0	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	295	443	577	867	469	705	359	540	288	433	487	732
	6	293	441	569	855	463	696	355	533	286	430	478	718
	7	293	440	566	851	461	692	353	531	285	429	475	713
	8	292	439	563	846	458	689	351	528	284	427	471	708
	9	291	438	560	841	455	684	349	525	283	426	467	702
	10	291	437	556	835	452	680	347	521	282	424	462	695
	11	290	436	551	829	449	674	344	517	281	422	457	687
	12	289	434	547	822	445	669	341	513	280	420	452	679
	13	288	433	542	814	441	663	338	509	278	418	446	671
	14	287	431	536	806	437	656	335	504	276	415	440	661
	15	286	429	530	797	432	650	332	498	275	413	433	651
	16	284	427	524	788	427	642	328	493	273	410	427	641
	17	283	425	518	778	422	635	324	487	271	407	419	630
	18	281	423	511	768	417	627	320	481	268	403	412	619
	19	280	421	504	758	411	618	316	475	264	397	404	607
	20	278	418	497	747	406	610	312	468	261	392	396	595
	21	277	416	489	736	400	601	307	462	257	387	388	583
	22	275	413	482	724	393	591	302	455	253	381	379	570
	23	273	410	474	712	387	582	298	447	249	375	370	557
	24	271	407	466	700	381	572	293	440	245	369	362	543
	25	269	404	457	687	374	562	288	432	241	362	353	530
	26	267	401	449	674	367	552	283	425	237	356	343	516
	27	265	398	440	661	360	541	277	417	233	350	334	502
	28	262	394	431	648	353	531	272	409	228	343	325	488
	29	260	391	422	634	346	520	266	400	224	336	315	474
	30	257	387	413	620	338	509	261	392	219	329	306	460
	32	252	379	394	592	324	486	250	375	210	315	287	431
	34	246	370	375	564	308	464	238	358	200	301	268	403
	36	240	361	356	535	293	441	227	341	191	287	249	375
	38	234	351	337	507	278	418	215	323	181	272	231	347
	40	225	339	318	478	263	395	203	306	172	258	213	320
Properties													
A_g, in.^{2}		19.2		32.1		26.1		20.0		16.7		27.1	
$I_x = I_y$, in.^{4}		782		935		780		609		518		568	
$r_x = r_y$, in.		6.38		5.40		5.47		5.52		5.57		4.58	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS12-HSS10

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Square HSS (Press Braked)

F_y = 30 ksi

Shape		HSS12×12×								HSS10×10×			
		0.500		0.375		0.312		0.250 [c1]		0.625		0.500	
t_{design}, in.		0.500		0.375		0.312		0.250		0.625		0.500	
lb/ft		76.8		58.8		49.4		40.0		76.6		62.9	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	397	597	305	459	257	386	187	281	397	597	325	489
	6	390	586	300	451	252	379	185	279	386	580	317	476
	7	387	582	298	448	251	377	185	278	382	575	314	471
	8	384	578	296	445	249	374	184	277	378	568	310	466
	9	381	573	293	441	247	371	183	275	373	561	306	460
	10	378	568	291	437	245	368	182	274	368	553	302	454
	11	374	562	288	433	242	364	181	272	362	544	297	447
	12	369	555	285	428	240	360	180	271	356	534	292	439
	13	365	548	281	422	237	356	179	269	349	524	287	431
	14	360	541	277	417	234	351	177	267	342	513	281	423
	15	355	533	273	411	230	346	176	264	334	502	275	414
	16	349	525	269	405	227	341	174	262	326	490	269	404
	17	343	516	265	398	223	336	173	260	318	478	263	395
	18	338	507	261	392	220	330	171	257	310	465	256	385
	19	331	498	256	385	216	324	169	254	301	452	249	374
	20	325	488	251	377	212	318	167	251	292	439	242	364
	21	318	478	246	370	207	312	165	248	283	426	235	353
	22	312	468	241	362	203	305	163	245	274	412	227	342
	23	305	458	236	354	199	299	160	241	265	398	220	331
	24	297	447	230	346	194	292	157	236	255	384	212	319
	25	290	436	225	338	190	285	154	231	246	370	205	308
	26	283	425	219	329	185	278	150	225	236	355	197	297
	27	276	414	214	321	180	271	146	220	227	341	190	285
	28	268	403	208	312	176	264	142	214	218	327	182	274
	29	260	391	202	304	171	257	139	208	208	313	175	263
	30	253	380	196	295	166	250	135	203	199	299	167	251
	32	238	357	185	278	156	235	127	191	181	272	153	229
	34	222	334	173	260	147	221	119	179	164	246	138	208
	36	207	312	162	243	137	206	112	168	147	221	125	188
	38	193	289	150	226	128	192	104	157	132	198	112	169
	40	178	268	139	209	118	178	96.7	145	119	179	101	152
Properties													
A_g, in.^{2}		22.1		17.0		14.3		11.5		22.1		18.1	
$I_x = I_y$, in.^{4}		478		376		320		263		312		266	
$r_x = r_y$, in.		4.65		4.70		4.73		4.78		3.76		3.83	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Square HSS (Press Braked)

HSS10-HSS8

Shape		HSS10×10×						HSS8×8×					
		0.375		0.312		0.250		0.625		0.500		0.375	
t_{design}, in.		0.375		0.312		0.250		0.625		0.500		0.375	
lb/ft		48.4		40.8		33.1		59.3		49.0		38.0	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	251	378	212	319	171	258	307	462	253	381	198	297
	6	245	368	207	311	167	251	294	441	243	365	190	285
	7	243	365	205	308	166	249	289	434	239	359	187	281
	8	240	361	203	305	164	246	284	426	235	353	184	276
	9	237	357	200	301	162	243	278	417	230	346	180	271
	10	234	352	198	297	160	240	271	407	225	338	176	265
	11	231	346	195	293	158	237	264	397	219	329	172	258
	12	227	341	192	288	155	233	256	385	213	320	167	252
	13	223	335	188	283	152	229	249	374	207	311	163	245
	14	218	328	185	277	150	225	240	361	200	301	158	237
	15	214	321	181	272	147	220	232	348	194	291	153	229
	16	209	314	177	266	143	216	223	335	186	280	147	221
	17	204	307	173	260	140	211	214	321	179	269	142	213
	18	199	299	169	254	137	206	205	308	172	258	136	205
	19	194	292	164	247	133	200	195	294	164	247	130	196
	20	189	283	160	240	130	195	186	280	157	236	125	188
	21	183	275	155	233	126	190	177	266	149	225	119	179
	22	178	267	151	226	122	184	167	252	142	213	113	170
	23	172	258	146	219	119	178	158	238	135	202	108	162
	24	166	250	141	212	115	173	149	224	127	191	102	153
	25	160	241	136	205	111	167	140	211	120	180	96.3	145
	26	155	232	132	198	107	161	132	198	113	170	90.8	137
	27	149	224	127	191	103	155	123	185	106	159	85.5	128
	28	143	215	122	183	99.4	149	115	173	99.2	149	80.2	121
	29	137	206	117	176	95.6	144	107	161	92.7	139	75.1	113
	30	132	198	112	169	91.7	138	100	151	86.6	130	70.3	106
	32	120	181	103	155	84.2	126	88.1	132	76.1	114	61.8	92.9
	34	109	164	93.8	141	76.8	115	78.0	117	67.4	101	54.7	82.3
	36	99.0	149	85.0	128	69.7	105	69.6	105	60.1	90.4	48.8	73.4
	38	89.1	134	76.6	115	62.9	94.5	62.5	93.9	54.0	81.1	43.8	65.8
	40	80.4	121	69.2	104	56.8	85.3	56.4	84.7	48.7	73.2	39.5	59.4
Properties													
A_g, in.^{2}		14.0		11.8		9.54		17.1		14.1		11.0	
$I_x = I_y$, in.^{4}		211		181		149		148		128		104	
$r_x = r_y$, in.		3.88		3.92		3.95		2.94		3.01		3.07	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS8-HSS7

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Square HSS (Press Braked)

F_y = 30 ksi

Shape		HSS8×8×						HSS7×7×					
		0.312		0.250		0.180 [c1]		0.500		0.375		0.312	
t_{design}, in.		0.312		0.250		0.180		0.500		0.375		0.312	
lb/ft		32.1		26.1		19.1		42.1		32.8		27.8	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	166	250	135	204	96.1	144	217	327	170	255	144	216
	6	160	240	130	196	93.8	141	205	308	161	242	136	205
	7	157	237	128	193	93.0	140	201	302	158	237	134	201
	8	155	233	126	190	92.1	138	196	295	154	231	131	197
	9	152	228	124	186	90.9	137	191	287	150	226	128	192
	10	149	224	121	182	89.1	134	185	278	146	219	124	186
	11	145	218	119	178	87.1	131	179	269	141	212	120	181
	12	142	213	116	174	85.0	128	173	259	136	205	116	175
	13	138	207	112	169	82.7	124	166	249	131	197	112	168
	14	134	201	109	164	80.4	121	159	239	126	189	108	162
	15	129	194	106	159	77.9	117	152	228	121	181	103	155
	16	125	188	102	154	75.4	113	144	217	115	173	98.4	148
	17	120	181	98.6	148	72.8	109	137	206	109	164	93.6	141
	18	116	174	94.9	143	70.1	105	129	194	104	156	88.9	134
	19	111	167	91.1	137	67.4	101	122	183	98.1	147	84.1	126
	20	106	160	87.3	131	64.6	97.1	114	172	92.4	139	79.4	119
	21	101	153	83.4	125	61.8	92.9	107	161	86.8	131	74.7	112
	22	96.7	145	79.6	120	59.0	88.7	100	150	81.3	122	70.1	105
	23	92.0	138	75.7	114	56.3	84.6	93.1	140	76.0	114	65.5	98.5
	24	87.3	131	71.9	108	53.5	80.4	86.3	130	70.7	106	61.1	91.9
	25	82.6	124	68.2	102	50.8	76.3	79.9	120	65.7	98.7	56.8	85.4
	26	78.0	117	64.4	96.8	48.1	72.2	73.8	111	60.8	91.4	52.7	79.2
	27	73.5	110	60.8	91.4	45.4	68.2	68.5	103	56.4	84.8	48.9	73.5
	28	69.1	104	57.2	86.0	42.8	64.3	63.7	95.7	52.4	78.8	45.4	68.3
	29	64.8	97.5	53.8	80.8	40.3	60.5	59.3	89.2	48.9	73.5	42.4	63.7
	30	60.7	91.3	50.4	75.7	37.8	56.8	55.5	83.4	45.7	68.7	39.6	59.5
	32	53.4	80.2	44.3	66.6	33.3	50.0	48.7	73.3	40.1	60.3	34.8	52.3
	34	47.3	71.1	39.2	59.0	29.5	44.3	43.2	64.9	35.6	53.4	30.8	46.3
	36	42.2	63.4	35.0	52.6	26.3	39.5	38.5	57.9	31.7	47.7	27.5	41.3
	38	37.8	56.9	31.4	47.2	23.6	35.5	34.6	52.0	28.5	42.8	24.7	37.1
	40	34.2	51.3	28.4	42.6	21.3	32.0	31.2	46.9	25.7	38.6	22.3	33.5
Properties													
A_g, in.^{2}		9.26		7.54		5.52		12.1		9.45		8.01	
$I_x = I_y$, in.^{4}		89.4		74.3		55.7		82.0		67.2		58.4	
$r_x = r_y$, in.		3.11		3.14		3.18		2.60		2.67		2.70	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

F_y = 30 ksi

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Square HSS (Press Braked)

HSS7-HSS6

Shape		HSS7×7×				HSS6×6×							
		0.250		0.180		0.500		0.375		0.312		0.250	
t_{design}, in.		0.250		0.180		0.500		0.375		0.312		0.250	
lb/ft		22.7		16.6		35.2		27.6		23.5		19.2	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	117	177	86.2	130	181	273	143	215	121	183	100	150
	6	111	168	82.0	123	167	251	132	199	113	169	92.6	139
	7	109	164	80.5	121	162	244	129	193	110	165	90.2	136
	8	107	161	78.8	118	157	236	125	187	106	160	87.5	131
	9	104	157	76.9	116	151	227	120	181	103	154	84.5	127
	10	102	153	74.9	113	145	218	116	174	98.8	148	81.4	122
	11	98.5	148	72.7	109	138	207	110	166	94.6	142	78.0	117
	12	95.3	143	70.4	106	131	197	105	158	90.2	136	74.5	112
	13	91.9	138	67.9	102	124	186	100	150	85.6	129	70.8	106
	14	88.4	133	65.4	98.3	117	175	94.2	142	81.0	122	67.1	101
	15	84.7	127	62.8	94.3	109	164	88.6	133	76.3	115	63.3	95.1
	16	81.0	122	60.1	90.3	102	153	83.0	125	71.6	108	59.4	89.3
	17	77.2	116	57.3	86.2	94.4	142	77.4	116	66.8	100	55.6	83.6
	18	73.4	110	54.6	82.0	87.3	131	71.8	108	62.2	93.4	51.8	77.9
	19	69.5	104	51.8	77.8	80.3	121	66.4	100	57.6	86.6	48.1	72.3
	20	65.7	98.7	49.0	73.7	73.5	110	61.1	91.9	53.1	79.9	44.5	66.9
	21	61.9	93.0	46.3	69.5	67.0	101	56.0	84.2	48.8	73.4	41.0	61.6
	22	58.1	87.4	43.5	65.4	61.1	91.8	51.2	76.9	44.7	67.2	37.6	56.5
	23	54.4	81.8	40.9	61.4	55.9	84.0	46.8	70.4	40.9	61.5	34.4	51.7
	24	50.9	76.4	38.2	57.5	51.3	77.1	43.0	64.7	37.6	56.4	31.6	47.5
	25	47.4	71.2	35.7	53.6	47.3	71.1	39.6	59.6	34.6	52.0	29.1	43.8
	26	44.0	66.1	33.2	49.9	43.7	65.7	36.7	55.1	32.0	48.1	26.9	40.5
	27	40.8	61.3	30.8	46.3	40.5	60.9	34.0	51.1	29.7	44.6	25.0	37.5
	28	37.9	57.0	28.7	43.1	37.7	56.7	31.6	47.5	27.6	41.5	23.2	34.9
	29	35.4	53.2	26.7	40.2	35.1	52.8	29.5	44.3	25.7	38.7	21.6	32.5
	30	33.0	49.7	25.0	37.5	32.8	49.4	27.5	41.4	24.0	36.1	20.2	30.4
	32	29.0	43.7	21.9	33.0	28.9	43.4	24.2	36.4	21.1	31.8	17.8	26.7
	34	25.7	38.7	19.4	29.2	25.6	38.4	21.4	32.2	18.7	28.1	15.7	23.7
	36	22.9	34.5	17.3	26.1	22.8	34.3	19.1	28.7	16.7	25.1	14.0	21.1
	38	20.6	31.0	15.6	23.4					15.0	22.5	12.6	18.9
	40	18.6	27.9	14.0	21.1								
Properties													
A_g, in.^{2}		6.54		4.80		10.1		7.95		6.76		5.54	
$I_x = I_y$, in.^{4}		48.7		36.7		48.6		40.5		35.5		29.9	
$r_x = r_y$, in.		2.73		2.77		2.19		2.26		2.29		2.32	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.

HSS6-HSS5

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Square HSS (Press Braked)

F_y = 30 ksi

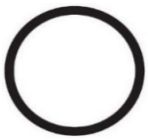
Shape		HSS6×6×				HSS5×5×					
		0.180		0.120 [c1]		0.250		0.180		0.120	
t_{design}, in.		0.180		0.120		0.250		0.180		0.120	
lb/ft		14.1		9.62		15.7		11.6		7.95	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_y	0	73.3	110	43.5	65.4	81.6	123	60.4	90.7	41.1	61.8
	6	68.3	103	41.9	63.0	73.3	110	54.5	81.9	37.2	56.0
	7	66.6	100	41.3	62.1	70.5	106	52.5	78.9	35.9	54.0
	8	64.7	97.3	40.7	61.1	67.4	101	50.3	75.6	34.5	51.8
	9	62.6	94.1	39.9	60.0	64.1	96.4	47.9	72.0	32.9	49.4
	10	60.3	90.7	39.0	58.7	60.6	91.1	45.4	68.2	31.2	46.9
	11	57.9	87.1	38.1	57.2	56.9	85.6	42.8	64.3	29.4	44.3
	12	55.4	83.2	37.0	55.6	53.2	79.9	40.0	60.2	27.6	41.5
	13	52.8	79.3	35.8	53.8	49.4	74.2	37.3	56.0	25.8	38.8
	14	50.1	75.2	34.3	51.6	45.6	68.5	34.5	51.9	23.9	36.0
	15	47.3	71.1	32.5	48.8	41.8	62.8	31.8	47.8	22.1	33.2
	16	44.5	66.9	30.6	46.0	38.1	57.3	29.1	43.7	20.3	30.5
	17	41.8	62.8	28.8	43.2	34.6	52.0	26.5	39.8	18.5	27.8
	18	39.0	58.7	26.9	40.5	31.2	46.8	24.0	36.0	16.8	25.3
	19	36.3	54.6	25.1	37.7	28.0	42.1	21.6	32.5	15.2	22.8
	20	33.7	50.6	23.3	35.0	25.3	38.0	19.5	29.3	13.7	20.6
	21	31.1	46.7	21.6	32.4	22.9	34.4	17.7	26.6	12.4	18.7
	22	28.6	43.0	19.9	29.9	20.9	31.4	16.1	24.2	11.3	17.0
	23	26.2	39.4	18.3	27.4	19.1	28.7	14.7	22.2	10.4	15.6
	24	24.1	36.2	16.8	25.2	17.5	26.4	13.5	20.3	9.51	14.3
	25	22.2	33.3	15.4	23.2	16.2	24.3	12.5	18.7	8.77	13.2
	26	20.5	30.8	14.3	21.5	15.0	22.5	11.5	17.3	8.10	12.2
	27	19.0	28.6	13.2	19.9	13.9	20.8	10.7	16.1	7.51	11.3
	28	17.7	26.6	12.3	18.5	12.9	19.4	9.94	14.9	6.99	10.5
	29	16.5	24.8	11.5	17.3	12.0	18.1	9.27	13.9	6.51	9.79
	30	15.4	23.2	10.7	16.1	11.2	16.9	8.66	13.0	6.09	9.15
	32	13.5	20.4	9.43	14.2			7.61	11.4	5.35	8.04
	34	12.0	18.0	8.35	12.6						
	36	10.7	16.1	7.45	11.2						
	38	9.60	14.4	6.69	10.0						
	40										

Properties					
A_g, in.^{2}	4.08	2.77	4.54	3.36	2.29
$I_x = I_y$, in.^{4}	22.7	15.8	16.6	12.8	9.00
$r_x = r_y$, in.	2.36	2.39	1.91	1.95	1.98

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

Note: Heavy line indicates KL/r_y equal to or greater than 200.



HSS7.5-HSS6.25

Table 4-6
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

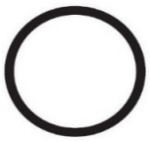
Shape		HSS7.5×								HSS6.25×			
		0.375		0.250		0.180		0.120		0.375		0.250	
t_{design}, in.		0.375		0.250		0.180		0.120		0.375		0.250	
lb/ft		29.1		19.7		14.4		9.65		24.0		16.3	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	143	214	97.0	145	70.6	106	47.4	70.9	118	176	80.3	120
	6	134	201	91.4	137	66.6	99.6	44.7	66.9	108	161	73.6	110
	7	132	197	89.5	134	65.2	97.5	43.8	65.6	104	156	71.3	107
	8	128	192	87.3	131	63.6	95.2	42.8	64.0	100	150	68.8	103
	9	125	186	84.9	127	61.9	92.6	41.7	62.3	96.3	144	66.0	98.8
	10	121	180	82.3	123	60.0	89.8	40.4	60.5	91.8	137	63.1	94.4
	11	116	174	79.5	119	58.0	86.8	39.1	58.5	87.1	130	60.0	89.7
	12	112	167	76.6	115	55.9	83.7	37.7	56.4	82.2	123	56.7	84.9
	13	107	160	73.5	110	53.7	80.3	36.2	54.2	77.2	116	53.4	79.9
	14	102	153	70.3	105	51.4	76.9	34.7	51.9	72.2	108	50.1	74.9
	15	97.4	146	67.1	100	49.1	73.4	33.1	49.6	67.1	100	46.7	69.8
	16	92.4	138	63.7	95.3	46.7	69.8	31.5	47.2	62.1	92.9	43.3	64.8
	17	87.3	131	60.4	90.3	44.2	66.2	29.9	44.8	57.2	85.6	40.0	59.8
	18	82.3	123	57.0	85.3	41.8	62.6	28.3	42.3	52.4	78.4	36.8	55.0
	19	77.2	116	53.6	80.3	39.4	58.9	26.7	39.9	47.8	71.4	33.6	50.3
	20	72.3	108	50.3	75.3	37.0	55.3	25.1	37.5	43.3	64.8	30.6	45.8
	21	67.4	101	47.0	70.4	34.6	51.8	23.5	35.2	39.3	58.8	27.8	41.6
	22	62.6	93.7	43.8	65.6	32.3	48.3	21.9	32.8	35.8	53.6	25.3	37.9
	23	58.0	86.8	40.7	60.9	30.0	44.9	20.4	30.6	32.8	49.0	23.2	34.7
	24	53.5	80.1	37.7	56.4	27.8	41.6	19.0	28.4	30.1	45.0	21.3	31.8
	25	49.4	73.8	34.8	52.1	25.7	38.5	17.5	26.2	27.7	41.5	19.6	29.3
	26	45.6	68.3	32.2	48.2	23.8	35.6	16.2	24.3	25.6	38.4	18.1	27.1
	27	42.3	63.3	29.8	44.7	22.1	33.0	15.0	22.5	23.8	35.6	16.8	25.2
	28	39.3	58.9	27.8	41.5	20.5	30.7	14.0	20.9	22.1	33.1	15.6	23.4
	29	36.7	54.9	25.9	38.7	19.1	28.6	13.0	19.5	20.6	30.8	14.6	21.8
	30	34.3	51.3	24.2	36.2	17.9	26.7	12.2	18.2	19.3	28.8	13.6	20.4
	32	30.1	45.1	21.2	31.8	15.7	23.5	10.7	16.0	16.9	25.3	12.0	17.9
	34	26.7	39.9	18.8	28.2	13.9	20.8	9.49	14.2	15.0	22.4	10.6	15.9
	36	23.8	35.6	16.8	25.1	12.4	18.6	8.46	12.7				
	38	21.4	32.0	15.1	22.5	11.1	16.7	7.59	11.4				
	40	19.3	28.8	13.6	20.3	10.0	15.0	6.85	10.3				
Properties													
A_g, in.^{2}		8.39		5.69		4.14		2.78		6.92		4.71	
I, in.^{4}		53.4		37.5		27.7		18.9		30.0		21.2	
r, in.		2.52		2.57		2.59		2.61		2.08		2.12	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

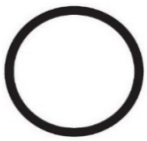


HSS6.25-HSS5

Shape		HSS6.25×				HSS5×							
		0.180		0.120		0.250		0.180		0.120		0.109	
t_{design}, in.		0.180		0.120		0.250		0.180		0.120		0.109	
lb/ft		11.9		8.01		12.9		9.45		6.38		5.81	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	58.5	87.5	39.4	58.9	63.6	95.1	46.5	69.6	31.4	46.9	28.5	42.6
	6	53.7	80.4	36.2	54.2	55.5	83.0	40.7	60.8	27.5	41.2	25.0	37.4
	7	52.1	78.0	35.2	52.6	52.8	79.0	38.7	57.9	26.3	39.3	23.8	35.7
	8	50.3	75.3	34.0	50.8	49.9	74.6	36.6	54.8	24.9	37.2	22.6	33.8
	9	48.4	72.3	32.7	48.9	46.8	70.0	34.3	51.4	23.4	35.0	21.2	31.8
	10	46.2	69.2	31.3	46.8	43.5	65.1	32.0	47.8	21.8	32.7	19.8	29.6
	11	44.0	65.9	29.8	44.6	40.2	60.1	29.6	44.2	20.2	30.3	18.4	27.5
	12	41.7	62.4	28.3	42.3	36.8	55.1	27.1	40.6	18.6	27.9	16.9	25.3
	13	39.3	58.9	26.7	39.9	33.5	50.1	24.7	36.9	17.0	25.4	15.4	23.1
	14	36.9	55.2	25.1	37.5	30.2	45.2	22.3	33.4	15.4	23.1	14.0	20.9
	15	34.5	51.6	23.5	35.1	27.1	40.5	20.0	29.9	13.9	20.8	12.6	18.9
	16	32.1	48.0	21.8	32.7	24.1	36.0	17.8	26.7	12.4	18.6	11.3	16.9
	17	29.7	44.4	20.2	30.3	21.3	31.9	15.8	23.6	11.0	16.5	10.0	15.0
	18	27.4	40.9	18.7	27.9	19.0	28.5	14.1	21.1	9.84	14.7	8.93	13.4
	19	25.1	37.5	17.2	25.7	17.1	25.6	12.7	18.9	8.83	13.2	8.02	12.0
	20	22.9	34.2	15.7	23.5	15.4	23.1	11.4	17.1	7.97	11.9	7.23	10.8
	21	20.8	31.1	14.3	21.4	14.0	20.9	10.4	15.5	7.23	10.8	6.56	9.82
	22	19.0	28.4	13.0	19.5	12.7	19.1	9.44	14.1	6.59	9.86	5.98	8.94
	23	17.4	26.0	11.9	17.8	11.7	17.4	8.64	12.9	6.03	9.02	5.47	8.18
	24	15.9	23.8	10.9	16.4	10.7	16.0	7.93	11.9	5.54	8.28	5.02	7.52
	25	14.7	22.0	10.1	15.1	9.87	14.8	7.31	10.9	5.10	7.63	4.63	6.93
	26	13.6	20.3	9.32	13.9	9.12	13.7	6.76	10.1	4.72	7.06	4.28	6.40
	27	12.6	18.8	8.64	12.9	8.46	12.7	6.27	9.37	4.37	6.54	3.97	5.94
	28	11.7	17.5	8.03	12.0	7.87	11.8	5.83	8.72	4.07	6.08	3.69	5.52
	29	10.9	16.3	7.49	11.2								
	30	10.2	15.3	7.00	10.5								
	32	8.96	13.4	6.15	9.20								
	34	7.94	11.9	5.45	8.15								
	36			4.86	7.27								
	38												
	40												
Properties													
A_g, in.^{2}		3.43		2.31		3.73		2.73		1.84		1.67	
I, in.^{4}		15.8		10.9		10.6		7.93		5.48		5.01	
r, in.		2.15		2.17		1.69		1.70		1.73		1.73	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.



HSS5-HSS4.5

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

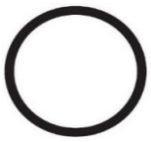
Shape		HSS5×		HSS4.5×									
		0.083		0.250		0.180		0.148		0.120		0.109	
t_{design}, in.		0.083		0.250		0.180		0.148		0.120		0.109	
lb/ft		4.45		11.6		8.47		7.02		5.73		5.21	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	21.8	32.6	56.9	85.2	41.6	62.2	34.4	51.5	28.1	42.1	25.6	38.3
	6	19.2	28.7	47.9	71.6	35.2	52.7	29.2	43.7	23.9	35.8	21.8	32.6
	7	18.3	27.4	45.0	67.3	33.2	49.6	27.5	41.2	22.5	33.7	20.6	30.8
	8	17.4	26.0	41.8	62.6	30.9	46.3	25.7	38.5	21.1	31.5	19.2	28.8
	9	16.3	24.4	38.5	57.7	28.6	42.8	23.8	35.6	19.5	29.2	17.8	26.7
	10	15.3	22.8	35.2	52.6	26.2	39.2	21.8	32.6	17.9	26.8	16.4	24.5
	11	14.1	21.2	31.8	47.6	23.8	35.5	19.8	29.6	16.3	24.4	14.9	22.3
	12	13.0	19.5	28.5	42.6	21.4	31.9	17.8	26.7	14.7	22.0	13.5	20.1
	13	11.9	17.8	25.2	37.7	19.0	28.5	15.9	23.8	13.1	19.6	12.0	18.0
	14	10.8	16.2	22.2	33.1	16.8	25.1	14.1	21.0	11.6	17.4	10.7	16.0
	15	9.75	14.6	19.3	28.9	14.7	22.0	12.3	18.4	10.2	15.3	9.39	14.1
	16	8.73	13.1	17.0	25.4	12.9	19.3	10.8	16.2	8.97	13.4	8.26	12.4
	17	7.76	11.6	15.1	22.5	11.4	17.1	9.60	14.4	7.94	11.9	7.31	10.9
	18	6.93	10.4	13.4	20.1	10.2	15.3	8.56	12.8	7.08	10.6	6.52	9.76
	19	6.22	9.30	12.1	18.0	9.16	13.7	7.68	11.5	6.36	9.51	5.85	8.76
	20	5.61	8.39	10.9	16.3	8.27	12.4	6.93	10.4	5.74	8.58	5.28	7.90
	21	5.09	7.61	9.87	14.8	7.50	11.2	6.29	9.41	5.20	7.79	4.79	7.17
	22	4.64	6.94	8.99	13.4	6.83	10.2	5.73	8.57	4.74	7.09	4.37	6.53
	23	4.24	6.35	8.23	12.3	6.25	9.35	5.24	7.84	4.34	6.49	4.00	5.98
	24	3.90	5.83	7.55	11.3	5.74	8.59	4.82	7.20	3.98	5.96	3.67	5.49
	25	3.59	5.37	6.96	10.4	5.29	7.92	4.44	6.64	3.67	5.49	3.38	5.06
	26	3.32	4.97									3.13	4.68
	27	3.08	4.60										
	28	2.86	4.28										
	29	2.67	3.99										
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		1.28		3.34		2.44		2.02		1.65		1.50	
I, in.^{4}		3.88		7.56		5.71		4.80		3.96		3.63	
r, in.		1.74		1.50		1.53		1.54		1.55		1.56	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

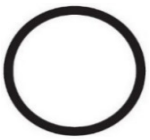


HSS4.5-HSS3.75

Shape		HSS4.5×		HSS4×						HSS3.75×			
		0.083		0.120		0.109		0.083		0.250		0.180	
t_{design}, in.		0.083		0.120		0.109		0.083		0.250		0.180	
lb/ft		3.99		5.07		4.62		3.54		9.53		7.00	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	19.6	29.3	24.9	37.2	22.7	33.9	17.4	26.0	46.9	70.1	34.4	51.5
	6	16.7	25.0	20.2	30.2	18.5	27.6	14.2	21.3	36.4	54.4	26.9	40.3
	7	15.8	23.6	18.8	28.1	17.2	25.7	13.2	19.8	33.2	49.6	24.6	36.9
	8	14.7	22.1	17.2	25.7	15.8	23.6	12.1	18.2	29.9	44.7	22.2	33.3
	9	13.7	20.4	15.6	23.3	14.3	21.4	11.0	16.5	26.5	39.6	19.8	29.6
	10	12.6	18.8	14.0	20.9	12.8	19.2	9.92	14.8	23.2	34.7	17.4	26.0
	11	11.4	17.1	12.4	18.5	11.4	17.0	8.82	13.2	20.0	29.9	15.1	22.6
	12	10.3	15.4	10.8	16.2	10.0	14.9	7.75	11.6	17.0	25.4	12.9	19.3
	13	9.24	13.8	9.38	14.0	8.67	13.0	6.74	10.1	14.5	21.7	11.0	16.4
	14	8.19	12.3	8.09	12.1	7.48	11.2	5.82	8.71	12.5	18.7	9.47	14.2
	15	7.20	10.8	7.05	10.5	6.52	9.75	5.07	7.59	10.9	16.3	8.25	12.3
	16	6.33	9.47	6.20	9.27	5.73	8.57	4.46	6.67	9.56	14.3	7.25	10.9
	17	5.61	8.39	5.49	8.21	5.07	7.59	3.95	5.91	8.47	12.7	6.42	9.61
	18	5.00	7.48	4.90	7.33	4.53	6.77	3.52	5.27	7.56	11.3	5.73	8.57
	19	4.49	6.72	4.40	6.57	4.06	6.08	3.16	4.73	6.78	10.1	5.14	7.69
	20	4.05	6.06	3.97	5.93	3.67	5.48	2.85	4.27	6.12	9.16	4.64	6.94
	21	3.67	5.50	3.60	5.38	3.33	4.97	2.59	3.87			4.21	6.30
	22	3.35	5.01	3.28	4.90	3.03	4.53	2.36	3.53				
	23	3.06	4.58			2.77	4.15	2.16	3.23				
	24	2.81	4.21										
	25	2.59	3.88										
	26	2.40	3.59										
	27												
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		1.15		1.46		1.33		1.02		2.75		2.02	
I, in.^{4}		2.81		2.76		2.52		1.96		4.23		3.22	
r, in.		1.56		1.37		1.38		1.39		1.24		1.26	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.



HSS3.75-HSS3.5

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

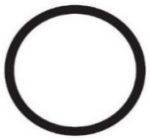
F_y = 30 ksi

Shape		HSS3.75×								HSS3.5×			
		0.148		0.120		0.109		0.083		0.180		0.148	
t_{design}, in.		0.148		0.120		0.109		0.083		0.180		0.148	
lb/ft		5.81		4.75		4.32		3.32		6.51		5.40	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	28.5	42.6	23.4	34.9	21.3	31.9	16.3	24.4	32.0	47.9	26.6	39.8
	6	22.4	33.6	18.4	27.5	16.9	25.2	12.9	19.4	24.1	36.1	20.1	30.1
	7	20.6	30.8	16.9	25.3	15.5	23.2	11.9	17.8	21.7	32.5	18.2	27.2
	8	18.6	27.9	15.3	22.9	14.0	21.0	10.8	16.2	19.3	28.9	16.2	24.2
	9	16.7	24.9	13.7	20.4	12.6	18.8	9.69	14.5	16.9	25.2	14.2	21.2
	10	14.7	22.0	12.1	18.0	11.1	16.6	8.58	12.8	14.5	21.7	12.2	18.3
	11	12.8	19.1	10.5	15.7	9.69	14.5	7.50	11.2	12.3	18.4	10.4	15.5
	12	11.0	16.4	9.01	13.5	8.34	12.5	6.47	9.68	10.3	15.5	8.73	13.1
	13	9.37	14.0	7.69	11.5	7.13	10.7	5.54	8.28	8.82	13.2	7.44	11.1
	14	8.08	12.1	6.63	9.92	6.14	9.19	4.77	7.14	7.60	11.4	6.42	9.60
	15	7.04	10.5	5.78	8.64	5.35	8.01	4.16	6.22	6.62	9.91	5.59	8.36
	16	6.19	9.26	5.08	7.59	4.70	7.04	3.65	5.47	5.82	8.71	4.91	7.35
	17	5.48	8.20	4.50	6.73	4.17	6.23	3.24	4.84	5.16	7.71	4.35	6.51
	18	4.89	7.31	4.01	6.00	3.72	5.56	2.89	4.32	4.60	6.88	3.88	5.81
	19	4.39	6.57	3.60	5.39	3.34	4.99	2.59	3.88	4.13	6.17	3.48	5.21
	20	3.96	5.92	3.25	4.86	3.01	4.50	2.34	3.50				
	21	3.59	5.37	2.95	4.41	2.73	4.09	2.12	3.17				
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		1.67		1.37		1.25		0.956		1.88		1.56	
I, in.^{4}		2.72		2.26		2.07		1.61		2.59		2.19	
r, in.		1.28		1.28		1.29		1.30		1.17		1.18	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS



HSS3.5-HSS3.125

Shape		HSS3.5×										HSS3.125×	
		0.120		0.109		0.083		0.063		0.049		0.250	
t_{design}, in.		0.120		0.109		0.083		0.063		0.049		0.250	
lb/ft		4.42		4.03		3.09		2.34		1.84		7.83	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	21.6	32.4	19.8	29.6	15.2	22.7	11.5	17.2	9.05	13.5	38.5	57.6
	6	16.5	24.7	15.1	22.6	11.6	17.4	8.85	13.2	6.96	10.4	26.5	39.6
	7	15.0	22.4	13.7	20.5	10.6	15.8	8.05	12.0	6.34	9.48	23.1	34.6
	8	13.4	20.0	12.2	18.3	9.46	14.1	7.22	10.8	5.68	8.50	19.8	29.6
	9	11.8	17.6	10.7	16.1	8.34	12.5	6.38	9.54	5.02	7.51	16.6	24.8
	10	10.2	15.3	9.32	13.9	7.25	10.8	5.56	8.31	4.37	6.54	13.6	20.4
	11	8.71	13.0	7.96	11.9	6.20	9.28	4.77	7.13	3.75	5.61	11.3	16.8
	12	7.35	11.0	6.72	10.0	5.25	7.85	4.04	6.04	3.18	4.75	9.45	14.1
	13	6.27	9.37	5.72	8.56	4.47	6.69	3.44	5.15	2.71	4.05	8.06	12.1
	14	5.40	8.08	4.93	7.38	3.85	5.77	2.97	4.44	2.33	3.49	6.95	10.4
	15	4.71	7.04	4.30	6.43	3.36	5.02	2.59	3.87	2.03	3.04	6.05	9.05
	16	4.14	6.19	3.78	5.65	2.95	4.41	2.27	3.40	1.79	2.67	5.32	7.96
	17	3.66	5.48	3.35	5.01	2.61	3.91	2.01	3.01	1.58	2.37	4.71	7.05
	18	3.27	4.89	2.99	4.47	2.33	3.49	1.80	2.69	1.41	2.11		
	19	2.93	4.39	2.68	4.01	2.09	3.13	1.61	2.41	1.27	1.90		
	20	2.65	3.96	2.42	3.62	1.89	2.82	1.45	2.18	1.14	1.71		
	21												
	22												
	23												
	24												
	25												
	26												
	27												
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	30												
	32												
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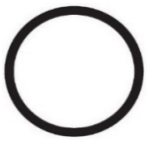
	40												
Properties													
A_g, in.^{2}		1.27		1.16		0.891		0.675		0.531		2.26	
I, in.^{4}		1.82		1.67		1.30		0.997		0.791		2.35	
r, in.		1.20		1.20		1.21		1.22		1.22		1.02	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	



HS3.125-HSS3

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

Shape		HSS3.125×										HSS3×	
		0.180		0.120		0.109		0.083		0.063		0.250	
t_{design}, in.		0.180		0.120		0.109		0.083		0.063		0.250	
lb/ft		5.78		3.93		3.58		2.75		2.09		7.49	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	28.5	42.6	19.3	28.8	17.6	26.3	13.5	20.2	10.2	15.3	36.8	55.1
	6	19.8	29.7	13.6	20.4	12.5	18.7	9.67	14.5	7.33	11.0	24.5	36.6
	7	17.4	26.1	12.0	18.0	11.0	16.5	8.57	12.8	6.50	9.72	21.1	31.6
	8	15.0	22.4	10.4	15.5	9.58	14.3	7.46	11.2	5.65	8.46	17.8	26.6
	9	12.6	18.9	8.82	13.2	8.16	12.2	6.37	9.53	4.83	7.22	14.7	22.0
	10	10.5	15.6	7.34	11.0	6.81	10.2	5.34	7.99	4.05	6.05	11.9	17.9
	11	8.64	12.9	6.08	9.09	5.64	8.44	4.43	6.62	3.35	5.02	9.87	14.8
	12	7.26	10.9	5.11	7.64	4.74	7.09	3.72	5.56	2.82	4.22	8.29	12.4
	13	6.19	9.26	4.35	6.51	4.04	6.04	3.17	4.74	2.40	3.59	7.06	10.6
	14	5.34	7.98	3.75	5.61	3.48	5.21	2.73	4.09	2.07	3.10	6.09	9.11
	15	4.65	6.95	3.27	4.89	3.03	4.54	2.38	3.56	1.80	2.70	5.31	7.94
	16	4.09	6.11	2.87	4.30	2.67	3.99	2.09	3.13	1.59	2.37	4.66	6.98
	17	3.62	5.41	2.54	3.81	2.36	3.53	1.85	2.77	1.40	2.10		
	18							1.65	2.47	1.25	1.87		
	19												
	20												
	21												
	22												
	23												
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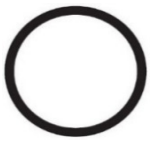
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		1.67		1.13		1.03		0.793		0.601		2.16	
I, in.^{4}		1.81		1.28		1.18		0.918		0.705		2.06	
r, in.		1.04		1.06		1.07		1.08		1.08		0.977	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

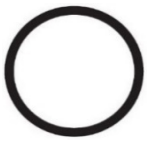


HSS3

Shape		HSS3×											
		0.180		0.148		0.120		0.109		0.083		0.063	
t_{design}, in.		0.180		0.148		0.120		0.109		0.083		0.063	
lb/ft		5.53		4.60		3.77		3.43		2.64		2.00	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	27.1	40.5	22.7	33.9	18.6	27.8	16.9	25.2	13.0	19.4	9.84	14.7
	1	26.8	40.1	22.4	33.6	18.4	27.5	16.7	25.0	12.8	19.2	9.74	14.6
	2	26.0	38.8	21.7	32.5	17.8	26.7	16.2	24.2	12.5	18.6	9.45	14.1
	3	24.6	36.8	20.6	30.8	16.9	25.3	15.4	23.0	11.8	17.7	8.99	13.4
	4	22.8	34.1	19.1	28.6	15.7	23.5	14.3	21.4	11.0	16.5	8.38	12.5
	5	20.7	30.9	17.4	26.0	14.3	21.4	13.0	19.5	10.0	15.0	7.66	11.5
	6	18.3	27.4	15.5	23.1	12.8	19.1	11.6	17.4	8.98	13.4	6.86	10.3
	7	15.9	23.8	13.5	20.2	11.2	16.7	10.1	15.2	7.86	11.8	6.02	9.01
	8	13.5	20.3	11.5	17.2	9.54	14.3	8.66	13.0	6.75	10.1	5.18	7.75
	9	11.3	16.9	9.59	14.3	7.99	12.0	7.26	10.9	5.67	8.48	4.37	6.54
	10	9.21	13.8	7.86	11.8	6.57	9.82	5.96	8.92	4.67	6.99	3.61	5.41
	11	7.61	11.4	6.49	9.71	5.43	8.12	4.93	7.37	3.86	5.78	2.99	4.47
	12	6.39	9.56	5.46	8.16	4.56	6.82	4.14	6.20	3.25	4.86	2.51	3.75
	13	5.45	8.15	4.65	6.95	3.89	5.81	3.53	5.28	2.77	4.14	2.14	3.20
	14	4.70	7.03	4.01	6.00	3.35	5.01	3.04	4.55	2.38	3.57	1.84	2.76
	15	4.09	6.12	3.49	5.22	2.92	4.37	2.65	3.97	2.08	3.11	1.61	2.40
	16	3.60	5.38	3.07	4.59	2.56	3.84	2.33	3.49	1.83	2.73	1.41	2.11
	17									1.62	2.42	1.25	1.87
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												

Properties						
A_g, in.^{2}	1.59	1.33	1.09	0.990	0.761	0.577
I, in.^{4}	1.59	1.35	1.13	1.04	0.810	0.622
r, in.	1.00	1.01	1.02	1.02	1.03	1.04

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	



HSS3-HSS2.75

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

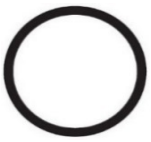
Shape		HSS3×		HSS2.875×								HSS2.75×	
		0.049		0.180		0.120		0.109		0.083		0.250	
t_{design}, in.		0.049		0.180		0.120		0.109		0.083		0.250	
lb/ft		1.58		5.29		3.60		3.28		2.52		6.81	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	7.74	11.6	25.9	38.8	17.7	26.5	16.1	24.1	12.4	18.6	33.4	50.0
	1	7.66	11.5	25.6	38.3	17.5	26.2	16.0	23.9	12.3	18.4	33.0	49.3
	2	7.43	11.1	24.7	37.0	16.9	25.3	15.4	23.1	11.9	17.8	31.6	47.3
	3	7.07	10.6	23.3	34.8	16.0	23.9	14.6	21.8	11.2	16.8	29.5	44.2
	4	6.59	9.86	21.4	32.1	14.8	22.1	13.5	20.2	10.4	15.5	26.8	40.1
	5	6.02	9.01	19.3	28.8	13.3	19.9	12.2	18.2	9.40	14.1	23.7	35.5
	6	5.40	8.07	16.9	25.3	11.8	17.6	10.7	16.1	8.32	12.4	20.4	30.5
	7	4.74	7.09	14.5	21.7	10.1	15.2	9.28	13.9	7.20	10.8	17.1	25.5
	8	4.08	6.10	12.1	18.1	8.53	12.8	7.83	11.7	6.10	9.12	13.9	20.8
	9	3.44	5.14	9.92	14.8	7.03	10.5	6.46	9.66	5.05	7.55	11.1	16.6
	10	2.84	4.25	8.04	12.0	5.71	8.55	5.26	7.86	4.11	6.16	8.97	13.4
	11	2.35	3.52	6.65	9.94	4.72	7.06	4.34	6.50	3.40	5.09	7.41	11.1
	12	1.97	2.95	5.59	8.36	3.97	5.93	3.65	5.46	2.86	4.27	6.23	9.32
	13	1.68	2.52	4.76	7.12	3.38	5.06	3.11	4.65	2.43	3.64	5.31	7.94
	14	1.45	2.17	4.10	6.14	2.91	4.36	2.68	4.01	2.10	3.14	4.58	6.85
	15	1.26	1.89	3.57	5.35	2.54	3.80	2.34	3.49	1.83	2.74		
	16	1.11	1.66			2.23	3.34	2.05	3.07	1.61	2.40		
	17	0.984	1.47										
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		0.454		1.52		1.04		0.947		0.728		1.96	
I, in.^{4}		0.495		1.39		0.987		0.907		0.710		1.55	
r, in.		1.04		0.956		0.974		0.979		0.988		0.889	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS



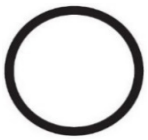
HSS2.75

Shape		HSS2.75×											
		0.180		0.148		0.120		0.109		0.083		0.065	
t_{design}, in.		0.180		0.148		0.120		0.109		0.083		0.065	
lb/ft		5.04		4.20		3.44		3.14		2.41		1.90	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	24.7	37.0	20.6	30.9	16.9	25.3	15.4	23.1	11.8	17.7	9.34	14.0
	1	24.4	36.5	20.4	30.5	16.7	25.0	15.2	22.8	11.7	17.5	9.23	13.8
	2	23.5	35.1	19.6	29.3	16.1	24.0	14.7	21.9	11.3	16.9	8.90	13.3
	3	22.0	32.9	18.4	27.5	15.1	22.6	13.8	20.6	10.6	15.9	8.38	12.5
	4	20.1	30.0	16.8	25.2	13.8	20.7	12.6	18.9	9.75	14.6	7.71	11.5
	5	17.9	26.7	15.0	22.5	12.4	18.5	11.3	16.9	8.74	13.1	6.91	10.3
	6	15.5	23.2	13.0	19.5	10.8	16.1	9.86	14.8	7.65	11.4	6.06	9.06
	7	13.1	19.6	11.1	16.5	9.15	13.7	8.39	12.6	6.53	9.77	5.18	7.75
	8	10.8	16.1	9.14	13.7	7.59	11.4	6.97	10.4	5.44	8.14	4.32	6.47
	9	8.66	13.0	7.37	11.0	6.14	9.19	5.65	8.45	4.42	6.62	3.52	5.27
	10	7.01	10.5	5.97	8.93	4.97	7.44	4.58	6.85	3.59	5.36	2.86	4.27
	11	5.80	8.67	4.93	7.38	4.11	6.15	3.78	5.66	2.96	4.43	2.36	3.53
	12	4.87	7.29	4.14	6.20	3.45	5.17	3.18	4.75	2.49	3.73	1.98	2.97
	13	4.15	6.21	3.53	5.28	2.94	4.40	2.71	4.05	2.12	3.17	1.69	2.53
	14	3.58	5.35	3.05	4.56	2.54	3.80	2.33	3.49	1.83	2.74	1.46	2.18
	15	3.12	4.66	2.65	3.97	2.21	3.31	2.03	3.04	1.59	2.38	1.27	1.90
	16												
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												

Properties						
A_g, in.^{2}	1.45	1.21	0.991	0.904	0.695	0.548
I, in.^{4}	1.21	1.03	0.859	0.790	0.619	0.494
r, in.	0.914	0.923	0.931	0.935	0.944	0.949

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.



HSS2.5

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

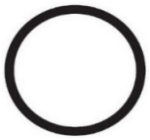
Shape		HSS2.5×											
		0.250		0.180		0.148		0.120		0.109		0.083	
t_{design}, in.		0.250		0.180		0.148		0.120		0.109		0.083	
lb/ft		6.13		4.55		3.79		3.11		2.84		2.19	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	30.2	45.1	22.3	33.4	18.6	27.8	15.3	22.9	14.0	20.9	10.7	16.1
	1	29.7	44.4	22.0	32.9	18.3	27.4	15.1	22.5	13.8	20.6	10.6	15.8
	2	28.2	42.2	20.9	31.3	17.5	26.1	14.4	21.5	13.1	19.7	10.1	15.1
	3	25.9	38.7	19.3	28.9	16.1	24.2	13.3	19.9	12.2	18.2	9.40	14.1
	4	23.0	34.4	17.3	25.9	14.5	21.7	12.0	17.9	11.0	16.4	8.47	12.7
	5	19.7	29.5	15.0	22.4	12.6	18.8	10.4	15.6	9.56	14.3	7.41	11.1
	6	16.4	24.5	12.6	18.8	10.6	15.9	8.83	13.2	8.09	12.1	6.30	9.42
	7	13.1	19.6	10.2	15.3	8.66	13.0	7.24	10.8	6.65	9.95	5.19	7.77
	8	10.2	15.3	8.03	12.0	6.86	10.3	5.76	8.62	5.30	7.93	4.16	6.22
	9	8.08	12.1	6.34	9.49	5.42	8.11	4.56	6.82	4.19	6.27	3.29	4.92
	10	6.54	9.79	5.14	7.69	4.39	6.57	3.69	5.52	3.39	5.08	2.67	3.99
	11	5.41	8.09	4.25	6.35	3.63	5.43	3.05	4.56	2.80	4.20	2.20	3.30
	12	4.54	6.80	3.57	5.34	3.05	4.56	2.56	3.83	2.36	3.53	1.85	2.77
	13	3.87	5.79	3.04	4.55	2.60	3.89	2.18	3.27	2.01	3.00	1.58	2.36
	14							1.88	2.82	1.73	2.59	1.36	2.04
	15												
	16												
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												

Properties						
A_g, in.^{2}	1.77	1.31	1.09	0.897	0.819	0.630
I, in.^{4}	1.13	0.888	0.759	0.637	0.586	0.461
r, in.	0.799	0.823	0.834	0.843	0.846	0.855

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS



HSS2.5-HSS2.375

Shape		HSS2.5×				HSS2.375×							
		0.063		0.049		0.180		0.148		0.120		0.109	
t_{design}, in.		0.063		0.049		0.180		0.148		0.120		0.109	
lb/ft		1.66		1.31		4.30		3.59		2.95		2.69	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	8.16	12.2	6.43	9.61	21.1	31.6	17.7	26.5	14.5	21.7	13.2	19.8
	1	8.05	12.0	6.33	9.48	20.8	31.1	17.4	26.1	14.2	21.3	13.0	19.5
	2	7.70	11.5	6.07	9.07	19.7	29.4	16.5	24.7	13.5	20.3	12.4	18.5
	3	7.16	10.7	5.64	8.44	18.0	26.9	15.2	22.7	12.4	18.6	11.4	17.0
	4	6.47	9.67	5.10	7.63	15.9	23.8	13.4	20.1	11.0	16.5	10.1	15.1
	5	5.67	8.48	4.48	6.70	13.5	20.2	11.5	17.1	9.48	14.2	8.68	13.0
	6	4.83	7.23	3.82	5.72	11.1	16.6	9.46	14.1	7.86	11.8	7.21	10.8
	7	4.00	5.98	3.17	4.74	8.81	13.2	7.54	11.3	6.31	9.44	5.79	8.67
	8	3.21	4.80	2.55	3.82	6.81	10.2	5.84	8.74	4.91	7.34	4.52	6.76
	9	2.54	3.81	2.03	3.03	5.38	8.05	4.62	6.91	3.88	5.80	3.57	5.34
	10	2.06	3.08	1.64	2.45	4.36	6.52	3.74	5.59	3.14	4.70	2.89	4.32
	11	1.70	2.55	1.36	2.03	3.60	5.39	3.09	4.62	2.60	3.88	2.39	3.57
	12	1.43	2.14	1.14	1.70	3.03	4.53	2.60	3.88	2.18	3.26	2.01	3.00
	13	1.22	1.82	0.971	1.45			2.21	3.31	1.86	2.78	1.71	2.56
	14	1.05	1.57	0.837	1.25								
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	17												
	18												
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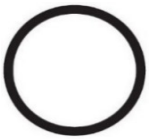
	30												
Properties													
A_g, in.^{2}		0.479		0.377		1.24		1.04		0.850		0.776	
I, in.^{4}		0.356		0.283		0.753		0.645		0.542		0.499	
r, in.		0.862		0.867		0.779		0.788		0.799		0.802	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.



HSS2.375-HSS2.25

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

Shape		HSS2.375×						HSS2.25×					
		0.083		0.063		0.049		0.180		0.148		0.120	
t_{design}, in.		0.083		0.063		0.049		0.180		0.148		0.120	
lb/ft		2.07		1.57		1.24		4.06		3.39		2.78	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	10.2	15.2	7.74	11.6	6.10	9.13	19.9	29.8	16.7	24.9	13.7	20.5
	1	10.0	15.0	7.61	11.4	6.01	8.98	19.5	29.2	16.3	24.4	13.4	20.1
	2	9.54	14.3	7.25	10.9	5.72	8.56	18.4	27.5	15.4	23.0	12.7	19.0
	3	8.79	13.1	6.69	10.0	5.28	7.90	16.6	24.9	14.0	20.9	11.5	17.2
	4	7.83	11.7	5.97	8.93	4.72	7.06	14.5	21.6	12.2	18.2	10.1	15.1
	5	6.75	10.1	5.16	7.72	4.09	6.11	12.1	18.1	10.2	15.3	8.50	12.7
	6	5.63	8.43	4.32	6.46	3.43	5.13	9.69	14.5	8.25	12.3	6.89	10.3
	7	4.55	6.80	3.50	5.24	2.78	4.16	7.46	11.2	6.40	9.57	5.38	8.05
	8	3.56	5.32	2.75	4.11	2.19	3.27	5.72	8.55	4.91	7.34	4.13	6.18
	9	2.81	4.21	2.17	3.25	1.73	2.59	4.52	6.76	3.88	5.80	3.26	4.88
	10	2.28	3.41	1.76	2.63	1.40	2.10	3.66	5.47	3.14	4.70	2.64	3.95
	11	1.88	2.82	1.45	2.17	1.16	1.73	3.02	4.52	2.59	3.88	2.18	3.27
	12	1.58	2.37	1.22	1.83	0.973	1.46	2.54	3.80	2.18	3.26	1.84	2.75
	13	1.35	2.02	1.04	1.56	0.829	1.24						
	14												
	15												
	16												
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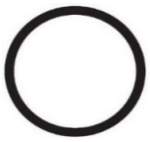
	29												
	30												
Properties													
A_g, in.^{2}		0.598		0.454		0.358		1.17		0.977		0.803	
I, in.^{4}		0.393		0.304		0.242		0.632		0.542		0.457	
r, in.		0.811		0.818		0.822		0.735		0.745		0.754	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS



HSS2.25-HSS2

Shape		HSS2.25×						HSS2×					
		0.109		0.083		0.063		0.180		0.148		0.120	
t_{design}, in.		0.109		0.083		0.063		0.180		0.148		0.120	
lb/ft		2.54		1.96		1.49		3.57		2.99		2.46	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	12.5	18.7	9.63	14.4	7.33	11.0	17.6	26.3	14.7	22.0	12.1	18.1
	1	12.3	18.3	9.45	14.1	7.20	10.8	17.1	25.6	14.3	21.4	11.8	17.6
	2	11.6	17.3	8.95	13.4	6.82	10.2	15.8	23.7	13.3	19.9	11.0	16.4
	3	10.5	15.8	8.16	12.2	6.23	9.31	13.9	20.8	11.7	17.5	9.69	14.5
	4	9.24	13.8	7.17	10.7	5.48	8.20	11.6	17.3	9.82	14.7	8.2	12.2
	5	7.80	11.7	6.08	9.09	4.66	6.97	9.17	13.7	7.84	11.7	6.55	9.80
	6	6.34	9.48	4.96	7.42	3.82	5.71	6.89	10.3	5.94	8.89	5.00	7.48
	7	4.96	7.42	3.91	5.84	3.01	4.51	5.08	7.60	4.39	6.57	3.70	5.54
	8	3.81	5.70	3.01	4.50	2.32	3.48	3.89	5.82	3.36	5.03	2.84	4.24
	9	3.01	4.50	2.38	3.55	1.84	2.75	3.07	4.60	2.66	3.97	2.24	3.35
	10	2.44	3.65	1.92	2.88	1.49	2.23	2.49	3.72	2.15	3.22	1.82	2.72
	11	2.02	3.01	1.59	2.38	1.23	1.84					1.50	2.24
	12	1.69	2.53	1.34	2.00	1.03	1.55						
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	14												
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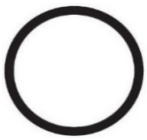
Properties													
A_g, in.^{2}		0.733		0.565		0.430		1.03		0.861		0.709	
I, in.^{4}		0.421		0.332		0.257		0.430		0.372		0.314	
r, in.		0.758		0.767		0.773		0.646		0.657		0.665	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.



HSS2-HSS1.9

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

Shape		HSS2×										HSS1.9×	
		0.109		0.083		0.063		0.049		0.035		0.148	
t_{design}, in.		0.109		0.083		0.063		0.049		0.035		0.148	
lb/ft		2.25		1.73		1.32		1.04		0.749		2.83	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	11.0	16.5	8.52	12.8	6.48	9.69	5.11	7.65	3.68	5.51	13.9	20.8
	1	10.8	16.1	8.32	12.5	6.33	9.47	5.00	7.48	3.60	5.39	13.5	20.2
	2	10.0	15.0	7.76	11.6	5.91	8.84	4.67	6.98	3.36	5.03	12.4	18.6
	3	8.88	13.3	6.89	10.3	5.26	7.88	4.17	6.23	3.01	4.50	10.8	16.2
	4	7.50	11.2	5.85	8.74	4.48	6.70	3.55	5.32	2.57	3.84	8.87	13.3
	5	6.03	9.02	4.73	7.07	3.64	5.45	2.89	4.33	2.10	3.14	6.90	10.3
	6	4.62	6.91	3.65	5.46	2.83	4.23	2.25	3.37	1.64	2.45	5.07	7.59
	7	3.43	5.13	2.72	4.06	2.11	3.16	1.69	2.52	1.23	1.84	3.73	5.57
	8	2.62	3.93	2.08	3.11	1.62	2.42	1.29	1.93	0.941	1.41	2.85	4.27
	9	2.07	3.10	1.64	2.46	1.28	1.91	1.02	1.53	0.744	1.11	2.25	3.37
	10	1.68	2.51	1.33	1.99	1.04	1.55	0.827	1.24	0.602	0.901	1.83	2.73
	11	1.39	2.08	1.10	1.65	0.856	1.28	0.683	1.02	0.498	0.745		
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	13												
	14												
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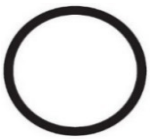
Properties						
A_g, in.^{2}	0.648	0.500	0.380	0.300	0.216	0.815
I, in.^{4}	0.290	0.230	0.179	0.143	0.104	0.315
r, in.	0.669	0.678	0.686	0.690	0.694	0.622

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS



HSS1.9

Shape		HSS1.9×											
		0.120		0.109		0.083		0.063		0.049		0.035	
t_{design}, in.		0.120		0.109		0.083		0.063		0.049		0.035	
lb/ft		2.33		2.13		1.64		1.25		0.988		0.711	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	11.4	17.1	10.4	15.6	8.08	12.1	6.15	9.21	4.86	7.27	3.49	5.23
	1	11.1	16.7	10.2	15.2	7.87	11.8	6.00	8.97	4.74	7.09	3.41	5.10
	2	10.3	15.3	9.38	14.0	7.28	10.9	5.55	8.31	4.39	6.57	3.16	4.73
	3	8.95	13.4	8.20	12.3	6.38	9.55	4.88	7.30	3.87	5.79	2.79	4.18
	4	7.40	11.1	6.80	10.2	5.31	7.95	4.08	6.10	3.24	4.85	2.35	3.51
	5	5.79	8.67	5.34	7.98	4.20	6.28	3.23	4.84	2.58	3.86	1.88	2.81
	6	4.29	6.42	3.97	5.94	3.15	4.71	2.44	3.65	1.95	2.92	1.43	2.13
	7	3.16	4.72	2.92	4.37	2.32	3.46	1.80	2.69	1.44	2.15	1.06	1.58
	8	2.42	3.62	2.24	3.35	1.77	2.65	1.38	2.06	1.10	1.65	0.808	1.21
	9	1.91	2.86	1.77	2.64	1.40	2.10	1.09	1.63	0.871	1.30	0.638	0.955
	10	1.55	2.31	1.43	2.14	1.13	1.70	0.880	1.32	0.706	1.06	0.517	0.773
	11												
	12												
	13												
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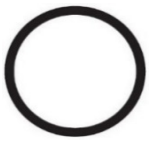
	30												

Properties						
A_g, in.^{2}	0.671	0.613	0.474	0.361	0.285	0.205
I, in.^{4}	0.267	0.247	0.196	0.152	0.122	0.089
r, in.	0.631	0.635	0.643	0.649	0.654	0.660

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.



HSS1.75

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

Shape		HSS1.75×											
		0.120		0.109		0.083		0.063		0.049		0.035	
t_{design}, in.		0.120		0.109		0.083		0.063		0.049		0.035	
lb/ft		2.13		1.95		1.51		1.15		0.908		0.654	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	10.5	15.7	9.58	14.3	7.41	11.1	5.64	8.44	4.47	6.68	3.22	4.82
	1	10.1	15.2	9.28	13.9	7.19	10.8	5.47	8.19	4.33	6.48	3.13	4.68
	2	9.19	13.8	8.43	12.6	6.54	9.79	5.00	7.47	3.96	5.93	2.86	4.28
	3	7.82	11.7	7.18	10.7	5.60	8.37	4.29	6.42	3.41	5.10	2.47	3.70
	4	6.23	9.32	5.73	8.57	4.50	6.73	3.47	5.19	2.77	4.14	2.01	3.01
	5	4.65	6.96	4.29	6.42	3.40	5.08	2.64	3.95	2.11	3.16	1.54	2.30
	6	3.30	4.94	3.05	4.56	2.43	3.63	1.90	2.84	1.53	2.28	1.12	1.67
	7	2.42	3.63	2.24	3.35	1.78	2.67	1.39	2.09	1.12	1.68	0.820	1.23
	8	1.86	2.78	1.72	2.57	1.37	2.04	1.07	1.60	0.859	1.29	0.628	0.939
	9	1.47	2.19	1.36	2.03	1.08	1.61	0.843	1.26	0.679	1.02	0.496	0.742
	10									0.550	0.822	0.402	0.601
	11												
	12												
	13												
	14												
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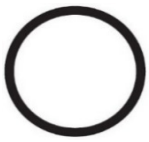
	27												
	28												
	29												
	30												

Properties						
A_g, in.^{2}	0.614	0.562	0.435	0.331	0.262	0.189
I, in.^{4}	0.205	0.190	0.151	0.118	0.095	0.069
r, in.	0.578	0.581	0.589	0.597	0.602	0.606

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS



HSS1.66-HSS1.5

Shape		HSS1.66×										HSS1.5×	
		0.148		0.120		0.109		0.083		0.063		0.120	
t_{design}, in.		0.148		0.120		0.109		0.083		0.063		0.120	
lb/ft		2.44		2.01		1.84		1.43		1.09		1.80	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	12.0	17.9	9.90	14.8	9.05	13.5	7.01	10.5	5.35	8.01	8.86	13.3
	1	11.5	17.3	9.55	14.3	8.73	13.1	6.77	10.1	5.17	7.74	8.47	12.7
	2	10.3	15.4	8.56	12.8	7.84	11.7	6.10	9.12	4.67	6.99	7.40	11.1
	3	8.54	12.8	7.14	10.7	6.55	9.80	5.12	7.66	3.94	5.89	5.90	8.83
	4	6.57	9.83	5.54	8.28	5.09	7.62	4.01	6.01	3.10	4.64	4.31	6.44
	5	4.68	7.01	3.99	5.97	3.68	5.51	2.94	4.39	2.28	3.42	2.89	4.33
	6	3.26	4.88	2.79	4.17	2.57	3.85	2.06	3.08	1.61	2.40	2.01	3.00
	7	2.40	3.58	2.05	3.06	1.89	2.83	1.51	2.26	1.18	1.77	1.48	2.21
	8	1.83	2.74	1.57	2.34	1.45	2.17	1.16	1.73	0.904	1.35	1.13	1.69
	9			1.24	1.85	1.14	1.71	0.915	1.37	0.714	1.07		
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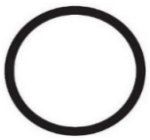
Properties													
A_g, in.^{2}		0.703		0.581		0.531		0.411		0.314		0.520	
I, in.^{4}		0.203		0.173		0.160		0.128		0.100		0.125	
r, in.		0.537		0.546		0.549		0.558		0.564		0.490	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.



HSS1.5-HSS1.25

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

Shape		HSS1.5×										HSS1.25×	
		0.109		0.083		0.063		0.049		0.035		0.120	
t_{design}, in.		0.109		0.083		0.063		0.049		0.035		0.120	
lb/ft		1.65		1.28		0.979		0.775		0.559		1.48	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	8.11	12.1	6.29	9.41	4.81	7.19	3.80	5.69	2.74	4.11	7.26	10.9
	1	7.76	11.6	6.03	9.01	4.61	6.90	3.65	5.46	2.64	3.94	6.79	10.2
	2	6.79	10.2	5.30	7.92	4.07	6.08	3.23	4.83	2.33	3.49	5.55	8.31
	3	5.44	8.14	4.27	6.39	3.30	4.94	2.63	3.93	1.91	2.85	3.97	5.94
	4	3.99	5.97	3.16	4.73	2.46	3.68	1.97	2.95	1.44	2.15	2.49	3.73
	5	2.69	4.02	2.15	3.22	1.69	2.53	1.36	2.04	1.00	1.50	1.59	2.39
	6	1.87	2.79	1.50	2.24	1.18	1.76	0.948	1.42	0.695	1.04	1.11	1.66
	7	1.37	2.05	1.10	1.64	0.863	1.29	0.696	1.04	0.510	0.764		
	8	1.05	1.57	0.841	1.26	0.661	0.989	0.533	0.797	0.391	0.585		
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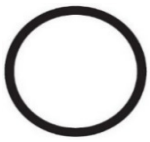
Properties													
A_g, in.^{2}		0.476		0.369		0.282		0.223		0.161		0.426	
I, in.^{4}		0.116		0.093		0.073		0.059		0.043		0.069	
r, in.		0.494		0.502		0.509		0.514		0.518		0.402	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS



HSS1.25-HSS1

Shape		HSS1.25×										HSS1×	
		0.109		0.083		0.063		0.049		0.035		0.120	
t_{design}, in.		0.109		0.083		0.063		0.049		0.035		0.120	
lb/ft		1.36		1.06		0.809		0.641		0.463		1.15	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	6.66	9.97	5.18	7.75	3.97	5.94	3.15	4.72	2.28	3.42	5.66	8.47
	1	6.24	9.33	4.86	7.28	3.74	5.59	2.97	4.44	2.15	3.22	5.07	7.58
	2	5.12	7.66	4.02	6.02	3.11	4.65	2.48	3.71	1.80	2.70	3.65	5.45
	3	3.68	5.50	2.93	4.39	2.29	3.43	1.84	2.75	1.34	2.01	2.10	3.15
	4	2.32	3.47	1.89	2.82	1.49	2.23	1.21	1.81	0.890	1.33	1.18	1.77
	5	1.49	2.22	1.21	1.81	0.956	1.43	0.774	1.16	0.571	0.854	0.758	1.13
	6	1.03	1.54	0.838	1.25	0.664	0.994	0.537	0.804	0.397	0.593		
	7					0.488	0.730	0.395	0.591	0.291	0.436		
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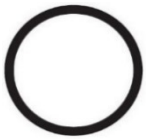
Properties						
A_g, in.^{2}	0.391	0.304	0.233	0.185	0.134	0.332
I, in.^{4}	0.064	0.052	0.041	0.033	0.025	0.033
r, in.	0.405	0.414	0.421	0.425	0.429	0.314

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.



HSS1

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 30 ksi

Shape		HSS1×											
		0.109		0.083		0.065		0.063		0.049		0.042	
t_{design}, in.		0.109		0.083		0.065		0.063		0.049		0.042	
lb/ft		1.06		0.829		0.662		0.638		0.508		0.438	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	5.20	7.78	4.07	6.09	3.26	4.87	3.14	4.69	2.49	3.72	2.15	3.21
	1	4.67	6.98	3.68	5.50	2.95	4.41	2.84	4.25	2.26	3.38	1.95	2.92
	2	3.38	5.05	2.70	4.04	2.20	3.29	2.12	3.17	1.70	2.54	1.47	2.20
	3	1.97	2.95	1.62	2.42	1.34	2.01	1.29	1.94	1.05	1.58	0.919	1.38
	4	1.11	1.66	0.914	1.37	0.762	1.14	0.734	1.10	0.600	0.898	0.524	0.784
	5	0.710	1.06	0.585	0.875	0.488	0.729	0.470	0.703	0.384	0.574	0.335	0.502
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Properties						
A_g, in.^{2}	0.305	0.239	0.191	0.184	0.146	0.126
I, in.^{4}	0.031	0.025	0.021	0.020	0.017	0.015
r, in.	0.317	0.325	0.332	0.332	0.337	0.339

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

Table 4-6 (continued)
Available Strength in Axial Compression, kips
Round HSS

HSS1

Shape		HSS1×			
		0.035		0.032	
t_{design}, in.		0.035		0.032	
lb/ft		0.368		0.337	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	1.81	2.70	1.66	2.48
	1	1.65	2.46	1.51	2.26
	2	1.25	1.87	1.14	1.71
	3	0.785	1.17	0.720	1.08
	4	0.449	0.671	0.412	0.616
	5	0.287	0.430	0.264	0.394
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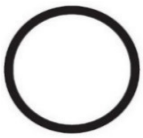
Properties		
A_g, in.^{2}	0.106	0.097
I, in.^{4}	0.012	0.011
r, in.	0.342	0.342

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	



PIPE 12-PIPE 8

Table 4-7
Available Strength in Axial Compression, kips
Pipe

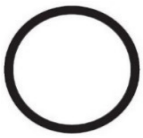
F_y = 30 ksi

Shape		Pipe 12				Pipe 10				Pipe 8			
		Std. 40S		Std. 10S		Std. 40S		Std. 10S		Std. 80S		Std. 40S	
t_{design}, in.		0.375		0.180		0.365		0.165		0.500		0.322	
lb/ft		50.6		24.7		41.3		19.0		44.3		29.1	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	249	372	122	182	205	306	93.9	141	218	326	143	214
	6	244	365	119	179	199	297	91.4	137	208	311	137	205
	7	242	362	118	177	197	294	90.5	135	205	306	135	201
	8	240	359	118	176	194	291	89.4	134	201	300	132	198
	9	238	356	116	174	192	287	88.3	132	196	294	129	194
	10	235	352	115	172	189	283	87.0	130	191	286	126	189
	11	233	348	114	170	186	278	85.6	128	186	279	123	184
	12	230	343	113	168	182	273	84.1	126	181	270	120	179
	13	226	339	111	166	179	267	82.5	123	175	262	116	173
	14	223	334	109	164	175	262	80.8	121	169	253	112	168
	15	219	328	108	161	171	256	79.0	118	163	243	108	162
	16	216	323	106	158	167	250	77.2	115	156	234	104	155
	17	212	317	104	156	163	243	75.3	113	150	224	99.7	149
	18	208	311	102	153	158	236	73.3	110	143	214	95.4	143
	19	203	304	100	150	153	230	71.2	107	136	204	91.1	136
	20	199	298	97.9	146	149	223	69.1	103	129	194	86.7	130
	21	194	291	95.7	143	144	215	67.0	100	123	183	82.4	123
	22	190	284	93.5	140	139	208	64.8	97.0	116	173	78.1	117
	23	185	277	91.2	136	134	201	62.6	93.7	109	164	73.8	110
	24	180	270	88.9	133	129	193	60.4	90.4	103	154	69.5	104
	25	175	262	86.6	130	124	186	58.2	87.0	96.4	144	65.4	97.8
	26	170	255	84.2	126	119	179	55.9	83.7	90.2	135	61.4	91.8
	27	165	248	81.8	122	115	171	53.7	80.4	84.2	126	57.4	85.9
	28	160	240	79.4	119	110	164	51.5	77.0	78.4	117	53.6	80.2
	29	155	233	77.0	115	105	157	49.3	73.7	73.1	109	50.0	74.8
	30	150	225	74.5	112	99.9	150	47.1	70.5	68.3	102	46.7	69.9
	32	140	210	69.7	104	90.5	135	42.8	64.1	60.0	89.8	41.1	61.4
	34	130	195	64.8	97.0	81.5	122	38.7	57.9	53.2	79.6	36.4	54.4
	36	120	180	60.1	89.9	73.0	109	34.8	52.0	47.4	71.0	32.4	48.5
	38	111	166	55.4	82.9	65.5	98.0	31.2	46.7	42.6	63.7	29.1	43.6
	40	102	152	50.9	76.2	59.1	88.5	28.2	42.2	38.4	57.5	26.3	39.3
Properties													
A_g, in.^{2}		14.6		7.14		12.0		5.51		12.8		8.40	
I, in.^{4}		283		142		163		78.0		106		72.6	
r, in.		4.40		4.46		3.69		3.76		2.88		2.94	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

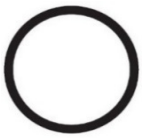
Table 4-7 (continued)
Available Strength in Axial Compression, kips
Pipe



PIPE 8-PIPE 6

Shape		Pipe 8				Pipe 6							
		Std. 10S		Std. 5S		Std. 80S		Std. 40S		Std. 10S		Std. 5S	
t_{design}, in.		0.148		0.109		0.432		0.280		0.134		0.109	
lb/ft		13.7		10.1		29.1		19.4		9.48		7.74	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	67.2	100	49.8	74.5	143	214	95.3	143	46.5	69.6	38.0	56.9
	6	64.3	96.2	47.7	71.3	132	198	88.2	132	43.2	64.7	35.3	52.9
	7	63.3	94.7	46.9	70.2	128	192	85.8	128	42.1	63.0	34.4	51.5
	8	62.2	93.0	46.1	69.0	124	186	83.1	124	40.8	61.1	33.4	49.9
	9	60.9	91.1	45.2	67.6	120	179	80.1	120	39.4	59.0	32.2	48.2
	10	59.5	89.1	44.2	66.1	115	171	76.9	115	37.9	56.7	31.0	46.4
	11	58.1	86.8	43.1	64.4	109	164	73.5	110	36.3	54.3	29.7	44.5
	12	56.5	84.5	41.9	62.7	104	155	70.0	105	34.6	51.8	28.4	42.4
	13	54.8	82.0	40.7	60.8	98.2	147	66.4	99.3	32.9	49.2	27.0	40.3
	14	53.0	79.4	39.4	58.9	92.4	138	62.6	93.7	31.1	46.6	25.5	38.2
	15	51.2	76.6	38.0	56.9	86.6	130	58.9	88.1	29.4	43.9	24.1	36.0
	16	49.3	73.8	36.6	54.8	80.8	121	55.1	82.4	27.5	41.2	22.6	33.8
	17	47.4	70.9	35.2	52.7	75.1	112	51.3	76.8	25.7	38.5	21.1	31.6
	18	45.5	68.0	33.8	50.5	69.4	104	47.6	71.2	24.0	35.8	19.7	29.5
	19	43.5	65.1	32.3	48.4	63.9	95.6	44.0	65.8	22.2	33.2	18.3	27.3
	20	41.5	62.1	30.8	46.1	58.5	87.6	40.5	60.6	20.5	30.7	16.9	25.2
	21	39.5	59.1	29.4	43.9	53.4	79.9	37.1	55.5	18.9	28.2	15.5	23.2
	22	37.5	56.1	27.9	41.7	48.7	72.8	33.9	50.6	17.3	25.8	14.2	21.3
	23	35.5	53.1	26.4	39.6	44.6	66.6	31.0	46.3	15.8	23.6	13.0	19.5
	24	33.6	50.2	25.0	37.4	40.9	61.2	28.4	42.6	14.5	21.7	12.0	17.9
	25	31.6	47.3	23.6	35.3	37.7	56.4	26.2	39.2	13.4	20.0	11.0	16.5
	26	29.8	44.5	22.2	33.2	34.9	52.2	24.2	36.3	12.4	18.5	10.2	15.2
	27	27.9	41.8	20.8	31.1	32.3	48.4	22.5	33.6	11.5	17.2	9.45	14.1
	28	26.1	39.1	19.5	29.2	30.1	45.0	20.9	31.3	10.7	16.0	8.79	13.1
	29	24.4	36.5	18.2	27.2	28.0	41.9	19.5	29.1	9.94	14.9	8.19	12.3
	30	22.8	34.1	17.0	25.5	26.2	39.2	18.2	27.2	9.29	13.9	7.66	11.5
	32	20.1	30.0	15.0	22.4	23.0	34.4	16.0	23.9	8.17	12.2	6.73	10.1
	34	17.8	26.6	13.3	19.8	20.4	30.5	14.2	21.2	7.23	10.8	5.96	8.92
	36	15.8	23.7	11.8	17.7	18.2	27.2	12.6	18.9	6.45	9.65	5.32	7.95
	38	14.2	21.3	10.6	15.9					5.79	8.66	4.77	7.14
	40	12.8	19.2	9.57	14.3								
Properties													
A_g, in.^{2}		3.94		2.92		8.41		5.59		2.73		2.23	
I, in.^{4}		35.5		26.5		40.6		28.2		14.4		11.9	
r, in.		3.00		3.01		2.20		2.25		2.30		2.31	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	



PIPE 5-PIPE 4

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Pipe

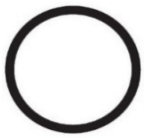
F_y = 30 ksi

Shape		Pipe 5								Pipe 4			
		Std. 80S		Std. 40S		Std. 10S		Std. 5S		Std. 80S		Std. 40S	
t_{design}, in.		0.375		0.258		0.134		0.109		0.337		0.237	
lb/ft		21.2		14.9		7.93		6.48		15.3		11.0	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	104	156	73.3	110	38.9	58.1	31.9	47.7	75.2	112	54.0	80.8
	6	92.8	139	65.6	98.1	35.0	52.3	28.7	42.9	62.9	94.1	45.5	68.1
	7	89.0	133	63.0	94.2	33.7	50.3	27.6	41.4	59.0	88.2	42.8	64.0
	8	84.9	127	60.1	89.9	32.2	48.2	26.5	39.6	54.8	81.9	39.9	59.6
	9	80.4	120	57.0	85.3	30.6	45.8	25.2	37.7	50.4	75.3	36.8	55.0
	10	75.6	113	53.8	80.4	29.0	43.3	23.8	35.6	45.8	68.6	33.6	50.3
	11	70.7	106	50.4	75.4	27.2	40.7	22.4	33.5	41.3	61.8	30.4	45.5
	12	65.7	98.3	46.9	70.2	25.5	38.1	21.0	31.4	36.9	55.2	27.3	40.8
	13	60.6	90.7	43.4	65.0	23.6	35.4	19.5	29.2	32.6	48.7	24.2	36.2
	14	55.6	83.2	39.9	59.7	21.8	32.7	18.0	27.0	28.5	42.6	21.3	31.8
	15	50.7	75.8	36.5	54.6	20.1	30.0	16.6	24.8	24.9	37.2	18.6	27.8
	16	45.9	68.7	33.2	49.6	18.3	27.4	15.1	22.6	21.8	32.7	16.3	24.5
	17	41.3	61.8	29.9	44.8	16.6	24.9	13.8	20.6	19.4	29.0	14.5	21.7
	18	37.0	55.3	26.9	40.2	15.0	22.4	12.4	18.6	17.3	25.8	12.9	19.3
	19	33.2	49.6	24.1	36.1	13.5	20.2	11.2	16.7	15.5	23.2	11.6	17.3
	20	29.9	44.8	21.8	32.6	12.2	18.2	10.1	15.1	14.0	20.9	10.5	15.7
	21	27.2	40.6	19.7	29.5	11.0	16.5	9.15	13.7	12.7	19.0	9.49	14.2
	22	24.7	37.0	18.0	26.9	10.1	15.0	8.33	12.5	11.6	17.3	8.65	12.9
	23	22.6	33.9	16.5	24.6	9.20	13.8	7.62	11.4	10.6	15.8	7.91	11.8
	24	20.8	31.1	15.1	22.6	8.45	12.6	7.00	10.5	9.71	14.5	7.27	10.9
	25	19.2	28.7	13.9	20.8	7.79	11.6	6.45	9.65			6.70	10.0
	26	17.7	26.5	12.9	19.3	7.20	10.8	5.97	8.93				
	27	16.4	24.6	11.9	17.9	6.68	10.0	5.53	8.28				
	28	15.3	22.9	11.1	16.6	6.21	9.29	5.14	7.70				
	29	14.2	21.3	10.4	15.5	5.79	8.66	4.80	7.17				
	30	13.3	19.9	9.67	14.5	5.41	8.09	4.48	6.70				
	32					4.75	7.11	3.94	5.89				
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		6.11		4.30		2.28		1.87		4.41		3.17	
I, in.^{4}		20.6		15.1		8.41		6.94		9.61		7.23	
r, in.		1.84		1.87		1.92		1.93		1.48		1.51	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

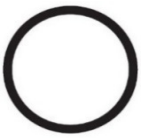
Table 4-7 (continued)
Available Strength in Axial Compression, kips
Pipe



PIPE 4-PIPE 3½

Shape		Pipe 4				Pipe 3½							
		Std. 10S		Std. 5S		Std. 80S		Std. 40S		Std. 10S		Std. 5S	
t_{design}, in.		0.120		0.083		0.318		0.226		0.120		0.083	
lb/ft		5.73		3.99		12.8		9.29		5.07		3.54	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	28.1	42.1	19.6	29.3	62.7	93.8	45.7	68.3	24.9	37.2	17.4	26.0
	6	23.9	35.8	16.7	25.0	50.0	74.8	36.8	55.0	20.2	30.2	14.2	21.3
	7	22.5	33.7	15.8	23.6	46.0	68.9	34.0	50.8	18.8	28.1	13.2	19.8
	8	21.1	31.5	14.7	22.1	41.9	62.6	31.0	46.4	17.2	25.7	12.1	18.2
	9	19.5	29.2	13.7	20.4	37.6	56.3	28.0	41.9	15.6	23.3	11.0	16.5
	10	17.9	26.8	12.6	18.8	33.4	49.9	25.0	37.4	14.0	20.9	9.92	14.8
	11	16.3	24.4	11.4	17.1	29.2	43.7	22.0	32.9	12.4	18.5	8.82	13.2
	12	14.7	22.0	10.3	15.4	25.3	37.8	19.2	28.7	10.8	16.2	7.75	11.6
	13	13.1	19.6	9.24	13.8	21.6	32.4	16.5	24.7	9.38	14.0	6.74	10.1
	14	11.6	17.4	8.19	12.3	18.7	27.9	14.2	21.3	8.09	12.1	5.82	8.71
	15	10.2	15.3	7.20	10.8	16.3	24.3	12.4	18.5	7.05	10.5	5.07	7.59
	16	8.97	13.4	6.33	9.47	14.3	21.4	10.9	16.3	6.20	9.27	4.46	6.67
	17	7.94	11.9	5.61	8.39	12.7	18.9	9.64	14.4	5.49	8.21	3.95	5.91
	18	7.08	10.6	5.00	7.48	11.3	16.9	8.60	12.9	4.90	7.33	3.52	5.27
	19	6.36	9.51	4.49	6.72	10.1	15.2	7.72	11.5	4.40	6.57	3.16	4.73
	20	5.74	8.58	4.05	6.06	9.14	13.7	6.97	10.4	3.97	5.93	2.85	4.27
	21	5.20	7.79	3.67	5.50	8.29	12.4	6.32	9.45	3.60	5.38	2.59	3.87
	22	4.74	7.09	3.35	5.01			5.76	8.61	3.28	4.90	2.36	3.53
	23	4.34	6.49	3.06	4.58							2.16	3.23
	24	3.98	5.96	2.81	4.21								
	25	3.67	5.49	2.59	3.88								
	26			2.40	3.59								
	27												
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		1.65		1.15		3.68		2.68		1.46		1.02	
I, in.^{4}		3.96		2.81		6.28		4.79		2.76		1.96	
r, in.		1.55		1.56		1.31		1.34		1.37		1.39	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	ϕ_c = 0.85	



PIPE 3-PIPE 2½

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Pipe

F_y = 30 ksi

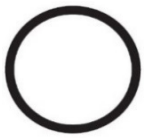
Shape		Pipe 3								Pipe 2½			
		Std. 80S		Std. 40S		Std. 10S		Std. 5S		Std. 80S		Std. 40S	
t_{design}, in.		0.300		0.216		0.120		0.083		0.276		0.203	
lb/ft		10.5		7.73		4.42		3.09		7.82		5.91	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	51.5	77.0	38.0	56.9	21.6	32.4	15.2	22.7	38.5	57.6	29.1	43.6
	6	37.9	56.7	28.4	42.6	16.5	24.7	11.6	17.4	24.5	36.6	18.9	28.3
	7	34.0	50.8	25.6	38.3	15.0	22.4	10.6	15.8	20.8	31.1	16.2	24.2
	8	29.9	44.7	22.7	34.0	13.4	20.0	9.46	14.1	17.2	25.7	13.5	20.2
	9	25.9	38.7	19.8	29.6	11.8	17.6	8.34	12.5	13.9	20.8	11.0	16.5
	10	22.0	33.0	17.0	25.4	10.2	15.3	7.25	10.8	11.2	16.8	8.92	13.3
	11	18.5	27.6	14.3	21.5	8.71	13.0	6.20	9.28	9.29	13.9	7.37	11.0
	12	15.5	23.2	12.1	18.0	7.35	11.0	5.25	7.85	7.81	11.7	6.19	9.26
	13	13.2	19.8	10.3	15.4	6.27	9.37	4.47	6.69	6.65	10.0	5.28	7.89
	14	11.4	17.0	8.86	13.3	5.40	8.08	3.85	5.77	5.74	8.58	4.55	6.81
	15	9.92	14.8	7.72	11.6	4.71	7.04	3.36	5.02	5.00	7.48	3.96	5.93
	16	8.72	13.0	6.79	10.2	4.14	6.19	2.95	4.41				
	17	7.73	11.6	6.01	8.99	3.66	5.48	2.61	3.91				
	18	6.89	10.3	5.36	8.02	3.27	4.89	2.33	3.49				
	19			4.81	7.20	2.93	4.39	2.09	3.13				
	20					2.65	3.96	1.89	2.82				
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
	32												
	34												
	36												
	38												
	40												
Properties													
A_g, in.^{2}		3.02		2.23		1.27		0.891		2.26		1.71	
I, in.^{4}		3.89		3.02		1.82		1.30		1.94		1.54	
r, in.		1.13		1.16		1.20		1.21		0.927		0.949	

ASD	LRFD
Ω_c = 1.76	φ_c = 0.85

Note: Heavy line indicates KL/r equal to or greater than 200.

F_y = 30 ksi

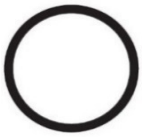
Table 4-7 (continued)
Available Strength in Axial Compression, kips
Pipe



PIPE 2½-PIPE 2

Shape		Pipe 2½				Pipe 2							
		Std. 10S		Std. 5S		Std. 80S		Std. 40S		Std. 10S		Std. 5S	
t_{design}, in.		0.120		0.083		0.218		0.154		0.109		0.065	
lb/ft		3.60		2.52		5.12		3.73		2.69		1.64	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	17.7	26.5	12.4	18.6	25.2	37.7	18.4	27.5	13.3	19.8	8.06	12.1
	1	17.5	26.2	12.3	18.4	24.8	37.1	18.1	27.1	13.0	19.5	7.93	11.9
	2	16.9	25.3	11.9	17.8	23.4	35.1	17.2	25.7	12.4	18.6	7.56	11.3
	3	16.0	23.9	11.2	16.8	21.4	32.0	15.7	23.5	11.4	17.1	6.97	10.4
	4	14.8	22.1	10.4	15.6	18.8	28.1	13.9	20.8	10.1	15.2	6.23	9.3
	5	13.3	20.0	9.43	14.1	15.9	23.8	11.9	17.8	8.72	13.0	5.38	8.05
	6	11.8	17.6	8.35	12.5	13.0	19.5	9.82	14.7	7.25	10.9	4.51	6.74
	7	10.2	15.2	7.23	10.8	10.3	15.3	7.83	11.7	5.83	8.73	3.65	5.47
	8	8.57	12.8	6.12	9.16	7.90	11.8	6.07	9.08	4.55	6.81	2.87	4.29
	9	7.07	10.6	5.07	7.59	6.24	9.33	4.79	7.17	3.59	5.38	2.27	3.39
	10	5.75	8.60	4.14	6.19	5.05	7.56	3.88	5.81	2.91	4.36	1.84	2.75
	11	4.75	7.11	3.42	5.11	4.18	6.25	3.21	4.80	2.41	3.60	1.52	2.27
	12	3.99	5.97	2.87	4.30	3.51	5.25	2.70	4.03	2.02	3.03	1.28	1.91
	13	3.40	5.09	2.45	3.66			2.30	3.44	1.72	2.58	1.09	1.63
	14	2.93	4.39	2.11	3.16								
	15	2.55	3.82	1.84	2.75								
	16	2.25	3.36	1.62	2.42								
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		1.04		0.729		1.48		1.08		0.778		0.473	
I, in.^{4}		0.993		0.714		0.874		0.670		0.503		0.317	
r, in.		0.977		0.990		0.768		0.788		0.804		0.819	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	



PIPE 1½-PIPE 1¼

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Pipe

F_y = 30 ksi

Shape		Pipe 1½								Pipe 1¼			
		Std. 80S		Std. 40S		Std. 10S		Std. 5S		Std. 80S		Std. 40S	
t_{design}, in.		0.200		0.145		0.109		0.065		0.191		0.140	
lb/ft		3.70		2.77		2.13		1.30		3.06		2.32	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	18.2	27.3	13.6	20.4	10.4	15.6	6.39	9.56	15.0	22.5	11.4	17.1
	1	17.7	26.5	13.2	19.8	10.2	15.2	6.23	9.32	14.4	21.6	11.0	16.4
	2	16.2	24.2	12.2	18.2	9.38	14.0	5.77	8.63	12.8	19.2	9.83	14.7
	3	14.0	20.9	10.6	15.8	8.20	12.3	5.07	7.59	10.5	15.7	8.16	12.2
	4	11.4	17.0	8.71	13.0	6.80	10.2	4.24	6.34	7.99	11.9	6.29	9.41
	5	8.70	13.00	6.78	10.1	5.34	7.98	3.36	5.03	5.60	8.38	4.50	6.74
	6	6.30	9.42	4.99	7.46	3.97	5.94	2.53	3.79	3.89	5.82	3.14	4.69
	7	4.63	6.92	3.66	5.48	2.92	4.37	1.87	2.79	2.86	4.28	2.31	3.45
	8	3.54	5.30	2.81	4.20	2.24	3.35	1.43	2.14	2.19	3.27	1.76	2.64
	9	2.80	4.19	2.22	3.32	1.77	2.64	1.13	1.69				
	10	2.27	3.39	1.80	2.69	1.43	2.14	0.915	1.37				
	11												
	12												
	13												
	14												
	15												
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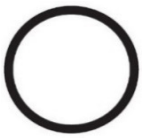
	24												
	25												
	26												
	27												
	28												
	29												
	30												
Properties													
A_g, in.^{2}		1.07		0.799		0.613		0.375		0.881		0.669	
I, in.^{4}		0.391		0.310		0.247		0.158		0.242		0.195	
r, in.		0.605		0.623		0.635		0.649		0.524		0.540	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	

F_y = 30 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Pipe



PIPE 1¼-PIPE 1

Shape		Pipe 1¼				Pipe 1							
		Std. 10S		Std. 5S		Std. 80S		Std. 40S		Std. 10S		Std. 5S	
t_{design}, in.		0.109		0.065		0.179		0.133		0.109		0.065	
lb/ft		1.84		1.13		2.22		1.71		1.43		0.885	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r	0	9.05	13.5	5.56	8.31	10.9	16.4	8.45	12.6	7.07	10.6	4.36	6.53
	1	8.73	13.1	5.37	8.04	10.3	15.3	7.96	11.9	6.67	10.0	4.13	6.18
	2	7.84	11.7	4.85	7.26	8.43	12.6	6.63	9.92	5.60	8.37	3.51	5.24
	3	6.55	9.80	4.09	6.12	6.09	9.11	4.89	7.31	4.17	6.25	2.67	3.99
	4	5.09	7.62	3.23	4.83	3.87	5.79	3.19	4.78	2.77	4.14	1.82	2.72
	5	3.68	5.51	2.38	3.56	2.48	3.70	2.05	3.06	1.78	2.66	1.17	1.76
	6	2.57	3.85	1.67	2.50	1.72	2.57	1.42	2.13	1.23	1.85	0.815	1.22
	7	1.89	2.83	1.23	1.84			1.04	1.56	0.907	1.36	0.599	0.896
	8	1.45	2.17	0.941	1.41								
	9	1.14	1.71	0.744	1.11								
	10												
	11												
	12												
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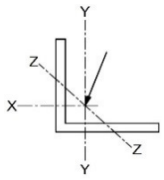
	30												
Properties													
A_g, in.^{2}		0.531		0.326		0.642		0.496		0.415		0.256	
I, in.^{4}		0.160		0.104		0.107		0.088		0.077		0.051	
r, in.		0.549		0.565		0.408		0.422		0.430		0.445	

ASD	LRFD	Note: Heavy line indicates KL/r equal to or greater than 200.
Ω_c = 1.76	φ_c = 0.85	



L8-L6

Table 4-8
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Welded)

F_y = 30 ksi

Shape		L8×8×										L6×6×	
		¾		⅝ [c1]		½ [c1]		⅜ [c1]		¼ [c1]		¾	
lb/ft		39.7		33.3		26.9		20.3		13.7		29.3	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	205	308	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	152	228
	1	204	306	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	150	226
	2	201	303	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	147	221
	3	197	296	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	141	212
	4	191	287	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	134	201
	5	184	276	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	125	188
	6	175	263	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	115	172
	7	166	249	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	104	156
	8	155	233	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	92.1	138
	9	144	217	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	80.7	121
	10	133	199	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	69.6	105
	11	121	182	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	59.1	88.9
	12	110	165	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	49.8	74.8
	13	98.3	148	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	42.4	63.8
	14	87.5	131	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	36.6	55.0
	15	77.1	116	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	31.9	47.9
	16	67.8	102	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	28.0	42.1
	17	60.1	90.3	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	24.8	37.3
	18	53.6	80.6	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	22.1	33.3
	19	48.1	72.3	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-	19.9	29.9
	20	43.4	65.3	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-		
	21	39.4	59.2	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-		
	22	35.9	53.9	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-		
	23	32.8	49.3	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-		
	24	30.1	45.3	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-		
	25	27.8	41.8	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-		
	26	25.7	38.6	-S-	-S-	-S-	-S-	-S-	-S-	-S-	-S-		
Properties													
A_g, in.^{2}		11.4		9.61		7.75		5.86		3.94		8.44	
r_z, in.		1.58		1.58		1.59		1.60		1.61		1.18	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

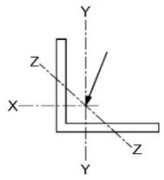
[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.

F_y = 30 ksi

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Welded)



L6-L5

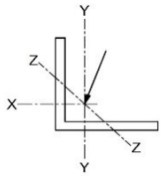
Shape		L6×6×								L5×5×			
		5/8		1/2 [c1]		3/8 [c1]		1/4 [c1]		3/4		5/8	
lb/ft		24.7		19.9		15.1		10.2		24.1		20.3	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	128	192	-S-	-S-	-S-	-S-	-S-	-S-	125	187	105	158
	1	127	190	-S-	-S-	-S-	-S-	-S-	-S-	123	185	104	156
	2	124	186	-S-	-S-	-S-	-S-	-S-	-S-	119	179	101	151
	3	119	179	-S-	-S-	-S-	-S-	-S-	-S-	112	169	95.1	143
	4	113	169	-S-	-S-	-S-	-S-	-S-	-S-	104	156	87.9	132
	5	105	158	-S-	-S-	-S-	-S-	-S-	-S-	93.5	141	79.4	119
	6	96.5	145	-S-	-S-	-S-	-S-	-S-	-S-	82.4	124	70.1	105
	7	87.2	131	-S-	-S-	-S-	-S-	-S-	-S-	71.0	107	60.5	90.9
	8	77.6	117	-S-	-S-	-S-	-S-	-S-	-S-	59.7	89.8	51.1	76.7
	9	68.0	102	-S-	-S-	-S-	-S-	-S-	-S-	49.1	73.9	42.1	63.3
	10	58.7	88.2	-S-	-S-	-S-	-S-	-S-	-S-	39.9	60.0	34.3	51.5
	11	49.8	74.9	-S-	-S-	-S-	-S-	-S-	-S-	33.0	49.6	28.3	42.6
	12	42.0	63.1	-S-	-S-	-S-	-S-	-S-	-S-	27.7	41.7	23.8	35.8
	13	35.7	53.7	-S-	-S-	-S-	-S-	-S-	-S-	23.6	35.5	20.3	30.5
	14	30.8	46.3	-S-	-S-	-S-	-S-	-S-	-S-	20.4	30.6	17.5	26.3
	15	26.8	40.4	-S-	-S-	-S-	-S-	-S-	-S-	17.7	26.7	15.2	22.9
	16	23.6	35.5	-S-	-S-	-S-	-S-	-S-	-S-	15.6	23.4	13.4	20.1
	17	20.9	31.4	-S-	-S-	-S-	-S-	-S-	-S-				
	18	18.6	28.0	-S-	-S-	-S-	-S-	-S-	-S-				
	19	16.7	25.2	-S-	-S-	-S-	-S-	-S-	-S-				
	20							-S-	-S-				
	21												
	22												
	23												
	24												
	25												
	26												
Properties													
A_g, in.^{2}		7.11		5.75		4.36		2.94		6.94		5.86	
r_z, in.		1.18		1.18		1.19		1.21		0.971		0.979	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.



L5-L4

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Welded)

F_y = 30 ksi

Shape		L5×5×								L4×4×			
		½		⅜ [c1]		5/16 [c1]		¼ [c1]		½		⅜	
lb/ft		16.5		12.5		10.5		8.45		13.0		9.92	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	85.3	128	-S-	-S-	-S-	-S-	-S-	-S-	67.4	101	51.4	77.2
	1	84.4	127	-S-	-S-	-S-	-S-	-S-	-S-	66.2	99.5	50.5	75.9
	2	81.6	123	-S-	-S-	-S-	-S-	-S-	-S-	62.7	94.3	47.9	72.0
	3	77.2	116	-S-	-S-	-S-	-S-	-S-	-S-	57.4	86.3	43.9	66.0
	4	71.4	107	-S-	-S-	-S-	-S-	-S-	-S-	50.7	76.2	38.8	58.4
	5	64.7	97.2	-S-	-S-	-S-	-S-	-S-	-S-	43.2	64.9	33.2	49.9
	6	57.2	86.0	-S-	-S-	-S-	-S-	-S-	-S-	35.5	53.4	27.4	41.1
	7	49.5	74.4	-S-	-S-	-S-	-S-	-S-	-S-	28.2	42.4	21.8	32.8
	8	41.9	63.0	-S-	-S-	-S-	-S-	-S-	-S-	21.8	32.8	16.9	25.4
	9	34.7	52.2	-S-	-S-	-S-	-S-	-S-	-S-	17.2	25.9	13.3	20.1
	10	28.3	42.5	-S-	-S-	-S-	-S-	-S-	-S-	14.0	21.0	10.8	16.2
	11	23.4	35.1	-S-	-S-	-S-	-S-	-S-	-S-	11.5	17.3	8.93	13.4
	12	19.6	29.5	-S-	-S-	-S-	-S-	-S-	-S-	9.69	14.6	7.51	11.3
	13	16.7	25.2	-S-	-S-	-S-	-S-	-S-	-S-	8.26	12.4	6.40	9.61
	14	14.4	21.7	-S-	-S-	-S-	-S-	-S-	-S-				
	15	12.6	18.9	-S-	-S-	-S-	-S-	-S-	-S-				
	16	11.1	16.6	-S-	-S-	-S-	-S-	-S-	-S-				
	17												
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												

Properties						
A_g, in.^{2}	4.75	3.61	3.03	2.44	3.75	2.86
r_z, in.	0.988	0.989	0.993	1.00	0.781	0.787

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

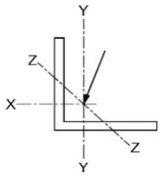
[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.

F_y = 30 ksi

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Welded)



L4-L3

Shape		L4×4×		L3½×3½×				L3×3×					
		¼ [c1]		⅜		¼ [c1]		½		⅜		¼ [c1]	
lb/ft		6.72		8.62		5.85		9.54		7.32		4.99	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	-S-	-S-	44.6	67.0	-S-	-S-	49.4	74.3	37.9	57.0	-S-	-S-
	1	-S-	-S-	43.5	65.5	-S-	-S-	47.9	71.9	36.7	55.2	-S-	-S-
	2	-S-	-S-	40.7	61.1	-S-	-S-	43.5	65.4	33.4	50.2	-S-	-S-
	3	-S-	-S-	36.3	54.6	-S-	-S-	37.2	55.8	28.6	42.9	-S-	-S-
	4	-S-	-S-	31.0	46.5	-S-	-S-	29.8	44.7	22.9	34.4	-S-	-S-
	5	-S-	-S-	25.2	37.9	-S-	-S-	22.4	33.6	17.3	26.0	-S-	-S-
	6	-S-	-S-	19.6	29.5	-S-	-S-	16.0	24.0	12.3	18.5	-S-	-S-
	7	-S-	-S-	14.7	22.1	-S-	-S-	11.7	17.6	9.05	13.6	-S-	-S-
	8	-S-	-S-	11.3	16.9	-S-	-S-	8.97	13.5	6.93	10.4	-S-	-S-
	9	-S-	-S-	8.89	13.4	-S-	-S-	7.09	10.7	5.48	8.23	-S-	-S-
	10	-S-	-S-	7.20	10.8	-S-	-S-						
	11	-S-	-S-	5.95	8.95	-S-	-S-						
	12	-S-	-S-										
	13	-S-	-S-										
	14												
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	23												
	24												
	25												
	26												

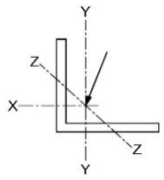
Properties						
A_g, in.^{2}	1.94	2.48	1.69	2.75	2.11	1.44
r_z, in.	0.796	0.690	0.693	0.585	0.587	0.589

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.



L3-L2

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Welded)

F_y = 30 ksi

Shape		L3×3×		L2½×2½×						L2×2×			
		3/16 [c1]		3/8		1/4		3/16 [c1]		3/8		1/4	
lb/ft		3.78		6.01		4.12		3.13		4.71		3.25	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	-S-	-S-	31.1	46.7	21.4	32.1	-S-	-S-	24.4	36.7	16.9	25.3
	1	-S-	-S-	29.7	44.6	20.4	30.7	-S-	-S-	22.7	34.2	15.7	23.6
	2	-S-	-S-	25.9	38.9	17.9	26.8	-S-	-S-	18.3	27.6	12.7	19.1
	3	-S-	-S-	20.6	31.0	14.3	21.4	-S-	-S-	12.8	19.3	8.93	13.4
	4	-S-	-S-	15.0	22.6	10.4	15.7	-S-	-S-	7.85	11.8	5.50	8.26
	5	-S-	-S-	10.1	15.1	7.00	10.5	-S-	-S-	5.02	7.55	3.52	5.29
	6	-S-	-S-	6.98	10.5	4.86	7.31	-S-	-S-	3.49	5.24	2.44	3.67
	7	-S-	-S-	5.13	7.71	3.57	5.37	-S-	-S-				
	8	-S-	-S-	3.93	5.90	2.74	4.11	-S-	-S-				
	9	-S-	-S-										
	10												
	11												
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Properties						
A_g, in.^{2}	1.09	1.73	1.19	0.902	1.36	0.938
r_z, in.	0.597	0.488	0.491	0.495	0.389	0.392

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

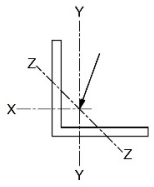
Note: Heavy line indicates KL/r_z equal to or greater than 200.

Table 4-8 (continued)

Available Strength in Axial Compression, kips

Concentrically Loaded Equal Angles (Welded)

F_y = 30 ksi



L2-L1¼

Shape		L2×2×				L1½×1½×						L1¼×1¼×	
		3/16		1/8 [c1]		1/4		3/16		1/8		1/4	
lb/ft		2.48		1.68		2.38		1.83		1.25		1.95	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	12.8	19.3	-S-	-S-	12.4	18.6	9.47	14.2	6.45	9.69	10.1	15.2
	1	12.0	18.0	-S-	-S-	10.9	16.4	8.35	12.6	5.70	8.57	8.42	12.7
	2	9.69	14.6	-S-	-S-	7.46	11.2	5.73	8.62	3.95	5.93	4.85	7.30
	3	6.81	10.2	-S-	-S-	4.00	6.02	3.09	4.64	2.15	3.23	2.25	3.39
	4	4.19	6.30	-S-	-S-	2.25	3.39	1.74	2.61	1.21	1.82	1.27	1.91
	5	2.68	4.03	-S-	-S-								
	6	1.86	2.80	-S-	-S-								
	7												
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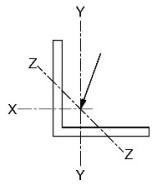
Properties													
A_g, in.^{2}		0.715		0.484		0.688		0.527		0.359		0.563	
r_z, in.		0.392		0.398		0.293		0.294		0.297		0.243	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.



L1¼-L¾

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Welded)

F_y = 30 ksi

Shape		L1¼×1¼×				L1×1×						L¾×¾×	
		3/16		1/8		1/4		3/16		1/8		3/8	
lb/ft		1.50		1.03		1.52		1.18		0.813		0.596	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	7.80	11.7	5.34	8.02	7.87	11.8	6.11	9.18	4.20	6.32	3.09	4.64
	1	6.49	9.75	4.45	6.69	5.93	8.92	4.58	6.88	3.16	4.75	1.86	2.79
	2	3.74	5.62	2.59	3.90	2.57	3.86	1.95	2.93	1.36	2.04	0.559	0.841
	3	1.74	2.61	1.21	1.82	1.14	1.71	0.868	1.30	0.603	0.907		
	4	0.977	1.47	0.680	1.02								
	5												
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Properties													
A_g, in.^{2}		0.434		0.297		0.438		0.340		0.234		0.172	
r_z, in.		0.243		0.245		0.196		0.194		0.195		0.146	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

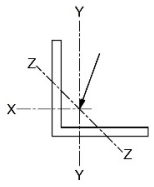
[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.

F_y = 30 ksi

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Welded)



L½

Shape		L½×½×⅛	
lb/ft		0.379	
Design		P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	1.96	2.94
	1	0.635	0.954
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
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	23		
	24		
	25		
	26		

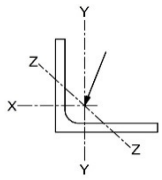
Properties	
A_g, in.^{2}	0.109
r_z, in.	0.098

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.



L6-L4

Table 4-9
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Hot Rolled)

F_y = 30 ksi

Shape		L6×6×				L5×5×				L4×4×			
		½ [c1]		⅜ [c1]		½		⅜ [c1]		½		⅜	
lb/ft		20.0		15.2		16.6		12.7		13.0		9.92	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	-S-	-S-	-S-	-S-	86.0	129	-S-	-S-	67.4	101	51.4	77.2
	1	-S-	-S-	-S-	-S-	85.1	128	-S-	-S-	66.2	99.4	50.5	75.9
	2	-S-	-S-	-S-	-S-	82.3	124	-S-	-S-	62.7	94.2	47.8	71.9
	3	-S-	-S-	-S-	-S-	77.7	117	-S-	-S-	57.3	86.1	43.8	65.8
	4	-S-	-S-	-S-	-S-	71.8	108	-S-	-S-	50.5	75.9	38.6	58.0
	5	-S-	-S-	-S-	-S-	64.9	97.5	-S-	-S-	43.0	64.6	32.9	49.4
	6	-S-	-S-	-S-	-S-	57.3	86.2	-S-	-S-	35.2	53.0	27.0	40.6
	7	-S-	-S-	-S-	-S-	49.5	74.4	-S-	-S-	27.9	41.9	21.4	32.2
	8	-S-	-S-	-S-	-S-	41.8	62.8	-S-	-S-	21.5	32.4	16.5	24.9
	9	-S-	-S-	-S-	-S-	34.5	51.9	-S-	-S-	17.0	25.6	13.1	19.7
	10	-S-	-S-	-S-	-S-	28.1	42.2	-S-	-S-	13.8	20.7	10.6	15.9
	11	-S-	-S-	-S-	-S-	23.2	34.9	-S-	-S-	11.4	17.1	8.75	13.2
	12	-S-	-S-	-S-	-S-	19.5	29.3	-S-	-S-	9.57	14.4	7.35	11.1
	13	-S-	-S-	-S-	-S-	16.6	25.0	-S-	-S-				
	14	-S-	-S-	-S-	-S-	14.3	21.5	-S-	-S-				
	15	-S-	-S-	-S-	-S-	12.5	18.8	-S-	-S-				
	16	-S-	-S-	-S-	-S-	11.0	16.5	-S-	-S-				
	17	-S-	-S-	-S-	-S-								
	18	-S-	-S-	-S-	-S-								
	19	-S-	-S-	-S-	-S-								
	20												
	21												
	22												
	23												
	24												
	25												
	26												

Properties						
A_g, in.^{2}	5.77	4.38	4.79	3.65	3.75	2.86
r_z, in.	1.18	1.19	0.980	0.986	0.776	0.779

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

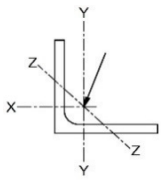
Note: Heavy line indicates KL/r_z equal to or greater than 200.

Table 4-9 (continued)

Available Strength in Axial Compression, kips

Concentrically Loaded Equal Angles (Hot Rolled)

F_y = 30 ksi



L4-L3

Shape		L4×4×		L3½×3½×				L3×3×					
		¼ [c1]		⅜		¼ [c1]		½		⅜		¼ [c1]	
lb/ft		6.69		8.64		5.88		9.57		7.32		4.99	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	-S-	-S-	44.8	67.3	-S-	-S-	49.6	74.5	37.9	57.0	-S-	-S-
	1	-S-	-S-	43.7	65.8	-S-	-S-	48.0	72.2	36.7	55.2	-S-	-S-
	2	-S-	-S-	40.8	61.3	-S-	-S-	43.6	65.5	33.3	50.1	-S-	-S-
	3	-S-	-S-	36.3	54.6	-S-	-S-	37.1	55.8	28.4	42.7	-S-	-S-
	4	-S-	-S-	30.9	46.4	-S-	-S-	29.6	44.5	22.7	34.1	-S-	-S-
	5	-S-	-S-	25.1	37.7	-S-	-S-	22.2	33.3	17.0	25.5	-S-	-S-
	6	-S-	-S-	19.4	29.2	-S-	-S-	15.7	23.7	12.1	18.1	-S-	-S-
	7	-S-	-S-	14.5	21.8	-S-	-S-	11.6	17.4	8.87	13.3	-S-	-S-
	8	-S-	-S-	11.1	16.7	-S-	-S-	8.85	13.3	6.79	10.2	-S-	-S-
	9	-S-	-S-	8.76	13.2	-S-	-S-	6.99	10.5	5.37	8.06	-S-	-S-
	10	-S-	-S-	7.09	10.7	-S-	-S-						
	11	-S-	-S-	5.86	8.81	-S-	-S-						
	12	-S-	-S-										
	13	-S-	-S-										
	14												
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	20												
	21												
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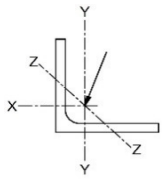
	23												
	24												
	25												
	26												
Properties													
A_g, in.^{2}		1.93		2.49		1.70		2.76		2.11		1.44	
r_z, in.		0.783		0.683		0.690		0.580		0.581		0.585	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.



L3-L2

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Hot Rolled)

F_y = 30 ksi

Shape		L3×3×		L2½×2½×						L2×2×			
		3/16 [c1]		3/8		1/4		3/16 [c1]		3/8		1/4	
lb/ft		3.78		6.00		4.13		3.12		4.75		3.27	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	-S-	-S-	31.1	46.7	21.4	32.1	-S-	-S-	24.6	37.0	17.0	25.5
	1	-S-	-S-	29.7	44.6	20.4	30.7	-S-	-S-	22.9	34.4	15.8	23.7
	2	-S-	-S-	25.8	38.7	17.7	26.7	-S-	-S-	18.4	27.7	12.7	19.1
	3	-S-	-S-	20.4	30.6	14.0	21.1	-S-	-S-	12.8	19.2	8.84	13.3
	4	-S-	-S-	14.7	22.1	10.1	15.2	-S-	-S-	7.78	11.7	5.39	8.10
	5	-S-	-S-	9.77	14.7	6.75	10.1	-S-	-S-	4.98	7.49	3.45	5.19
	6	-S-	-S-	6.78	10.2	4.69	7.04	-S-	-S-	3.46	5.20	2.40	3.60
	7	-S-	-S-	4.98	7.49	3.44	5.17	-S-	-S-				
	8	-S-	-S-	3.82	5.74	2.64	3.96	-S-	-S-				
	9	-S-	-S-										
	10												
	11												
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	23												
	24												
	25												
	26												
Properties													
A_g, in.^{2}		1.09		1.73		1.19		0.901		1.37		0.944	
r_z, in.		0.586		0.481		0.482		0.482		0.386		0.387	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

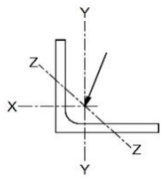
Note: Heavy line indicates KL/r_z equal to or greater than 200.

Table 4-9 (continued)

Available Strength in Axial Compression, kips

Concentrically Loaded Equal Angles (Hot Rolled)

F_y = 30 ksi



L2-L1¼

Shape		L2×2×				L1½×1½×						L1¼×1¼×	
		3/16		1/8 [c1]		1/4		3/16		1/8 [c1]		1/4	
lb/ft		2.50		1.70		2.40		1.84		1.26		1.96	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	13.0	19.5	-S-	-S-	12.4	18.6	9.50	14.3	-S-	-S-	10.1	15.2
	1	12.1	18.1	-S-	-S-	10.9	16.4	8.37	12.6	-S-	-S-	8.42	12.7
	2	9.74	14.6	-S-	-S-	7.42	11.2	5.72	8.60	-S-	-S-	4.84	7.27
	3	6.81	10.2	-S-	-S-	3.95	5.94	3.07	4.61	-S-	-S-	2.24	3.37
	4	4.17	6.26	-S-	-S-	2.22	3.34	1.72	2.59	-S-	-S-	1.26	1.89
	5	2.67	4.01	-S-	-S-								
	6	1.85	2.78	-S-	-S-								
	7												
	8												
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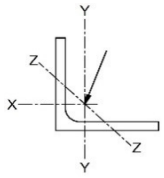
	25												
	26												
Properties													
A_g, in.^{2}		0.722		0.491		0.689		0.529		0.361		0.564	
r_z, in.		0.389		0.391		0.291		0.292		0.295		0.242	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.



L1¼-L¾

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Hot Rolled)

F_y = 30 ksi

Shape		L1¼×1¼×				L1×1×						L¾×¾×	
		3/16		1/8		1/4		3/16		1/8		1/8	
lb/ft		1.51		1.04		1.53		1.19		0.821		0.605	
Design		P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$	P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	7.82	11.8	5.36	8.06	7.89	11.9	6.14	9.22	4.24	6.37	3.13	4.71
	1	6.50	9.77	4.48	6.73	5.92	8.90	4.59	6.89	3.18	4.78	1.81	2.72
	2	3.74	5.62	2.60	3.91	2.53	3.80	1.94	2.91	1.35	2.04	0.527	0.792
	3	1.73	2.61	1.21	1.82	1.12	1.69	0.862	1.29	0.602	0.905		
	4	0.975	1.47	0.681	1.02								
	5												
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Properties													
A_g, in.^{2}		0.435		0.299		0.439		0.342		0.236		0.174	
r_z, in.		0.242		0.245		0.194		0.193		0.194		0.141	

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

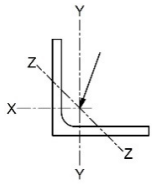
[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.

F_y = 30 ksi

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Equal Angles (Hot Rolled)



L1½

Shape		L½×½×⅛	
lb/ft		0.388	
Design		P_n/Ω_c	$\varphi_c P_n$
		ASD	LRFD
Effective length, KL (ft), with respect to least radius of gyration, r_z	0	2.01	3.02
	1	0.570	0.856
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
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	26		

Properties	
A_g, in.^{2}	0.112
r_z, in.	0.091

ASD	LRFD
Ω_c = 1.67	φ_c = 0.90

[c1] Shape is slender for compression with F_y = 30 ksi.

-S- Slender cross-section (outside scope of DG27).

Note: Heavy line indicates KL/r_z equal to or greater than 200.

STRUCTURAL STAINLESS STEEL DESIGN TABLES

IN ACCORDANCE WITH AISC DG27: STRUCTURAL STAINLESS STEEL

This publication presents design data derived in accordance with the American Institute of Steel Construction's Design Guide 27 *Structural Stainless Steel*. The data is presented in an equivalent set of tables to those in the AISC *Steel Construction Manual* for carbon steel sections. Tables cover dimensions and properties, design data for flexural members and design data for compression members. Two strength levels are covered – 30 ksi which corresponds to austenitic stainless steels and 65 ksi which corresponds to duplex stainless steels.

The following structural sections are included in this publication:

- W- and S-shapes
- C- and MC-shapes
- Equal angles
- Rectangular hollow structural sections (HSS)
- Square HSS
- Circular HSS.

Section ranges listed cover sections that are readily available at the time of printing.

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