STEEL CONSTRUCTION

MANUAL

An Online Resource

AMERICAN INSTITUTE
OF
STEEL CONSTRUCTION

FIFTEENTH EDITION

Table of Contents (Clickable)

Table 2-4
Applicable ASTM Specifications for Various Structural Shapes

Steel Type	ASTM Designation		F_y Yield Stress[a] (ksi)	F_u Tensile Stress[a] (ksi)	Applicable Shape Series									
					W	M	S	HP	C	MC	L	HSS Rect.	HSS Round	Pipe
Carbon	A36		36	58–80[b]	▒	■	■	▒	■	■	■			
	A53 Gr. B		35	60										■
	A500	Gr. B	42	58									▒	
			46	58								▒		
		Gr. C	46	62									■	
			50	62								■		
	A501	Gr. A	36	58								▒	▒	
		Gr. B	50	70								▒	▒	
	A529[c]	Gr. 50	50	65–100	▒	▒	▒	▒	▒	▒	▒			
		Gr. 55	55	70–100	▒	▒	▒	▒	▒	▒	▒			
	A709	36	36	58–80[b]	▒	▒	▒	▒	▒	▒	▒			
	A1043[d,k]	36	36–52	58	▒									
		50	50–65	65	▒									
	A1085	Gr. A	50	65								▒	▒	
High-Strength Low-Alloy	A572	Gr. 42	42	60	▒	▒	▒	▒	▒	▒	▒			
		Gr. 50	50	65	▒	▒	▒	■	▒	▒	▒			
		Gr. 55	55	70	▒	▒	▒	▒	▒	▒	▒			
		Gr. 60[e]	60	75	▒	▒	▒	▒	▒	▒	▒			
		Gr. 65[e]	65	80	▒	▒	▒	▒	▒	▒	▒			
	A618[f]	Gr. Ia[a], Ib & II	50[g]	70[g]								▒	▒	
		Gr. III	50	65								▒	▒	
	A709	50	50	65	▒	▒	▒	▒	▒	▒	▒			
		50S	50–65	65	▒	▒	▒	▒	▒	▒	▒			
		50W	50	70	▒	▒	▒	▒	▒	▒	▒			
	A913	50	50[h]	65[h]	▒	▒	▒	▒	▒	▒	▒			
		60	60	75	▒	▒	▒	▒	▒	▒	▒			
		65	65	80	▒	▒	▒	▒	▒	▒	▒			
		70	70	90	▒	▒	▒	▒	▒	▒	▒			
	A992		50[i]	65[i]	■	▒	▒	▒	▒	▒	▒			
	A1065[k]	Gr. 50[j]	50	60								▒		

■ = Preferred material specification.

▒ = Other applicable material specification, the availability of which should be confirmed prior to specification.

□ = Material specification does not apply.

Footnotes on facing page.

Table 2-4 (continued)
Applicable ASTM Specifications for Various Structural Shapes

Steel Type	ASTM Designation		F_y Yield Stress[a] (ksi)	F_u Tensile Stress[a] (ksi)	Applicable Shape Series									
					W	M	S	HP	C	MC	L	HSS Rect.	HSS Round	Pipe
Corrosion Resistant High-Strength Low-Alloy	A588		50	70	▒	▒	▒	▒	▒	▒	▒			
	A847[k]		50	70								▒	▒	
	A1065[k]	Gr. 50W[j]	50	70								▒		

■ = Preferred material specification.
▒ = Other applicable material specification, the availability of which should be confirmed prior to specification.
□ = Material specification does not apply.

[a] Minimum, unless a range is shown.
[b] For wide-flange shapes with flange thicknesses over 3 in., only the minimum of 58 ksi applies.
[c] For shapes with a flange or leg thickness less than or equal to 1½ in. only. To improve weldability, a maximum carbon equivalent can be specified (per ASTM A529 Supplementary Requirement S78). If desired, maximum tensile stress of 90 ksi can be specified (per ASTM A529 Supplementary Requirement S79).
[d] For shape profiles with a flange width of 6 in. or greater.
[e] For shapes with a flange thickness less than or equal to 2 in. only.
[f] ASTM A618 can also be specified as corrosion-resistant; see ASTM A618.
[g] Minimum applies for walls nominally ¾ in. thick and under. For wall thickness over ¾ in., F_y = 46 ksi and F_u = 67 ksi.
[h] If desired, maximum yield stress of 65 ksi and maximum yield-to-tensile strength ratio of 0.85 can be specified (per ASTM A913 Supplementary Requirement S75).
[i] A maximum yield-to-tensile strength ratio of 0.85 and carbon equivalent formula are included as mandatory, and some variation is allowed, including for shapes tested with coupons cut from the web; see ASTM A992. If desired, maximum tensile stress of 90 ksi can be specified (per ASTM A992 Supplementary Requirement S79).
[j] The grades of ASTM A1065 may not be interchanged without approval of the purchaser.
[k] This specification is not a prequalified base metal per AWS D1.1/D1.1M:2015.

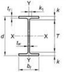


Table 1-1
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web: Thickness, t_w		Web: $\frac{t_w}{2}$	Flange: Width, b_f		Flange: Thickness, t_f		Distance: k, k_{des}	Distance: k, k_{det}	k_1	T	Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W44×335[c]	98.5	44.0	44	1.03	1	1/2	15.9	16	1.77	1 3/4	2.56	3	1 3/4	38	5 1/2
×290[c]	85.4	43.6	43 5/8	0.865	7/8	7/16	15.8	15 7/8	1.58	1 9/16	2.36	2 13/16	1 5/8		
×262[c]	77.2	43.3	43 1/4	0.785	13/16	7/16	15.8	15 3/4	1.42	1 7/16	2.20	2 5/8	1 5/8		
×230[c,v]	67.8	42.9	42 7/8	0.710	11/16	3/8	15.8	15 3/4	1.22	1 1/4	2.01	2 7/16	1 9/16	↓	↓
W40×655[h]	193	43.6	43 5/8	1.97	2	1	16.9	16 7/8	3.54	3 9/16	4.72	4 13/16	2 3/16	34	7 1/2
×593[h]	174	43.0	43	1.79	1 13/16	15/16	16.7	16 3/4	3.23	3 1/4	4.41	4 1/2	2 1/8		
×503[h]	148	42.1	42	1.54	1 9/16	13/16	16.4	16 3/8	2.76	2 3/4	3.94	4	2		
×431[h]	127	41.3	41 1/4	1.34	1 5/16	11/16	16.2	16 1/4	2.36	2 3/8	3.54	3 5/8	1 7/8		
×397[h]	117	41.0	41	1.22	1 1/4	5/8	16.1	16 1/8	2.20	2 3/16	3.38	3 1/2	1 13/16		
×372[h]	110	40.6	40 5/8	1.16	1 3/16	5/8	16.1	16 1/8	2.05	2 1/16	3.23	3 5/16	1 13/16		
×362[h]	106	40.6	40 1/2	1.12	1 1/8	9/16	16.0	16	2.01	2	3.19	3 1/4	1 3/4		
×324	95.3	40.2	40 1/8	1.00	1	1/2	15.9	15 7/8	1.81	1 13/16	2.99	3 1/16	1 11/16		
×297[c]	87.3	39.8	39 7/8	0.930	15/16	1/2	15.8	15 7/8	1.65	1 5/8	2.83	2 15/16	1 11/16		
×277[c]	81.5	39.7	39 3/4	0.830	13/16	7/16	15.8	15 7/8	1.58	1 9/16	2.76	2 7/8	1 5/8		
×249[c]	73.5	39.4	39 3/8	0.750	3/4	3/8	15.8	15 3/4	1.42	1 7/16	2.60	2 11/16	1 9/16		
×215[c]	63.5	39.0	39	0.650	5/8	5/16	15.8	15 3/4	1.22	1 1/4	2.40	2 1/2	1 9/16		
×199[c]	58.8	38.7	38 5/8	0.650	5/8	5/16	15.8	15 3/4	1.07	1 1/16	2.25	2 5/16	1 9/16	↓	↓
W40×392[h]	116	41.6	41 5/8	1.42	1 7/16	3/4	12.4	12 3/8	2.52	2 1/2	3.70	3 13/16	1 15/16	34	7 1/2
×331[h]	97.7	40.8	40 3/4	1.22	1 1/4	5/8	12.2	12 1/8	2.13	2 1/8	3.31	3 3/8	1 13/16		
×327[h]	95.9	40.8	40 3/4	1.18	1 3/16	5/8	12.1	12 1/8	2.13	2 1/8	3.31	3 3/8	1 13/16		
×294	86.2	40.4	40 3/8	1.06	1 1/16	9/16	12.0	12	1.93	1 15/16	3.11	3 3/16	1 3/4		
×278	82.3	40.2	40 1/8	1.03	1	1/2	12.0	12	1.81	1 13/16	2.99	3 1/16	1 3/4		
×264	77.4	40.0	40	0.960	15/16	1/2	11.9	11 7/8	1.73	1 3/4	2.91	3	1 11/16		
×235[c]	69.1	39.7	39 3/4	0.830	13/16	7/16	11.9	11 7/8	1.58	1 9/16	2.76	2 7/8	1 5/8		
×211[c]	62.1	39.4	39 3/8	0.750	3/4	3/8	11.8	11 3/4	1.42	1 7/16	2.60	2 11/16	1 9/16		
×183[c]	53.3	39.0	39	0.650	5/8	5/16	11.8	11 3/4	1.20	1 3/16	2.38	2 1/2	1 9/16		
×167[c]	49.3	38.6	38 5/8	0.650	5/8	5/16	11.8	11 3/4	1.03	1	2.21	2 5/16	1 9/16		
×149[c,v]	43.8	38.2	38 1/4	0.630	5/8	5/16	11.8	11 3/4	0.830	13/16	2.01	2 1/8	1 1/2	↓	↓

[c] Shape is slender for compression with F_y = 50 ksi.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shape does not meet the h/t_w limit for shear in AISC *Specification* Section G2.1(a) with F_y = 50 ksi.

Table 1-1 (continued)
W-Shapes
Properties

W44–W40

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
335	4.50	38.0	31100	1410	17.8	1620	1200	150	3.49	236	4.24	42.2	74.7	535000
290	5.02	45.0	27000	1240	17.8	1410	1040	132	3.49	205	4.20	42.0	50.9	461000
262	5.57	49.6	24100	1110	17.7	1270	923	117	3.47	182	4.17	41.9	37.3	405000
230	6.45	54.8	20800	971	17.5	1100	796	101	3.43	157	4.13	41.7	24.9	346000
655	2.39	17.3	56500	2590	17.1	3080	2870	340	3.86	542	4.71	40.1	589	1150000
593	2.58	19.1	50400	2340	17.0	2760	2520	302	3.80	481	4.63	39.8	445	997000
503	2.98	22.3	41600	1980	16.8	2320	2040	249	3.72	394	4.50	39.3	277	789000
431	3.44	25.5	34800	1690	16.6	1960	1690	208	3.65	328	4.41	38.9	177	638000
397	3.66	28.0	32000	1560	16.6	1800	1540	191	3.64	300	4.38	38.8	142	579000
372	3.93	29.5	29600	1460	16.5	1680	1420	177	3.60	277	4.33	38.6	116	528000
362	3.99	30.5	28900	1420	16.5	1640	1380	173	3.60	270	4.33	38.6	109	513000
324	4.40	34.2	25600	1280	16.4	1460	1220	153	3.58	239	4.27	38.4	79.4	448000
297	4.80	36.8	23200	1170	16.3	1330	1090	138	3.54	215	4.22	38.2	61.2	399000
277	5.03	41.2	21900	1100	16.4	1250	1040	132	3.58	204	4.25	38.1	51.5	379000
249	5.55	45.6	19600	993	16.3	1120	926	118	3.55	182	4.21	38.0	38.1	334000
215	6.45	52.6	16700	859	16.2	964	803	101	3.54	156	4.19	37.8	24.8	284000
199	7.39	52.6	14900	770	16.0	869	695	88.2	3.45	137	4.12	37.6	18.3	246000
392	2.45	24.1	29900	1440	16.1	1710	803	130	2.64	212	3.30	39.1	172	306000
331	2.86	28.0	24700	1210	15.9	1430	644	106	2.57	172	3.21	38.7	105	241000
327	2.85	29.0	24500	1200	16.0	1410	640	105	2.58	170	3.21	38.7	103	239000
294	3.11	32.2	21900	1080	15.9	1270	562	93.5	2.55	150	3.16	38.5	76.6	208000
278	3.31	33.3	20500	1020	15.8	1190	521	87.1	2.52	140	3.13	38.4	65.0	192000
264	3.45	35.6	19400	971	15.8	1130	493	82.6	2.52	132	3.12	38.3	56.1	181000
235	3.77	41.2	17400	875	15.9	1010	444	74.6	2.54	118	3.11	38.1	41.3	161000
211	4.17	45.6	15500	786	15.8	906	390	66.1	2.51	105	3.07	38.0	30.4	141000
183	4.92	52.6	13200	675	15.7	774	331	56.0	2.49	88.3	3.04	37.8	19.3	118000
167	5.76	52.6	11600	600	15.3	693	283	47.9	2.40	76.0	2.98	37.6	14.0	99700
149	7.11	54.3	9800	513	15.0	598	229	38.8	2.29	62.2	2.89	37.4	9.36	80000

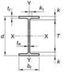


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k_{des}	Distance k_{det}	k_1	T	Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W36×925[h]	272	43.1	43 1/8	3.02	3	1 1/2	18.6	18 5/8	4.53	4 1/2	5.28	5 3/8	2 5/16	32 3/8	7 1/2
×853[h]	251	43.1	43 1/8	2.52	2 1/2	1 1/4	18.2	18 1/4	4.53	4 1/2	5.28	5 3/8	2 1/16		
×802[h]	236	42.6	42 5/8	2.38	2 3/8	1 3/16	18.0	18	4.29	4 5/16	5.04	5 1/8	2		
×723[h]	213	41.8	41 3/4	2.17	2 3/16	1 1/8	17.8	17 3/4	3.90	3 7/8	4.65	4 11/16	1 7/8		
×652[h]	192	41.1	41	1.97	2	1	17.6	17 5/8	3.54	3 9/16	4.49	4 13/16	2 3/16	31 3/8	
×529[h]	156	39.8	39 3/4	1.61	1 5/8	13/16	17.2	17 1/4	2.91	2 15/16	3.86	4 3/16	2		
×487[h]	143	39.3	39 3/8	1.50	1 1/2	3/4	17.1	17 1/8	2.68	2 11/16	3.63	4	1 7/8		
×441[h]	130	38.9	38 7/8	1.36	1 3/8	11/16	17.0	17	2.44	2 7/16	3.39	3 3/4	1 7/8		
×395[h]	116	38.4	38 3/8	1.22	1 1/4	5/8	16.8	16 7/8	2.20	2 3/16	3.15	3 7/16	1 13/16		
×361[h]	106	38.0	38	1.12	1 1/8	9/16	16.7	16 3/4	2.01	2	2.96	3 5/16	1 3/4		
×330	96.9	37.7	37 5/8	1.02	1	1/2	16.6	16 5/8	1.85	1 7/8	2.80	3 1/8	1 3/4		
×302	89.0	37.3	37 3/8	0.945	15/16	1/2	16.7	16 5/8	1.68	1 11/16	2.63	3	1 11/16		
×282[c]	82.9	37.1	37 1/8	0.885	7/8	7/16	16.6	16 5/8	1.57	1 9/16	2.52	2 7/8	1 5/8		
×262[c]	77.2	36.9	36 7/8	0.840	13/16	7/16	16.6	16 1/2	1.44	1 7/16	2.39	2 3/4	1 5/8		
×247[c]	72.5	36.7	36 5/8	0.800	13/16	7/16	16.5	16 1/2	1.35	1 3/8	2.30	2 5/8	1 5/8		
×231[c]	68.2	36.5	36 1/2	0.760	3/4	3/8	16.5	16 1/2	1.26	1 1/4	2.21	2 9/16	1 9/16		
W36×256	75.3	37.4	37 3/8	0.960	15/16	1/2	12.2	12 1/4	1.73	1 3/4	2.48	2 15/16	1 11/16	31 1/2	5 1/2
×232[c]	68.0	37.1	37 1/8	0.870	7/8	7/16	12.1	12 1/8	1.57	1 9/16	2.32	2 13/16	1 5/8		
×210[c]	61.9	36.7	36 3/4	0.830	13/16	7/16	12.2	12 1/8	1.36	1 3/8	2.11	2 5/8	1 5/8		
×194[c]	57.0	36.5	36 1/2	0.765	3/4	3/8	12.1	12 1/8	1.26	1 1/4	2.01	2 1/2	1 9/16		
×182[c]	53.6	36.3	36 3/8	0.725	3/4	3/8	12.1	12 1/8	1.18	1 3/16	1.93	2 3/8	1 9/16		
×170[c]	50.0	36.2	36 1/8	0.680	11/16	3/8	12.0	12	1.10	1 1/8	1.85	2 3/8	1 9/16		
×160[c]	47.0	36.0	36	0.650	5/8	5/16	12.0	12	1.02	1	1.77	2 1/4	1 9/16		
×150[c]	44.3	35.9	35 7/8	0.625	5/8	5/16	12.0	12	0.940	15/16	1.69	2 3/16	1 1/2		
×135[c,v]	39.9	35.6	35 1/2	0.600	5/8	5/16	12.0	12	0.790	13/16	1.54	2 1/16	1 1/2		
W33×387[h]	114	36.0	36	1.26	1 1/4	5/8	16.2	16 1/4	2.28	2 1/4	3.07	3 9/16	1 13/16	28 7/8	5 1/2
×354[h]	104	35.6	35 1/2	1.16	1 3/16	5/8	16.1	16 1/8	2.09	2 1/16	2.88	3 3/8	1 13/16		
×318	93.7	35.2	35 1/8	1.04	1 1/16	9/16	16.0	16	1.89	1 7/8	2.68	3 3/16	1 3/4		
×291	85.6	34.8	34 7/8	0.960	15/16	1/2	15.9	15 7/8	1.73	1 3/4	2.52	2 15/16	1 11/16		
×263	77.4	34.5	34 1/2	0.870	7/8	7/16	15.8	15 3/4	1.57	1 9/16	2.36	2 13/16	1 5/8		
×241[c]	71.1	34.2	34 1/8	0.830	13/16	7/16	15.9	15 7/8	1.40	1 3/8	2.19	2 11/16	1 5/8		
×221[c]	65.3	33.9	33 7/8	0.775	3/4	3/8	15.8	15 3/4	1.28	1 1/4	2.06	2 1/2	1 5/8		
×201[c]	59.1	33.7	33 5/8	0.715	11/16	3/8	15.7	15 3/4	1.15	1 1/8	1.94	2 7/16	1 9/16		

[c] Shape is slender for compression with F_y = 50 ksi.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shape does not meet the h/t_w limit for shear in AISC *Specification* Section G2.1(a) with F_y = 50 ksi.

Table 1-1 (continued)
W-Shapes
Properties

W36–W33

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
925	2.05	10.8	73000	3390	16.4	4130	4940	531	4.26	862	5.30	38.6	1430	1840000
853	2.01	12.9	70000	3250	16.7	3920	4600	505	4.28	805	5.22	38.6	1240	1710000
802	2.10	13.7	64800	3040	16.6	3660	4210	468	4.22	744	5.15	38.3	1050	1540000
723	2.28	15.0	57300	2740	16.4	3270	3700	416	4.17	658	5.06	37.9	785	1330000
652	2.48	16.3	50600	2460	16.2	2910	3230	367	4.10	581	4.96	37.6	593	1130000
529	2.96	19.9	39600	1990	16.0	2330	2490	289	4.00	454	4.80	36.9	327	846000
487	3.19	21.4	36000	1830	15.8	2130	2250	263	3.96	412	4.74	36.6	258	754000
441	3.48	23.6	32100	1650	15.7	1910	1990	235	3.92	368	4.69	36.5	194	661000
395	3.83	26.3	28500	1490	15.7	1710	1750	208	3.88	325	4.61	36.2	142	575000
361	4.16	28.6	25700	1350	15.6	1550	1570	188	3.85	293	4.58	36.0	109	509000
330	4.49	31.4	23300	1240	15.5	1410	1420	171	3.83	265	4.53	35.9	84.3	456000
302	4.96	33.9	21100	1130	15.4	1280	1300	156	3.82	241	4.53	35.6	64.3	412000
282	5.29	36.2	19600	1050	15.4	1190	1200	144	3.80	223	4.50	35.5	52.7	378000
262	5.75	38.2	17900	972	15.3	1100	1090	132	3.76	204	4.46	35.5	41.6	342000
247	6.11	40.1	16700	913	15.2	1030	1010	123	3.74	190	4.42	35.4	34.7	316000
231	6.54	42.2	15600	854	15.1	963	940	114	3.71	176	4.40	35.2	28.7	292000
256	3.53	33.8	16800	895	14.9	1040	528	86.5	2.65	137	3.24	35.7	52.9	168000
232	3.86	37.3	15000	809	14.8	936	468	77.2	2.62	122	3.21	35.5	39.6	148000
210	4.48	39.1	13200	719	14.6	833	411	67.5	2.58	107	3.18	35.3	28.0	128000
194	4.81	42.4	12100	664	14.6	767	375	61.9	2.56	97.7	3.15	35.2	22.2	116000
182	5.12	44.8	11300	623	14.5	718	347	57.6	2.55	90.7	3.13	35.1	18.5	107000
170	5.47	47.7	10500	581	14.5	668	320	53.2	2.53	83.8	3.11	35.1	15.1	98500
160	5.88	49.9	9760	542	14.4	624	295	49.1	2.50	77.3	3.09	35.0	12.4	90200
150	6.37	51.9	9040	504	14.3	581	270	45.1	2.47	70.9	3.06	35.0	10.1	82200
135	7.56	54.1	7800	439	14.0	509	225	37.7	2.38	59.7	2.99	34.8	7.00	68100
387	3.55	23.7	24300	1350	14.6	1560	1620	200	3.77	312	4.49	33.7	148	459000
354	3.85	25.7	22000	1240	14.5	1420	1460	181	3.74	282	4.44	33.5	115	408000
318	4.23	28.7	19500	1110	14.5	1270	1290	161	3.71	250	4.40	33.3	84.4	357000
291	4.60	31.0	17700	1020	14.4	1160	1160	146	3.68	226	4.34	33.1	65.1	319000
263	5.03	34.3	15900	919	14.3	1040	1040	131	3.66	202	4.31	32.9	48.7	281000
241	5.66	35.9	14200	831	14.1	940	933	118	3.62	182	4.29	32.8	36.2	251000
221	6.20	38.5	12900	759	14.1	857	840	106	3.59	164	4.25	32.6	27.8	224000
201	6.85	41.7	11600	686	14.0	773	749	95.2	3.56	147	4.21	32.6	20.8	198000

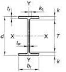


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k k_{des}	Distance k k_{det}	k_1	T	Workable Gage
	in.²	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W33×169[c]	49.5	33.8	33 7/8	0.670	11/16	3/8	11.5	11 1/2	1.22	1 1/4	1.92	2 7/16	1 9/16	28 7/8	5 1/2
×152[c]	44.9	33.5	33 1/2	0.635	5/8	5/16	11.6	11 5/8	1.06	1 1/16	1.76	2 5/16	1 1/2		
×141[c]	41.5	33.3	33 1/4	0.605	5/8	5/16	11.5	11 1/2	0.960	15/16	1.66	2 3/16	1 1/2		
×130[c]	38.3	33.1	33 1/8	0.580	9/16	5/16	11.5	11 1/2	0.855	7/8	1.56	2 1/8	1 1/2		
×118[c,v]	34.7	32.9	32 7/8	0.550	9/16	5/16	11.5	11 1/2	0.740	3/4	1.44	2	1 1/2		
W30×391[h]	115	33.2	33 1/4	1.36	1 3/8	11/16	15.6	15 5/8	2.44	2 7/16	3.23	3 3/4	1 7/8	25 3/4	5 1/2
×357[h]	105	32.8	32 3/4	1.24	1 1/4	5/8	15.5	15 1/2	2.24	2 1/4	3.03	3 1/2	1 13/16		
×326[h]	95.9	32.4	32 3/8	1.14	1 1/8	9/16	15.4	15 3/8	2.05	2 1/16	2.84	3 5/16	1 3/4		
×292	86.0	32.0	32	1.02	1	1/2	15.3	15 1/4	1.85	1 7/8	2.64	3 1/8	1 3/4		
×261	77.0	31.6	31 5/8	0.930	15/16	1/2	15.2	15 1/8	1.65	1 5/8	2.44	2 15/16	1 11/16		
×235	69.3	31.3	31 1/4	0.830	13/16	7/16	15.1	15	1.50	1 1/2	2.29	2 3/4	1 5/8		
×211	62.3	30.9	31	0.775	3/4	3/8	15.1	15 1/8	1.32	1 5/16	2.10	2 9/16	1 5/8		
×191[c]	56.1	30.7	30 5/8	0.710	11/16	3/8	15.0	15	1.19	1 3/16	1.97	2 1/2	1 9/16		
×173[c]	50.9	30.4	30 1/2	0.655	5/8	5/16	15.0	15	1.07	1 1/16	1.85	2 5/16	1 9/16		
W30×148[c]	43.6	30.7	30 5/8	0.650	5/8	5/16	10.5	10 1/2	1.18	1 3/16	1.83	2 1/2	1 9/16	25 3/4	5 1/2
×132[c]	38.8	30.3	30 1/4	0.615	5/8	5/16	10.5	10 1/2	1.00	1	1.65	2 1/4	1 1/2		
×124[c]	36.5	30.2	30 1/8	0.585	9/16	5/16	10.5	10 1/2	0.930	15/16	1.58	2 1/4	1 1/2		
×116[c]	34.2	30.0	30	0.565	9/16	5/16	10.5	10 1/2	0.850	7/8	1.50	2 1/8	1 1/2		
×108[c]	31.7	29.8	29 7/8	0.545	9/16	5/16	10.5	10 1/2	0.760	3/4	1.41	2	1 1/2		
×99[c]	29.0	29.7	29 5/8	0.520	1/2	1/4	10.5	10 1/2	0.670	11/16	1.32	2	1 1/2		
×90[c,v]	26.3	29.5	29 1/2	0.470	1/2	1/4	10.4	10 3/8	0.610	5/8	1.26	1 7/8	1 7/16		
W27×539[h]	159	32.5	32 1/2	1.97	2	1	15.3	15 1/4	3.54	3 9/16	4.33	4 7/16	1 13/16	23	5 1/2[g]
×368[h]	109	30.4	30 3/8	1.38	1 3/8	11/16	14.7	14 5/8	2.48	2 1/2	3.27	3 11/16	1 7/8		5 1/2
×336[h]	99.2	30.0	30	1.26	1 1/4	5/8	14.6	14 1/2	2.28	2 1/4	3.07	3 1/2	1 13/16		
×307[h]	90.2	29.6	29 5/8	1.16	1 3/16	5/8	14.4	14 1/2	2.09	2 1/16	2.88	3 5/16	1 13/16		
×281	83.1	29.3	29 1/4	1.06	1 1/16	9/16	14.4	14 3/8	1.93	1 15/16	2.72	3 1/8	1 3/4		
×258	76.1	29.0	29	0.980	1	1/2	14.3	14 1/4	1.77	1 3/4	2.56	3	1 11/16		
×235	69.4	28.7	28 5/8	0.910	15/16	1/2	14.2	14 1/4	1.61	1 5/8	2.40	2 7/8	1 11/16		
×217	63.9	28.4	28 3/8	0.830	13/16	7/16	14.1	14 1/8	1.50	1 1/2	2.29	2 11/16	1 5/8		
×194	57.1	28.1	28 1/8	0.750	3/4	3/8	14.0	14	1.34	1 5/16	2.13	2 9/16	1 9/16		
×178	52.5	27.8	27 3/4	0.725	3/4	3/8	14.1	14 1/8	1.19	1 3/16	1.98	2 3/8	1 9/16		
×161[c]	47.6	27.6	27 5/8	0.660	11/16	3/8	14.0	14	1.08	1 1/16	1.87	2 5/16	1 9/16		
×146[c]	43.2	27.4	27 3/8	0.605	5/8	5/16	14.0	14	0.975	1	1.76	2 3/16	1 1/2		

[c] Shape is slender for compression with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shape does not meet the h/t_w limit for shear in AISC *Specification* Section G2.1(a) with $F_y = 50$ ksi.

Table 1-1 (continued)
W-Shapes
Properties

W33–W27

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
169	4.71	44.7	9290	549	13.7	629	310	53.9	2.50	84.4	3.03	32.6	17.7	82400
152	5.48	47.2	8160	487	13.5	559	273	47.2	2.47	73.9	3.01	32.4	12.4	71700
141	6.01	49.6	7450	448	13.4	514	246	42.7	2.43	66.9	2.98	32.3	9.70	64400
130	6.73	51.7	6710	406	13.2	467	218	37.9	2.39	59.5	2.94	32.2	7.37	56600
118	7.76	54.5	5900	359	13.0	415	187	32.6	2.32	51.3	2.89	32.2	5.30	48300
391	3.19	19.7	20700	1250	13.4	1450	1550	198	3.67	310	4.37	30.8	173	366000
357	3.45	21.6	18700	1140	13.3	1320	1390	179	3.64	279	4.31	30.6	134	324000
326	3.75	23.4	16800	1040	13.2	1190	1240	162	3.60	252	4.26	30.4	103	287000
292	4.12	26.2	14900	930	13.2	1060	1100	144	3.58	223	4.22	30.2	75.2	250000
261	4.59	28.7	13100	829	13.1	943	959	127	3.53	196	4.16	30.0	54.1	215000
235	5.02	32.2	11700	748	13.0	847	855	114	3.51	175	4.13	29.8	40.3	190000
211	5.74	34.5	10300	665	12.9	751	757	100	3.49	155	4.11	29.6	28.4	166000
191	6.35	37.7	9200	600	12.8	675	673	89.5	3.46	138	4.06	29.5	21.0	146000
173	7.04	40.8	8230	541	12.7	607	598	79.8	3.42	123	4.03	29.3	15.6	129000
148	4.44	41.6	6680	436	12.4	500	227	43.3	2.28	68.0	2.77	29.5	14.5	49400
132	5.27	43.9	5770	380	12.2	437	196	37.2	2.25	58.4	2.75	29.3	9.72	42100
124	5.65	46.2	5360	355	12.1	408	181	34.4	2.23	54.0	2.73	29.3	7.99	38600
116	6.17	47.8	4930	329	12.0	378	164	31.3	2.19	49.2	2.70	29.2	6.43	34900
108	6.89	49.6	4470	299	11.9	346	146	27.9	2.15	43.9	2.67	29.0	4.99	30900
99	7.80	51.9	3990	269	11.7	312	128	24.5	2.10	38.6	2.62	29.0	3.77	26800
90	8.52	57.5	3610	245	11.7	283	115	22.1	2.09	34.7	2.60	28.9	2.84	24000
539	2.15	12.1	25600	1570	12.7	1890	2110	277	3.65	437	4.41	29.0	496	443000
368	2.96	17.3	16200	1060	12.2	1240	1310	179	3.48	279	4.15	27.9	170	255000
336	3.19	18.9	14600	972	12.1	1130	1180	162	3.45	252	4.10	27.7	131	226000
307	3.46	20.6	13100	887	12.0	1030	1050	146	3.41	227	4.04	27.5	101	199000
281	3.72	22.5	11900	814	12.0	936	953	133	3.39	206	4.00	27.4	79.5	178000
258	4.03	24.4	10800	745	11.9	852	859	120	3.36	187	3.96	27.2	61.6	159000
235	4.41	26.2	9700	677	11.8	772	769	108	3.33	168	3.92	27.1	47.0	141000
217	4.71	28.7	8910	627	11.8	711	704	100	3.32	154	3.89	26.9	37.6	128000
194	5.24	31.8	7860	559	11.7	631	619	88.1	3.29	136	3.85	26.8	27.1	111000
178	5.92	32.9	7020	505	11.6	570	555	78.8	3.25	122	3.83	26.6	20.1	98400
161	6.49	36.1	6310	458	11.5	515	497	70.9	3.23	109	3.79	26.5	15.1	87300
146	7.16	39.4	5660	414	11.5	464	443	63.5	3.20	97.7	3.76	26.4	11.3	77200

Menu

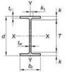


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web: Thickness, t_w		Web: $\frac{t_w}{2}$	Flange: Width, b_f		Flange: Thickness, t_f		Distance: k, k_{des}	Distance: k, k_{det}	Distance: k_1	Distance: T	Distance: Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W27×129[c]	37.8	27.6	27 5/8	0.610	5/8	5/16	10.0	10	1.10	1 1/8	1.70	2 5/16	1 1/2	23	5 1/2
×114[c]	33.6	27.3	27 1/4	0.570	9/16	5/16	10.1	10 1/8	0.930	15/16	1.53	2 1/8	1 1/2		
×102[c]	30.0	27.1	27 1/8	0.515	1/2	1/4	10.0	10	0.830	13/16	1.43	2 1/16	1 7/16		
×94[c]	27.6	26.9	26 7/8	0.490	1/2	1/4	10.0	10	0.745	3/4	1.34	1 15/16	1 7/16		
×84[c]	24.7	26.7	26 3/4	0.460	7/16	1/4	10.0	10	0.640	5/8	1.24	1 7/8	1 7/16	↓	↓
W24×370[h]	109	28.0	28	1.52	1 1/2	3/4	13.7	13 5/8	2.72	2 3/4	3.22	4	2	20	5 1/2
×335[h]	98.3	27.5	27 1/2	1.38	1 3/8	11/16	13.5	13 1/2	2.48	2 1/2	2.98	3 3/4	1 7/8		
×306[h]	89.7	27.1	27 1/8	1.26	1 1/4	5/8	13.4	13 3/8	2.28	2 1/4	2.78	3 9/16	1 13/16		
×279[h]	81.9	26.7	26 3/4	1.16	1 3/16	5/8	13.3	13 1/4	2.09	2 1/16	2.59	3 3/8	1 13/16		
×250	73.5	26.3	26 3/8	1.04	1 1/16	9/16	13.2	13 1/8	1.89	1 7/8	2.39	3 1/8	1 3/4		
×229	67.2	26.0	26	0.960	15/16	1/2	13.1	13 1/8	1.73	1 3/4	2.23	3	1 11/16		
×207	60.7	25.7	25 3/4	0.870	7/8	7/16	13.0	13	1.57	1 9/16	2.07	2 7/8	1 5/8		
×192	56.5	25.5	25 1/2	0.810	13/16	7/16	13.0	13	1.46	1 7/16	1.96	2 3/4	1 5/8		
×176	51.7	25.2	25 1/4	0.750	3/4	3/8	12.9	12 7/8	1.34	1 5/16	1.84	2 5/8	1 9/16		
×162	47.8	25.0	25	0.705	11/16	3/8	13.0	13	1.22	1 1/4	1.72	2 1/2	1 9/16		
×146	43.0	24.7	24 3/4	0.650	5/8	5/16	12.9	12 7/8	1.09	1 1/16	1.59	2 3/8	1 9/16		
×131	38.6	24.5	24 1/2	0.605	5/8	5/16	12.9	12 7/8	0.960	15/16	1.46	2 1/4	1 1/2		
×117[c]	34.4	24.3	24 1/4	0.550	9/16	5/16	12.8	12 3/4	0.850	7/8	1.35	2 1/8	1 1/2		
×104[c]	30.7	24.1	24	0.500	1/2	1/4	12.8	12 3/4	0.750	3/4	1.25	2 1/16	1 7/16	↓	↓
W24×103[c]	30.3	24.5	24 1/2	0.550	9/16	5/16	9.00	9	0.980	1	1.48	2 1/4	1 1/2	20	5 1/2
×94[c]	27.7	24.3	24 1/4	0.515	1/2	1/4	9.07	9 1/8	0.875	7/8	1.38	2 1/8	1 7/16		
×84[c]	24.7	24.1	24 1/8	0.470	1/2	1/4	9.02	9	0.770	3/4	1.27	2 1/16	1 7/16		
×76[c]	22.4	23.9	23 7/8	0.440	7/16	1/4	8.99	9	0.680	11/16	1.18	1 15/16	1 7/16		
×68[c]	20.1	23.7	23 3/4	0.415	7/16	1/4	8.97	9	0.585	9/16	1.09	1 7/8	1 7/16	↓	↓
W24×62[c]	18.2	23.7	23 3/4	0.430	7/16	1/4	7.04	7	0.590	9/16	1.09	1 1/2	1 1/16	20 3/4	3 1/2[g]
×55[c,v]	16.2	23.6	23 5/8	0.395	3/8	3/16	7.01	7	0.505	1/2	1.01	1 7/16	1	20 3/4	3 1/2[g]

[c] Shape is slender for compression with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shape does not meet the h/t_w limit for shear in AISC *Specification* Section G2.1(a) with $F_y = 50$ ksi.

Table 1-1 (continued)
W-Shapes
Properties

W27–W24

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
129	4.55	39.7	4760	345	11.2	395	184	36.8	2.21	57.6	2.66	26.5	11.1	32500
114	5.41	42.5	4080	299	11.0	343	159	31.5	2.18	49.3	2.65	26.4	7.33	27600
102	6.03	47.1	3620	267	11.0	305	139	27.8	2.15	43.4	2.62	26.3	5.28	24000
94	6.70	49.5	3270	243	10.9	278	124	24.8	2.12	38.8	2.59	26.2	4.03	21300
84	7.78	52.7	2850	213	10.7	244	106	21.2	2.07	33.2	2.54	26.1	2.81	17900
370	2.51	14.2	13400	957	11.1	1130	1160	170	3.27	267	3.92	25.3	201	186000
335	2.73	15.6	11900	864	11.0	1020	1030	152	3.23	238	3.86	25.0	152	161000
306	2.94	17.1	10700	789	10.9	922	919	137	3.20	214	3.81	24.8	117	142000
279	3.18	18.6	9600	718	10.8	835	823	124	3.17	193	3.76	24.6	90.5	125000
250	3.49	20.7	8490	644	10.7	744	724	110	3.14	171	3.71	24.4	66.6	108000
229	3.79	22.5	7650	588	10.7	675	651	99.4	3.11	154	3.67	24.3	51.3	96100
207	4.14	24.8	6820	531	10.6	606	578	88.8	3.08	137	3.62	24.1	38.3	84100
192	4.43	26.6	6260	491	10.5	559	530	81.8	3.07	126	3.60	24.0	30.8	76300
176	4.81	28.7	5680	450	10.5	511	479	74.3	3.04	115	3.57	23.9	23.9	68400
162	5.31	30.6	5170	414	10.4	468	443	68.4	3.05	105	3.57	23.8	18.5	62600
146	5.92	33.2	4580	371	10.3	418	391	60.5	3.01	93.2	3.53	23.6	13.4	54600
131	6.70	35.6	4020	329	10.2	370	340	53.0	2.97	81.5	3.49	23.5	9.50	47100
117	7.53	39.2	3540	291	10.1	327	297	46.5	2.94	71.4	3.46	23.5	6.72	40800
104	8.50	43.1	3100	258	10.1	289	259	40.7	2.91	62.4	3.42	23.4	4.72	35200
103	4.59	39.2	3000	245	10.0	280	119	26.5	1.99	41.5	2.40	23.5	7.07	16600
94	5.18	41.9	2700	222	9.87	254	109	24.0	1.98	37.5	2.40	23.4	5.26	15000
84	5.86	45.9	2370	196	9.79	224	94.4	20.9	1.95	32.6	2.37	23.3	3.70	12800
76	6.61	49.0	2100	176	9.69	200	82.5	18.4	1.92	28.6	2.33	23.2	2.68	11100
68	7.66	52.0	1830	154	9.55	177	70.4	15.7	1.87	24.5	2.30	23.1	1.87	9430
62	5.97	50.1	1550	131	9.23	153	34.5	9.80	1.38	15.7	1.75	23.1	1.71	4620
55	6.94	54.6	1350	114	9.11	134	29.1	8.30	1.34	13.3	1.72	23.1	1.18	3870

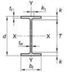


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k k_{des}	Distance k k_{det}	Distance k_1	Distance T	Distance Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W21×275[h]	81.8	24.1	24 1/8	1.22	1 1/4	5/8	12.9	12 7/8	2.19	2 3/16	3.37	3 7/16	1 13/16	17 1/4	5 1/2
×248	73.8	23.7	23 3/4	1.10	1 1/8	9/16	12.8	12 3/4	1.99	2	3.17	3 1/4	1 3/4		
×223	66.5	23.4	23 3/8	1.00	1	1/2	12.7	12 5/8	1.79	1 13/16	2.97	3 1/16	1 11/16		
×201	59.3	23.0	23	0.910	15/16	1/2	12.6	12 5/8	1.63	1 5/8	2.13	2 7/8	1 11/16		
×182	53.6	22.7	22 3/4	0.830	13/16	7/16	12.5	12 1/2	1.48	1 1/2	1.98	2 3/4	1 5/8		
×166	48.8	22.5	22 1/2	0.750	3/4	3/8	12.4	12 3/8	1.36	1 3/8	1.86	2 5/8	1 9/16		
×147	43.2	22.1	22	0.720	3/4	3/8	12.5	12 1/2	1.15	1 1/8	1.65	2 7/16	1 9/16		
×132	38.8	21.8	21 7/8	0.650	5/8	5/16	12.4	12 1/2	1.04	1 1/16	1.54	2 1/4	1 9/16		
×122	35.9	21.7	21 5/8	0.600	5/8	5/16	12.4	12 3/8	0.960	15/16	1.46	2 1/4	1 1/2		
×111	32.6	21.5	21 1/2	0.550	9/16	5/16	12.3	12 3/8	0.875	7/8	1.38	2 1/8	1 1/2		
×101[c]	29.8	21.4	21 3/8	0.500	1/2	1/4	12.3	12 1/4	0.800	13/16	1.30	2 1/16	1 7/16	↓	↓
W21×93	27.3	21.6	21 5/8	0.580	9/16	5/16	8.42	8 3/8	0.930	15/16	1.43	1 5/8	15/16	18 3/8	5 1/2
×83[c]	24.4	21.4	21 3/8	0.515	1/2	1/4	8.36	8 3/8	0.835	13/16	1.34	1 1/2	7/8		
×73[c]	21.5	21.2	21 1/4	0.455	7/16	1/4	8.30	8 1/4	0.740	3/4	1.24	1 7/16	7/8		
×68[c]	20.0	21.1	21 1/8	0.430	7/16	1/4	8.27	8 1/4	0.685	11/16	1.19	1 3/8	7/8		
×62[c]	18.3	21.0	21	0.400	3/8	3/16	8.24	8 1/4	0.615	5/8	1.12	1 5/16	13/16		
×55[c]	16.2	20.8	20 3/4	0.375	3/8	3/16	8.22	8 1/4	0.522	1/2	1.02	1 3/16	13/16		
×48[c,f]	14.1	20.6	20 5/8	0.350	3/8	3/16	8.14	8 1/8	0.430	7/16	0.930	1 1/8	13/16	↓	↓
W21×57[c]	16.7	21.1	21	0.405	3/8	3/16	6.56	6 1/2	0.650	5/8	1.15	1 5/16	13/16	18 3/8	3 1/2
×50[c]	14.7	20.8	20 7/8	0.380	3/8	3/16	6.53	6 1/2	0.535	9/16	1.04	1 1/4	13/16		
×44[c]	13.0	20.7	20 5/8	0.350	3/8	3/16	6.50	6 1/2	0.450	7/16	0.950	1 1/8	13/16	↓	↓

[c] Shape is slender for compression with F_y = 50 ksi.
[f] Shape exceeds compact limit for flexure with F_y = 50 ksi.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Table 1-1 (continued)
W-Shapes
Properties

W21

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
275	2.95	14.2	7690	638	9.70	749	787	122	3.10	191	3.68	21.9	107	94400
248	3.22	15.8	6830	576	9.62	671	699	109	3.08	170	3.63	21.7	80.7	82400
223	3.55	17.5	6080	520	9.56	601	614	96.7	3.04	150	3.57	21.6	59.5	71700
201	3.86	20.6	5310	461	9.47	530	542	86.1	3.02	133	3.55	21.4	40.9	62000
182	4.22	22.6	4730	417	9.40	476	483	77.2	3.00	119	3.51	21.2	30.7	54400
166	4.57	25.0	4280	380	9.36	432	435	70.0	2.99	108	3.48	21.1	23.6	48500
147	5.44	26.1	3630	329	9.17	373	376	60.1	2.95	92.6	3.46	21.0	15.4	41100
132	6.01	28.9	3220	295	9.12	333	333	53.5	2.93	82.3	3.43	20.8	11.3	36000
122	6.45	31.3	2960	273	9.09	307	305	49.2	2.92	75.6	3.40	20.7	8.98	32700
111	7.05	34.1	2670	249	9.05	279	274	44.5	2.90	68.2	3.37	20.6	6.83	29200
101	7.68	37.5	2420	227	9.02	253	248	40.3	2.89	61.7	3.35	20.6	5.21	26200
93	4.53	32.3	2070	192	8.70	221	92.9	22.1	1.84	34.7	2.24	20.7	6.03	9940
83	5.00	36.4	1830	171	8.67	196	81.4	19.5	1.83	30.5	2.21	20.6	4.34	8630
73	5.60	41.2	1600	151	8.64	172	70.6	17.0	1.81	26.6	2.19	20.5	3.02	7410
68	6.04	43.6	1480	140	8.60	160	64.7	15.7	1.80	24.4	2.17	20.4	2.45	6760
62	6.70	46.9	1330	127	8.54	144	57.5	14.0	1.77	21.7	2.15	20.4	1.83	5960
55	7.87	50.0	1140	110	8.40	126	48.4	11.8	1.73	18.4	2.11	20.3	1.24	4980
48	9.47	53.6	959	93.0	8.24	107	38.7	9.52	1.66	14.9	2.05	20.2	0.803	3950
57	5.04	46.3	1170	111	8.36	129	30.6	9.35	1.35	14.8	1.68	20.5	1.77	3190
50	6.10	49.4	984	94.5	8.18	110	24.9	7.64	1.30	12.2	1.64	20.3	1.14	2570
44	7.22	53.6	843	81.6	8.06	95.4	20.7	6.37	1.26	10.2	1.60	20.3	0.770	2110

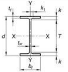


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k, k_{des}	Distance k, k_{det}	Distance k_1	Distance T	Distance Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W18×311[h]	91.6	22.3	22 3/8	1.52	1 1/2	3/4	12.0	12	2.74	2 3/4	3.24	3 9/16	1 9/16	15 1/8	5 1/2
×283[h]	83.3	21.9	21 7/8	1.40	1 3/8	11/16	11.9	11 7/8	2.50	2 1/2	3.00	3 3/8	1 1/2		
×258[h]	76.0	21.5	21 1/2	1.28	1 1/4	5/8	11.8	11 3/4	2.30	2 5/16	2.70	3 3/16	1 7/16		
×234[h]	68.6	21.1	21	1.16	1 3/16	5/8	11.7	11 5/8	2.11	2 1/8	2.51	3	1 3/8		
×211	62.3	20.7	20 5/8	1.06	1 1/16	9/16	11.6	11 1/2	1.91	1 15/16	2.31	2 13/16	1 3/8		
×192	56.2	20.4	20 3/8	0.960	15/16	1/2	11.5	11 1/2	1.75	1 3/4	2.15	2 5/8	1 5/16		
×175	51.4	20.0	20	0.890	7/8	7/16	11.4	11 3/8	1.59	1 9/16	1.99	2 7/16	1 1/4		
×158	46.3	19.7	19 3/4	0.810	13/16	7/16	11.3	11 1/4	1.44	1 7/16	1.84	2 3/8	1 1/4		
×143	42.0	19.5	19 1/2	0.730	3/4	3/8	11.2	11 1/4	1.32	1 5/16	1.72	2 3/16	1 3/16		
×130	38.3	19.3	19 1/4	0.670	11/16	3/8	11.2	11 1/8	1.20	1 3/16	1.60	2 1/16	1 3/16		
×119	35.1	19.0	19	0.655	5/8	5/16	11.3	11 1/4	1.06	1 1/16	1.46	1 15/16	1 3/16		
×106	31.1	18.7	18 3/4	0.590	9/16	5/16	11.2	11 1/4	0.940	15/16	1.34	1 13/16	1 1/8		
×97	28.5	18.6	18 5/8	0.535	9/16	5/16	11.1	11 1/8	0.870	7/8	1.27	1 3/4	1 1/8		
×86	25.3	18.4	18 3/8	0.480	1/2	1/4	11.1	11 1/8	0.770	3/4	1.17	1 5/8	1 1/16		
×76[c]	22.3	18.2	18 1/4	0.425	7/16	1/4	11.0	11	0.680	11/16	1.08	1 9/16	1 1/16		
W18×71	20.9	18.5	18 1/2	0.495	1/2	1/4	7.64	7 5/8	0.810	13/16	1.21	1 1/2	7/8	15 1/2	3 1/2[g]
×65	19.1	18.4	18 3/8	0.450	7/16	1/4	7.59	7 5/8	0.750	3/4	1.15	1 7/16	7/8		
×60[c]	17.6	18.2	18 1/4	0.415	7/16	1/4	7.56	7 1/2	0.695	11/16	1.10	1 3/8	13/16		
×55[c]	16.2	18.1	18 1/8	0.390	3/8	3/16	7.53	7 1/2	0.630	5/8	1.03	1 5/16	13/16		
×50[c]	14.7	18.0	18	0.355	3/8	3/16	7.50	7 1/2	0.570	9/16	0.972	1 1/4	13/16		
W18×46[c]	13.5	18.1	18	0.360	3/8	3/16	6.06	6	0.605	5/8	1.01	1 1/4	13/16	15 1/2	3 1/2[g]
×40[c]	11.8	17.9	17 7/8	0.315	5/16	3/16	6.02	6	0.525	1/2	0.927	1 3/16	13/16		
×35[c]	10.3	17.7	17 3/4	0.300	5/16	3/16	6.00	6	0.425	7/16	0.827	1 1/8	3/4		
W16×100	29.4	17.0	17	0.585	9/16	5/16	10.4	10 3/8	0.985	1	1.39	1 7/8	1 1/8	13 1/4	5 1/2
×89	26.2	16.8	16 3/4	0.525	1/2	1/4	10.4	10 3/8	0.875	7/8	1.28	1 3/4	1 1/16		
×77	22.6	16.5	16 1/2	0.455	7/16	1/4	10.3	10 1/4	0.760	3/4	1.16	1 5/8	1 1/16		
×67[c]	19.6	16.3	16 3/8	0.395	3/8	3/16	10.2	10 1/4	0.665	11/16	1.07	1 9/16	1		
W16×57	16.8	16.4	16 3/8	0.430	7/16	1/4	7.12	7 1/8	0.715	11/16	1.12	1 3/8	7/8	13 5/8	3 1/2[g]
×50[c]	14.7	16.3	16 1/4	0.380	3/8	3/16	7.07	7 1/8	0.630	5/8	1.03	1 5/16	13/16		
×45[c]	13.3	16.1	16 1/8	0.345	3/8	3/16	7.04	7	0.565	9/16	0.967	1 1/4	13/16		
×40[c]	11.8	16.0	16	0.305	5/16	3/16	7.00	7	0.505	1/2	0.907	1 3/16	13/16		
×36[c]	10.6	15.9	15 7/8	0.295	5/16	3/16	6.99	7	0.430	7/16	0.832	1 1/8	3/4		
W16×31[c]	9.13	15.9	15 7/8	0.275	1/4	1/8	5.53	5 1/2	0.440	7/16	0.842	1 1/8	3/4	13 5/8	3 1/2
×26[c,v]	7.68	15.7	15 3/4	0.250	1/4	1/8	5.50	5 1/2	0.345	3/8	0.747	1 1/16	3/4	13 5/8	3 1/2

[c] Shape is slender for compression with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shape does not meet the h/t_w limit for shear in AISC *Specification* Section G2.1(a) with $F_y = 50$ ksi.

Table 1-1 (continued)
W-Shapes
Properties

W18–W16

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
311	2.19	10.4	6970	624	8.72	754	795	132	2.95	207	3.53	19.6	176	76200
283	2.38	11.3	6170	565	8.61	676	704	118	2.91	185	3.47	19.4	134	65900
258	2.56	12.5	5510	514	8.53	611	628	107	2.88	166	3.42	19.2	103	57600
234	2.76	13.8	4900	466	8.44	549	558	95.8	2.85	149	3.37	19.0	78.7	50100
211	3.02	15.1	4330	419	8.35	490	493	85.3	2.82	132	3.32	18.8	58.6	43400
192	3.27	16.7	3870	380	8.28	442	440	76.8	2.79	119	3.28	18.7	44.7	38000
175	3.58	18.0	3450	344	8.20	398	391	68.8	2.76	106	3.24	18.4	33.8	33300
158	3.92	19.8	3060	310	8.12	356	347	61.4	2.74	94.8	3.20	18.3	25.2	29000
143	4.25	22.0	2750	282	8.09	322	311	55.5	2.72	85.4	3.17	18.2	19.2	25700
130	4.65	23.9	2460	256	8.03	290	278	49.9	2.70	76.7	3.13	18.1	14.5	22700
119	5.31	24.5	2190	231	7.90	262	253	44.9	2.69	69.1	3.13	17.9	10.6	20300
106	5.96	27.2	1910	204	7.84	230	220	39.4	2.66	60.5	3.10	17.8	7.48	17400
97	6.41	30.0	1750	188	7.82	211	201	36.1	2.65	55.3	3.08	17.7	5.86	15800
86	7.20	33.4	1530	166	7.77	186	175	31.6	2.63	48.4	3.05	17.6	4.10	13600
76	8.11	37.8	1330	146	7.73	163	152	27.6	2.61	42.2	3.02	17.5	2.83	11700
71	4.71	32.4	1170	127	7.50	146	60.3	15.8	1.70	24.7	2.05	17.7	3.49	4700
65	5.06	35.7	1070	117	7.49	133	54.8	14.4	1.69	22.5	2.03	17.7	2.73	4240
60	5.44	38.7	984	108	7.47	123	50.1	13.3	1.68	20.6	2.02	17.5	2.17	3850
55	5.98	41.1	890	98.3	7.41	112	44.9	11.9	1.67	18.5	2.00	17.5	1.66	3430
50	6.57	45.2	800	88.9	7.38	101	40.1	10.7	1.65	16.6	1.98	17.4	1.24	3040
46	5.01	44.6	712	78.8	7.25	90.7	22.5	7.43	1.29	11.7	1.58	17.5	1.22	1720
40	5.73	50.9	612	68.4	7.21	78.4	19.1	6.35	1.27	10.0	1.56	17.4	0.810	1440
35	7.06	53.5	510	57.6	7.04	66.5	15.3	5.12	1.22	8.06	1.51	17.3	0.506	1140
100	5.29	24.3	1490	175	7.10	198	186	35.7	2.51	54.9	2.92	16.0	7.73	11900
89	5.92	27.0	1300	155	7.05	175	163	31.4	2.49	48.1	2.88	15.9	5.45	10200
77	6.77	31.2	1110	134	7.00	150	138	26.9	2.47	41.1	2.85	15.7	3.57	8590
67	7.70	35.9	954	117	6.96	130	119	23.2	2.46	35.5	2.82	15.6	2.39	7300
57	4.98	33.0	758	92.2	6.72	105	43.1	12.1	1.60	18.9	1.92	15.7	2.22	2660
50	5.61	37.4	659	81.0	6.68	92.0	37.2	10.5	1.59	16.3	1.89	15.7	1.52	2270
45	6.23	41.1	586	72.7	6.65	82.3	32.8	9.34	1.57	14.5	1.87	15.5	1.11	1990
40	6.93	46.5	518	64.7	6.63	73.0	28.9	8.25	1.57	12.7	1.86	15.5	0.794	1730
36	8.12	48.1	448	56.5	6.51	64.0	24.5	7.00	1.52	10.8	1.83	15.5	0.545	1460
31	6.28	51.6	375	47.2	6.41	54.0	12.4	4.49	1.17	7.03	1.42	15.5	0.461	739
26	7.97	56.8	301	38.4	6.26	44.2	9.59	3.49	1.12	5.48	1.38	15.4	0.262	565

Menu

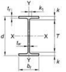


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k_{des}	Distance k_{det}	k_1	T	Workable Gage
	in.²	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W14×873[h]	257	23.6	23 5/8	3.94	3 15/16	2	18.8	18 3/4	5.51	5 1/2	6.10	6 3/16	2 9/16	11 1/4	3-8 1/2-3[g]
×808[h]	238	22.8	22 3/4	3.74	3 3/4	1 7/8	18.6	18 5/8	5.12	5 1/8	5.71	5 3/4	2 1/2	11 1/4	3-8 1/2-3[g]
×730[h]	215	22.4	22 3/8	3.07	3 1/16	1 9/16	17.9	17 7/8	4.91	4 15/16	5.51	6 3/16	2 3/4	10	3-7 1/2-3[g]
×665[h]	196	21.6	21 5/8	2.83	2 13/16	1 7/16	17.7	17 5/8	4.52	4 1/2	5.12	5 13/16	2 5/8		3-7 1/2-3[g]
×605[h]	178	20.9	20 7/8	2.60	2 5/8	1 5/16	17.4	17 3/8	4.16	4 3/16	4.76	5 7/16	2 1/2		3-7 1/2-3
×550[h]	162	20.2	20 1/4	2.38	2 3/8	1 3/16	17.2	17 1/4	3.82	3 13/16	4.42	5 1/8	2 3/8		
×500[h]	147	19.6	19 5/8	2.19	2 3/16	1 1/8	17.0	17	3.50	3 1/2	4.10	4 13/16	2 5/16		
×455[h]	134	19.0	19	2.02	2	1	16.8	16 7/8	3.21	3 3/16	3.81	4 1/2	2 1/4		
×426[h]	125	18.7	18 5/8	1.88	1 7/8	15/16	16.7	16 3/4	3.04	3 1/16	3.63	4 5/16	2 1/8		
×398[h]	117	18.3	18 1/4	1.77	1 3/4	7/8	16.6	16 5/8	2.85	2 7/8	3.44	4 1/8	2 1/8		
×370[h]	109	17.9	17 7/8	1.66	1 11/16	13/16	16.5	16 1/2	2.66	2 11/16	3.26	3 15/16	2 1/16		
×342[h]	101	17.5	17 1/2	1.54	1 9/16	13/16	16.4	16 3/8	2.47	2 1/2	3.07	3 3/4	2		
×311[h]	91.4	17.1	17 1/8	1.41	1 7/16	3/4	16.2	16 1/4	2.26	2 1/4	2.86	3 9/16	1 15/16		
×283[h]	83.3	16.7	16 3/4	1.29	1 5/16	11/16	16.1	16 1/8	2.07	2 1/16	2.67	3 3/8	1 7/8		
×257	75.6	16.4	16 3/8	1.18	1 3/16	5/8	16.0	16	1.89	1 7/8	2.49	3 3/16	1 13/16		
×233	68.5	16.0	16	1.07	1 1/16	9/16	15.9	15 7/8	1.72	1 3/4	2.32	3	1 3/4		
×211	62.0	15.7	15 3/4	0.980	1	1/2	15.8	15 3/4	1.56	1 9/16	2.16	2 7/8	1 11/16		
×193	56.8	15.5	15 1/2	0.890	7/8	7/16	15.7	15 3/4	1.44	1 7/16	2.04	2 3/4	1 11/16		
×176	51.8	15.2	15 1/4	0.830	13/16	7/16	15.7	15 5/8	1.31	1 5/16	1.91	2 5/8	1 5/8		
×159	46.7	15.0	15	0.745	3/4	3/8	15.6	15 5/8	1.19	1 3/16	1.79	2 1/2	1 9/16		
×145	42.7	14.8	14 3/4	0.680	11/16	3/8	15.5	15 1/2	1.09	1 1/16	1.69	2 3/8	1 9/16	↓	↓
W14×132	38.8	14.7	14 5/8	0.645	5/8	5/16	14.7	14 3/4	1.03	1	1.63	2 5/16	1 9/16	10	5 1/2
×120	35.3	14.5	14 1/2	0.590	9/16	5/16	14.7	14 5/8	0.940	15/16	1.54	2 1/4	1 1/2		
×109	32.0	14.3	14 3/8	0.525	1/2	1/4	14.6	14 5/8	0.860	7/8	1.46	2 3/16	1 1/2		
×99[f]	29.1	14.2	14 1/8	0.485	1/2	1/4	14.6	14 5/8	0.780	3/4	1.38	2 1/16	1 7/16		
×90[f]	26.5	14.0	14	0.440	7/16	1/4	14.5	14 1/2	0.710	11/16	1.31	2	1 7/16	↓	↓
W14×82	24.0	14.3	14 1/4	0.510	1/2	1/4	10.1	10 1/8	0.855	7/8	1.45	1 11/16	1 1/16	10 7/8	5 1/2
×74	21.8	14.2	14 1/8	0.450	7/16	1/4	10.1	10 1/8	0.785	13/16	1.38	1 5/8	1 1/16		
×68	20.0	14.0	14	0.415	7/16	1/4	10.0	10	0.720	3/4	1.31	1 9/16	1 1/16		
×61	17.9	13.9	13 7/8	0.375	3/8	3/16	10.0	10	0.645	5/8	1.24	1 1/2	1	↓	↓
W14×53	15.6	13.9	13 7/8	0.370	3/8	3/16	8.06	8	0.660	11/16	1.25	1 1/2	1	10 7/8	5 1/2
×48	14.1	13.8	13 3/4	0.340	5/16	3/16	8.03	8	0.595	5/8	1.19	1 7/16	1		
×43[c]	12.6	13.7	13 5/8	0.305	5/16	3/16	8.00	8	0.530	1/2	1.12	1 3/8	1	↓	↓

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Table 1-1 (continued)
W-Shapes
Properties

W14

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
873	1.71	2.89	18100	1530	8.39	2030	6170	656	4.90	1020	6.04	18.1	2270	505000
808	1.82	3.04	15900	1390	8.17	1830	5550	597	4.83	930	5.94	17.7	1840	434000
730	1.82	3.71	14300	1280	8.17	1660	4720	527	4.69	816	5.68	17.5	1450	362000
665	1.95	4.03	12400	1150	7.98	1480	4170	472	4.62	730	5.57	17.1	1120	305000
605	2.09	4.39	10800	1040	7.80	1320	3680	423	4.55	652	5.44	16.7	869	258000
550	2.25	4.79	9430	931	7.63	1180	3250	378	4.49	583	5.35	16.4	669	219000
500	2.43	5.21	8210	838	7.48	1050	2880	339	4.43	522	5.26	16.1	514	187000
455	2.62	5.66	7190	756	7.33	936	2560	304	4.38	468	5.17	15.8	395	160000
426	2.75	6.08	6600	706	7.26	869	2360	283	4.34	434	5.11	15.7	331	144000
398	2.92	6.44	6000	656	7.16	801	2170	262	4.31	402	5.05	15.5	273	129000
370	3.10	6.89	5440	607	7.07	736	1990	241	4.27	370	5.00	15.2	222	116000
342	3.31	7.41	4900	558	6.98	672	1810	221	4.24	338	4.95	15.0	178	103000
311	3.59	8.09	4330	506	6.88	603	1610	199	4.20	304	4.87	14.8	136	89100
283	3.89	8.84	3840	459	6.79	542	1440	179	4.17	274	4.80	14.6	104	77700
257	4.23	9.71	3400	415	6.71	487	1290	161	4.13	246	4.75	14.5	79.1	67800
233	4.62	10.7	3010	375	6.63	436	1150	145	4.10	221	4.69	14.3	59.5	59000
211	5.06	11.6	2660	338	6.55	390	1030	130	4.07	198	4.64	14.1	44.6	51500
193	5.45	12.8	2400	310	6.50	355	931	119	4.05	180	4.59	14.1	34.8	45900
176	5.97	13.7	2140	281	6.43	320	838	107	4.02	163	4.55	13.9	26.5	40500
159	6.54	15.3	1900	254	6.38	287	748	96.2	4.00	146	4.51	13.8	19.7	35600
145	7.11	16.8	1710	232	6.33	260	677	87.3	3.98	133	4.47	13.7	15.2	31700
132	7.15	17.7	1530	209	6.28	234	548	74.5	3.76	113	4.23	13.7	12.3	25500
120	7.80	19.3	1380	190	6.24	212	495	67.5	3.74	102	4.20	13.6	9.37	22700
109	8.49	21.7	1240	173	6.22	192	447	61.2	3.73	92.7	4.17	13.4	7.12	20200
99	9.34	23.5	1110	157	6.17	173	402	55.2	3.71	83.6	4.14	13.4	5.37	18000
90	10.2	25.9	999	143	6.14	157	362	49.9	3.70	75.6	4.10	13.3	4.06	16000
82	5.92	22.4	881	123	6.05	139	148	29.3	2.48	44.8	2.85	13.4	5.07	6710
74	6.41	25.4	795	112	6.04	126	134	26.6	2.48	40.5	2.83	13.4	3.87	5990
68	6.97	27.5	722	103	6.01	115	121	24.2	2.46	36.9	2.80	13.3	3.01	5380
61	7.75	30.4	640	92.1	5.98	102	107	21.5	2.45	32.8	2.78	13.3	2.19	4710
53	6.11	30.9	541	77.8	5.89	87.1	57.7	14.3	1.92	22.0	2.22	13.2	1.94	2540
48	6.75	33.6	484	70.2	5.85	78.4	51.4	12.8	1.91	19.6	2.20	13.2	1.45	2240
43	7.54	37.4	428	62.6	5.82	69.6	45.2	11.3	1.89	17.3	2.18	13.2	1.05	1950

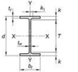


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance				
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k		k_1	T	Workable Gage
											k_{des}	k_{det}			
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W14×38[c]	11.2	14.1	14 1/8	0.310	5/16	3/16	6.77	6 3/4	0.515	1/2	0.915	1 1/4	13/16	11 5/8	3 1/2[g]
×34[c]	10.0	14.0	14	0.285	5/16	3/16	6.75	6 3/4	0.455	7/16	0.855	1 3/16	3/4	↓	3 1/2
×30[c]	8.85	13.8	13 7/8	0.270	1/4	1/8	6.73	6 3/4	0.385	3/8	0.785	1 1/8	3/4	↓	3 1/2
W14×26[c]	7.69	13.9	13 7/8	0.255	1/4	1/8	5.03	5	0.420	7/16	0.820	1 1/8	3/4	11 5/8	2 3/4[g]
×22[c]	6.49	13.7	13 3/4	0.230	1/4	1/8	5.00	5	0.335	5/16	0.735	1 1/16	3/4	11 5/8	2 3/4[g]
W12×336[h]	98.9	16.8	16 7/8	1.78	1 3/4	7/8	13.4	13 3/8	2.96	2 15/16	3.55	3 7/8	1 11/16	9 1/8	5 1/2
×305[h]	89.5	16.3	16 3/8	1.63	1 5/8	13/16	13.2	13 1/4	2.71	2 11/16	3.30	3 5/8	1 5/8	↓	↓
×279[h]	81.9	15.9	15 7/8	1.53	1 1/2	3/4	13.1	13 1/8	2.47	2 1/2	3.07	3 3/8	1 5/8	↓	↓
×252[h]	74.1	15.4	15 3/8	1.40	1 3/8	11/16	13.0	13	2.25	2 1/4	2.85	3 1/8	1 1/2	↓	↓
×230[h]	67.7	15.1	15	1.29	1 5/16	11/16	12.9	12 7/8	2.07	2 1/16	2.67	2 15/16	1 1/2	↓	↓
×210	61.8	14.7	14 3/4	1.18	1 3/16	5/8	12.8	12 3/4	1.90	1 7/8	2.50	2 13/16	1 7/16	↓	↓
×190	56.0	14.4	14 3/8	1.06	1 1/16	9/16	12.7	12 5/8	1.74	1 3/4	2.33	2 5/8	1 3/8	↓	↓
×170	50.0	14.0	14	0.960	15/16	1/2	12.6	12 5/8	1.56	1 9/16	2.16	2 7/16	1 5/16	↓	↓
×152	44.7	13.7	13 3/4	0.870	7/8	7/16	12.5	12 1/2	1.40	1 3/8	2.00	2 5/16	1 1/4	↓	↓
×136	39.9	13.4	13 3/8	0.790	13/16	7/16	12.4	12 3/8	1.25	1 1/4	1.85	2 1/8	1 1/4	↓	↓
×120	35.2	13.1	13 1/8	0.710	11/16	3/8	12.3	12 3/8	1.11	1 1/8	1.70	2	1 3/16	↓	↓
×106	31.2	12.9	12 7/8	0.610	5/8	5/16	12.2	12 1/4	0.990	1	1.59	1 7/8	1 1/8	↓	↓
×96	28.2	12.7	12 3/4	0.550	9/16	5/16	12.2	12 1/8	0.900	7/8	1.50	1 13/16	1 1/8	↓	↓
×87	25.6	12.5	12 1/2	0.515	1/2	1/4	12.1	12 1/8	0.810	13/16	1.41	1 11/16	1 1/16	↓	↓
×79	23.2	12.4	12 3/8	0.470	1/2	1/4	12.1	12 1/8	0.735	3/4	1.33	1 5/8	1 1/16	↓	↓
×72	21.1	12.3	12 1/4	0.430	7/16	1/4	12.0	12	0.670	11/16	1.27	1 9/16	1 1/16	↓	↓
×65[f]	19.1	12.1	12 1/8	0.390	3/8	3/16	12.0	12	0.605	5/8	1.20	1 1/2	1	↓	↓
W12×58	17.0	12.2	12 1/4	0.360	3/8	3/16	10.0	10	0.640	5/8	1.24	1 1/2	15/16	9 1/4	5 1/2
×53	15.6	12.1	12	0.345	3/8	3/16	10.0	10	0.575	9/16	1.18	1 3/8	15/16	9 1/4	5 1/2
W12×50	14.6	12.2	12 1/4	0.370	3/8	3/16	8.08	8 1/8	0.640	5/8	1.14	1 1/2	15/16	9 1/4	5 1/2
×45	13.1	12.1	12	0.335	5/16	3/16	8.05	8	0.575	9/16	1.08	1 3/8	15/16	↓	↓
×40	11.7	11.9	12	0.295	5/16	3/16	8.01	8	0.515	1/2	1.02	1 3/8	7/8	↓	↓
W12×35[c]	10.3	12.5	12 1/2	0.300	5/16	3/16	6.56	6 1/2	0.520	1/2	0.820	1 3/16	3/4	10 1/8	3 1/2
×30[c]	8.79	12.3	12 3/8	0.260	1/4	1/8	6.52	6 1/2	0.440	7/16	0.740	1 1/8	3/4	↓	↓
×26[c]	7.65	12.2	12 1/4	0.230	1/4	1/8	6.49	6 1/2	0.380	3/8	0.680	1 1/16	3/4	↓	↓
W12×22[c]	6.48	12.3	12 1/4	0.260	1/4	1/8	4.03	4	0.425	7/16	0.725	15/16	5/8	10 3/8	2 1/4[g]
×19[c]	5.57	12.2	12 1/8	0.235	1/4	1/8	4.01	4	0.350	3/8	0.650	7/8	9/16	↓	↓
×16[c]	4.71	12.0	12	0.220	1/4	1/8	3.99	4	0.265	1/4	0.565	13/16	9/16	↓	↓
×14[c,v]	4.16	11.9	11 7/8	0.200	3/16	1/8	3.97	4	0.225	1/4	0.525	3/4	9/16	↓	↓

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shape does not meet the h/t_w limit for shear in AISC *Specification* Section G2.1(a) with $F_y = 50$ ksi.

Menu

Table 1-1 (continued)
W-Shapes
Properties

W14–W12

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
38	6.57	39.6	385	54.6	5.87	61.5	26.7	7.88	1.55	12.1	1.82	13.6	0.798	1230
34	7.41	43.1	340	48.6	5.83	54.6	23.3	6.91	1.53	10.6	1.80	13.5	0.569	1070
30	8.74	45.4	291	42.0	5.73	47.3	19.6	5.82	1.49	8.99	1.77	13.4	0.380	887
26	5.98	48.1	245	35.3	5.65	40.2	8.91	3.55	1.08	5.54	1.30	13.5	0.358	405
22	7.46	53.3	199	29.0	5.54	33.2	7.00	2.80	1.04	4.39	1.27	13.4	0.208	314
336	2.26	5.47	4060	483	6.41	603	1190	177	3.47	274	4.13	13.8	243	57000
305	2.45	5.98	3550	435	6.29	537	1050	159	3.42	244	4.05	13.6	185	48600
279	2.66	6.35	3110	393	6.16	481	937	143	3.38	220	4.00	13.4	143	42000
252	2.89	6.96	2720	353	6.06	428	828	127	3.34	196	3.93	13.2	108	35800
230	3.11	7.56	2420	321	5.97	386	742	115	3.31	177	3.87	13.0	83.8	31200
210	3.37	8.23	2140	292	5.89	348	664	104	3.28	159	3.81	12.8	64.7	27200
190	3.65	9.16	1890	263	5.82	311	589	93.0	3.25	143	3.77	12.7	48.8	23600
170	4.03	10.1	1650	235	5.74	275	517	82.3	3.22	126	3.70	12.4	35.6	20100
152	4.46	11.2	1430	209	5.66	243	454	72.8	3.19	111	3.66	12.3	25.8	17200
136	4.96	12.3	1240	186	5.58	214	398	64.2	3.16	98.0	3.61	12.2	18.5	14700
120	5.57	13.7	1070	163	5.51	186	345	56.0	3.13	85.4	3.56	12.0	12.9	12400
106	6.17	15.9	933	145	5.47	164	301	49.3	3.11	75.1	3.52	11.9	9.13	10700
96	6.76	17.7	833	131	5.44	147	270	44.4	3.09	67.5	3.49	11.8	6.85	9410
87	7.48	18.9	740	118	5.38	132	241	39.7	3.07	60.4	3.46	11.7	5.10	8270
79	8.22	20.7	662	107	5.34	119	216	35.8	3.05	54.3	3.43	11.7	3.84	7330
72	8.99	22.6	597	97.4	5.31	108	195	32.4	3.04	49.2	3.41	11.6	2.93	6540
65	9.92	24.9	533	87.9	5.28	96.8	174	29.1	3.02	44.1	3.38	11.5	2.18	5780
58	7.82	27.0	475	78.0	5.28	86.4	107	21.4	2.51	32.5	2.81	11.6	2.10	3570
53	8.69	28.1	425	70.6	5.23	77.9	95.8	19.2	2.48	29.1	2.79	11.5	1.58	3160
50	6.31	26.8	391	64.2	5.18	71.9	56.3	13.9	1.96	21.3	2.25	11.6	1.71	1880
45	7.00	29.6	348	57.7	5.15	64.2	50.0	12.4	1.95	19.0	2.23	11.5	1.26	1650
40	7.77	33.6	307	51.5	5.13	57.0	44.1	11.0	1.94	16.8	2.21	11.4	0.906	1440
35	6.31	36.2	285	45.6	5.25	51.2	24.5	7.47	1.54	11.5	1.79	12.0	0.741	879
30	7.41	41.8	238	38.6	5.21	43.1	20.3	6.24	1.52	9.56	1.77	11.9	0.457	720
26	8.54	47.2	204	33.4	5.17	37.2	17.3	5.34	1.51	8.17	1.75	11.8	0.300	607
22	4.74	41.8	156	25.4	4.91	29.3	4.66	2.31	0.848	3.66	1.04	11.9	0.293	164
19	5.72	46.2	130	21.3	4.82	24.7	3.76	1.88	0.822	2.98	1.02	11.9	0.180	131
16	7.53	49.4	103	17.1	4.67	20.1	2.82	1.41	0.773	2.26	0.983	11.7	0.103	96.9
14	8.82	54.3	88.6	14.9	4.62	17.4	2.36	1.19	0.753	1.90	0.961	11.7	0.0704	80.4

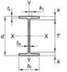


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		$\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		k_{des}	k_{det}	k_1	T	Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W10×112	32.9	11.4	11 3/8	0.755	3/4	3/8	10.4	10 3/8	1.25	1 1/4	1.75	1 15/16	1	7 1/2	5 1/2
×100	29.3	11.1	11 1/8	0.680	11/16	3/8	10.3	10 3/8	1.12	1 1/8	1.62	1 13/16	1	↓	↓
×88	26.0	10.8	10 7/8	0.605	5/8	5/16	10.3	10 1/4	0.990	1	1.49	1 11/16	15/16	↓	↓
×77	22.7	10.6	10 5/8	0.530	1/2	1/4	10.2	10 1/4	0.870	7/8	1.37	1 9/16	7/8	↓	↓
×68	19.9	10.4	10 3/8	0.470	1/2	1/4	10.1	10 1/8	0.770	3/4	1.27	1 7/16	7/8	↓	↓
×60	17.7	10.2	10 1/4	0.420	7/16	1/4	10.1	10 1/8	0.680	11/16	1.18	1 3/8	13/16	↓	↓
×54	15.8	10.1	10 1/8	0.370	3/8	3/16	10.0	10	0.615	5/8	1.12	1 5/16	13/16	↓	↓
×49	14.4	10.0	10	0.340	5/16	3/16	10.0	10	0.560	9/16	1.06	1 1/4	13/16	↓	↓
W10×45	13.3	10.1	10 1/8	0.350	3/8	3/16	8.02	8	0.620	5/8	1.12	1 5/16	13/16	7 1/2	5 1/2
×39	11.5	9.92	9 7/8	0.315	5/16	3/16	7.99	8	0.530	1/2	1.03	1 3/16	13/16	↓	↓
×33	9.71	9.73	9 3/4	0.290	5/16	3/16	7.96	8	0.435	7/16	0.935	1 1/8	3/4	↓	↓
W10×30	8.84	10.5	10 1/2	0.300	5/16	3/16	5.81	5 3/4	0.510	1/2	0.810	1 1/8	11/16	8 1/4	2 3/4[g]
×26	7.61	10.3	10 3/8	0.260	1/4	1/8	5.77	5 3/4	0.440	7/16	0.740	1 1/16	11/16	↓	↓
×22[c]	6.49	10.2	10 1/8	0.240	1/4	1/8	5.75	5 3/4	0.360	3/8	0.660	15/16	5/8	↓	↓
W10×19	5.62	10.2	10 1/4	0.250	1/4	1/8	4.02	4	0.395	3/8	0.695	15/16	5/8	8 3/8	2 1/4[g]
×17[c]	4.99	10.1	10 1/8	0.240	1/4	1/8	4.01	4	0.330	5/16	0.630	7/8	9/16	↓	↓
×15[c]	4.41	9.99	10	0.230	1/4	1/8	4.00	4	0.270	1/4	0.570	13/16	9/16	↓	↓
×12[c,f]	3.54	9.87	9 7/8	0.190	3/16	1/8	3.96	4	0.210	3/16	0.510	3/4	9/16	↓	↓
W8×67	19.7	9.00	9	0.570	9/16	5/16	8.28	8 1/4	0.935	15/16	1.33	1 5/8	15/16	5 3/4	5 1/2
×58	17.1	8.75	8 3/4	0.510	1/2	1/4	8.22	8 1/4	0.810	13/16	1.20	1 1/2	7/8	↓	↓
×48	14.1	8.50	8 1/2	0.400	3/8	3/16	8.11	8 1/8	0.685	11/16	1.08	1 3/8	13/16	↓	↓
×40	11.7	8.25	8 1/4	0.360	3/8	3/16	8.07	8 1/8	0.560	9/16	0.954	1 1/4	13/16	↓	↓
×35	10.3	8.12	8 1/8	0.310	5/16	3/16	8.02	8	0.495	1/2	0.889	1 3/16	13/16	↓	↓
×31[f]	9.13	8.00	8	0.285	5/16	3/16	8.00	8	0.435	7/16	0.829	1 1/8	3/4	↓	↓
W8×28	8.25	8.06	8	0.285	5/16	3/16	6.54	6 1/2	0.465	7/16	0.859	15/16	5/8	6 1/8	4
×24	7.08	7.93	7 7/8	0.245	1/4	1/8	6.50	6 1/2	0.400	3/8	0.794	7/8	9/16	6 1/8	4
W8×21	6.16	8.28	8 1/4	0.250	1/4	1/8	5.27	5 1/4	0.400	3/8	0.700	7/8	9/16	6 1/2	2 3/4[g]
×18	5.26	8.14	8 1/8	0.230	1/4	1/8	5.25	5 1/4	0.330	5/16	0.630	13/16	9/16	6 1/2	2 3/4[g]
W8×15	4.44	8.11	8 1/8	0.245	1/4	1/8	4.02	4	0.315	5/16	0.615	13/16	9/16	6 1/2	2 1/4[g]
×13	3.84	7.99	8	0.230	1/4	1/8	4.00	4	0.255	1/4	0.555	3/4	9/16	↓	↓
×10[c,f]	2.96	7.89	7 7/8	0.170	3/16	1/8	3.94	4	0.205	3/16	0.505	11/16	1/2	↓	↓

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener compon-ents should be compared with the geometry of the cross section to ensure compatibility.

Table 1-1 (continued)
W-Shapes
Properties

W10–W8

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
112	4.17	10.4	716	126	4.66	147	236	45.3	2.68	69.2	3.08	10.2	15.1	6020
100	4.62	11.6	623	112	4.60	130	207	40.0	2.65	61.0	3.04	10.0	10.9	5150
88	5.18	13.0	534	98.5	4.54	113	179	34.8	2.63	53.1	2.99	9.81	7.53	4330
77	5.86	14.8	455	85.9	4.49	97.6	154	30.1	2.60	45.9	2.95	9.73	5.11	3630
68	6.58	16.7	394	75.7	4.44	85.3	134	26.4	2.59	40.1	2.92	9.63	3.56	3100
60	7.41	18.7	341	66.7	4.39	74.6	116	23.0	2.57	35.0	2.88	9.52	2.48	2640
54	8.15	21.2	303	60.0	4.37	66.6	103	20.6	2.56	31.3	2.85	9.49	1.82	2320
49	8.93	23.1	272	54.6	4.35	60.4	93.4	18.7	2.54	28.3	2.84	9.44	1.39	2070
45	6.47	22.5	248	49.1	4.32	54.9	53.4	13.3	2.01	20.3	2.27	9.48	1.51	1200
39	7.53	25.0	209	42.1	4.27	46.8	45.0	11.3	1.98	17.2	2.24	9.39	0.976	992
33	9.15	27.1	171	35.0	4.19	38.8	36.6	9.20	1.94	14.0	2.20	9.30	0.583	791
30	5.70	29.5	170	32.4	4.38	36.6	16.7	5.75	1.37	8.84	1.60	9.99	0.622	414
26	6.56	34.0	144	27.9	4.35	31.3	14.1	4.89	1.36	7.50	1.58	9.86	0.402	345
22	7.99	36.9	118	23.2	4.27	26.0	11.4	3.97	1.33	6.10	1.55	9.84	0.239	275
19	5.09	35.4	96.3	18.8	4.14	21.6	4.29	2.14	0.874	3.35	1.06	9.81	0.233	104
17	6.08	36.9	81.9	16.2	4.05	18.7	3.56	1.78	0.845	2.80	1.04	9.77	0.156	85.1
15	7.41	38.5	68.9	13.8	3.95	16.0	2.89	1.45	0.810	2.30	1.01	9.72	0.104	68.3
12	9.43	46.6	53.8	10.9	3.90	12.6	2.18	1.10	0.785	1.74	0.983	9.66	0.0547	50.9
67	4.43	11.1	272	60.4	3.72	70.1	88.6	21.4	2.12	32.7	2.43	8.07	5.05	1440
58	5.07	12.4	228	52.0	3.65	59.8	75.1	18.3	2.10	27.9	2.39	7.94	3.33	1180
48	5.92	15.9	184	43.2	3.61	49.0	60.9	15.0	2.08	22.9	2.35	7.82	1.96	931
40	7.21	17.6	146	35.5	3.53	39.8	49.1	12.2	2.04	18.5	2.31	7.69	1.12	726
35	8.10	20.5	127	31.2	3.51	34.7	42.6	10.6	2.03	16.1	2.28	7.63	0.769	619
31	9.19	22.3	110	27.5	3.47	30.4	37.1	9.27	2.02	14.1	2.26	7.57	0.536	530
28	7.03	22.3	98.0	24.3	3.45	27.2	21.7	6.63	1.62	10.1	1.84	7.60	0.537	312
24	8.12	25.9	82.7	20.9	3.42	23.1	18.3	5.63	1.61	8.57	1.81	7.53	0.346	259
21	6.59	27.5	75.3	18.2	3.49	20.4	9.77	3.71	1.26	5.69	1.46	7.88	0.282	152
18	7.95	29.9	61.9	15.2	3.43	17.0	7.97	3.04	1.23	4.66	1.43	7.81	0.172	122
15	6.37	28.1	48.0	11.8	3.29	13.6	3.41	1.70	0.876	2.67	1.06	7.80	0.137	51.8
13	7.84	29.9	39.6	9.91	3.21	11.4	2.73	1.37	0.843	2.15	1.03	7.74	0.0871	40.8
10	9.61	40.5	30.8	7.81	3.22	8.87	2.09	1.06	0.841	1.66	1.01	7.69	0.0426	30.9

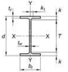


Table 1-1 (continued)
W-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k k_{des}	Distance k k_{det}	Distance k_1	Distance T	Distance Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W6×25	7.34	6.38	6 3/8	0.320	5/16	3/16	6.08	6 1/8	0.455	7/16	0.705	15/16	9/16	4 1/2	3 1/2
×20	5.87	6.20	6 1/4	0.260	1/4	1/8	6.02	6	0.365	3/8	0.615	7/8	9/16	↓	↓
×15[f]	4.43	5.99	6	0.230	1/4	1/8	5.99	6	0.260	1/4	0.510	3/4	9/16	↓	↓
W6×16	4.74	6.28	6 1/4	0.260	1/4	1/8	4.03	4	0.405	3/8	0.655	7/8	9/16	4 1/2	2 1/4[g]
×12	3.55	6.03	6	0.230	1/4	1/8	4.00	4	0.280	1/4	0.530	3/4	9/16	↓	↓
×9[f]	2.68	5.90	5 7/8	0.170	3/16	1/8	3.94	4	0.215	3/16	0.465	11/16	1/2	↓	↓
×8.5[f]	2.52	5.83	5 7/8	0.170	3/16	1/8	3.94	4	0.195	3/16	0.445	11/16	1/2	↓	↓
W5×19	5.56	5.15	5 1/8	0.270	1/4	1/8	5.03	5	0.430	7/16	0.730	13/16	7/16	3 1/2	2 3/4[g]
×16	4.71	5.01	5	0.240	1/4	1/8	5.00	5	0.360	3/8	0.660	3/4	7/16	3 1/2	2 3/4[g]
W4×13	3.83	4.16	4 1/8	0.280	1/4	1/8	4.06	4	0.345	3/8	0.595	3/4	1/2	2 5/8	2 1/4[g]

[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.

Table 1-1 (continued)
W-Shapes
Properties

W6–W4

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
25	6.68	15.5	53.4	16.7	2.70	18.9	17.1	5.61	1.52	8.56	1.74	5.93	0.461	150
20	8.25	19.1	41.4	13.4	2.66	14.9	13.3	4.41	1.50	6.72	1.70	5.84	0.240	113
15	11.5	21.6	29.1	9.72	2.56	10.8	9.32	3.11	1.45	4.75	1.66	5.73	0.101	76.5
16	4.98	19.1	32.1	10.2	2.60	11.7	4.43	2.20	0.967	3.39	1.13	5.88	0.223	38.2
12	7.14	21.6	22.1	7.31	2.49	8.30	2.99	1.50	0.918	2.32	1.08	5.75	0.0903	24.7
9	9.16	29.2	16.4	5.56	2.47	6.23	2.20	1.11	0.905	1.72	1.06	5.69	0.0405	17.7
8.5	10.1	29.1	14.9	5.10	2.43	5.73	1.99	1.01	0.890	1.56	1.05	5.64	0.0333	15.8
19	5.85	13.7	26.3	10.2	2.17	11.6	9.13	3.63	1.28	5.53	1.45	4.72	0.316	50.9
16	6.94	15.4	21.4	8.55	2.13	9.63	7.51	3.00	1.26	4.58	1.43	4.65	0.192	40.6
13	5.88	10.6	11.3	5.46	1.72	6.28	3.86	1.90	1.00	2.92	1.16	3.82	0.151	14.0

Menu

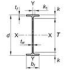


Table 1-2
M-Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance			
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k	k_1	T	Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.
M12.5×12.4^{c,v}	3.63	12.5	12 1/2	0.155	1/8	1/16	3.75	3 3/4	0.228	1/4	9/16	3/8	11 3/8	–
×11.6^{c,v}	3.40	12.5	12 1/2	0.155	1/8	1/16	3.50	3 1/2	0.211	3/16	9/16	3/8	11 3/8	–
M12×11.8^{c}	3.47	12.0	12	0.177	3/16	1/8	3.07	3 1/8	0.225	1/4	9/16	3/8	10 7/8	–
×10.8^{c,v}	3.18	12.0	12	0.160	3/16	1/8	3.07	3 1/8	0.210	3/16	9/16	3/8	10 7/8	–
M12×10^{c,v}	2.95	12.0	12	0.149	1/8	1/16	3.25	3 1/4	0.180	3/16	1/2	3/8	11	–
M10×9^{c}	2.65	10.0	10	0.157	3/16	1/8	2.69	2 3/4	0.206	3/16	9/16	3/8	8 7/8	–
×8^{c,v}	2.37	9.95	10	0.141	1/8	1/16	2.69	2 3/4	0.182	3/16	9/16	3/8	8 7/8	–
M10×7.5^{c,v}	2.22	9.99	10	0.130	1/8	1/16	2.69	2 3/4	0.173	3/16	7/16	5/16	9 1/8	–
M8×6.5^{c}	1.92	8.00	8	0.135	1/8	1/16	2.28	2 1/4	0.189	3/16	9/16	3/8	6 7/8	–
×6.2^{c}	1.82	8.00	8	0.129	1/8	1/16	2.28	2 1/4	0.177	3/16	7/16	1/4	7 1/8	–
M6×4.4^{c}	1.29	6.00	6	0.114	1/8	1/16	1.84	1 7/8	0.171	3/16	3/8	1/4	5 1/4	–
×3.7^{c}	1.09	5.92	5 7/8	0.0980	1/8	1/16	2.00	2	0.129	1/8	5/16	1/4	5 1/4	–
M5×18.9^{t}	5.56	5.00	5	0.316	5/16	3/16	5.00	5	0.416	7/16	13/16	1/2	3 3/8	2 3/4^{g}
M4×6^{t}	1.75	3.80	3 3/4	0.130	1/8	1/16	3.80	3 3/4	0.160	3/16	1/2	3/8	2 3/4	–
×4.08	1.27	4.00	4	0.115	1/8	1/16	2.25	2 1/4	0.170	3/16	9/16	3/8	2 7/8	–
×3.45	1.01	4.00	4	0.0920	1/16	1/16	2.25	2 1/4	0.130	1/8	1/2	3/8	3	–
×3.2	1.01	4.00	4	0.0920	1/16	1/16	2.25	2 1/4	0.130	1/8	1/2	3/8	3	–
M3×2.9	0.914	3.00	3	0.0900	1/16	1/16	2.25	2 1/4	0.130	1/8	1/2	3/8	2	–

[c] Shape is slender for compression with $F_y = 36$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 36$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[t] Shape has tapered flanges while other M-shapes have parallel flange surfaces.
[v] Shape does not meet the h/t_w limit for shear in AISC *Specification* Section G2.1(b)(1)(i) with $F_y = 36$ ksi.
– Indicates flange is too narrow to establish a workable gage.

Table 1-2 (continued)
M-Shapes
Properties

M-SHAPES

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	$\frac{J}{S_x h_o}$	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z				J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.		in.^{4}	in.^{6}
12.4	8.22	74.8	89.3	14.2	4.96	16.5	2.01	1.07	0.744	1.68	0.933	12.3	0.000283	0.0493	76.0
11.6	8.29	74.8	80.3	12.8	4.86	15.0	1.51	0.864	0.667	1.37	0.852	12.3	0.000263	0.0414	57.1
11.8	6.81	62.5	72.2	12.0	4.56	14.3	1.09	0.709	0.559	1.15	0.731	11.8	0.000355	0.0500	37.7
10.8	7.30	69.2	66.7	11.1	4.58	13.2	1.01	0.661	0.564	1.07	0.732	11.8	0.000300	0.0393	35.0
10	9.03	74.7	61.7	10.3	4.57	12.2	1.03	0.636	0.592	1.02	0.768	11.8	0.000240	0.0292	35.9
9	6.53	58.4	39.0	7.79	3.83	9.22	0.672	0.500	0.503	0.809	0.650	9.79	0.000411	0.0314	16.1
8	7.39	65.0	34.6	6.95	3.82	8.20	0.593	0.441	0.500	0.711	0.646	9.77	0.000328	0.0224	14.2
7.5	7.77	71.0	33.0	6.60	3.85	7.77	0.562	0.418	0.503	0.670	0.646	9.82	0.000289	0.0187	13.5
6.5	6.03	53.8	18.5	4.63	3.11	5.43	0.376	0.329	0.443	0.529	0.563	7.81	0.000509	0.0184	5.73
6.2	6.44	56.5	17.6	4.39	3.10	5.15	0.352	0.308	0.439	0.495	0.560	7.82	0.000455	0.0156	5.38
4.4	5.39	47.0	7.23	2.41	2.36	2.80	0.180	0.195	0.372	0.311	0.467	5.83	0.000707	0.00990	1.53
3.7	7.75	54.7	5.96	2.01	2.34	2.33	0.173	0.173	0.398	0.273	0.499	5.79	0.000459	0.00530	1.45
18.9	6.01	11.2	24.2	9.67	2.08	11.1	8.70	3.48	1.25	5.33	1.44	4.58	0.00709	0.313	45.7
6	11.9	22.0	4.72	2.48	1.64	2.74	1.47	0.771	0.915	1.18	1.04	3.64	0.00208	0.0184	4.87
4.08	6.62	26.4	3.53	1.77	1.67	2.00	0.325	0.289	0.506	0.453	0.593	3.83	0.00218	0.0147	1.19
3.45	8.65	33.9	2.86	1.43	1.68	1.60	0.248	0.221	0.496	0.346	0.580	3.87	0.00148	0.00820	0.930
3.2	8.65	33.9	2.86	1.43	1.68	1.60	0.248	0.221	0.496	0.346	0.580	3.87	0.00148	0.00820	0.930
2.9	8.65	23.6	1.50	1.00	1.28	1.12	0.248	0.221	0.521	0.344	0.597	2.87	0.00275	0.00790	0.511

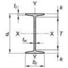


Table 1-3
S-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k	Distance T	Distance Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.
S24×121	35.5	24.5	24 1/2	0.800	13/16	7/16	8.05	8	1.09	1 1/16	2	20 1/2	4
×106	31.1	24.5	24 1/2	0.620	5/8	5/16	7.87	7 7/8	1.09	1 1/16	2	20 1/2	4
S24×100	29.3	24.0	24	0.745	3/4	3/8	7.25	7 1/4	0.870	7/8	1 3/4	20 1/2	4
×90	26.5	24.0	24	0.625	5/8	5/16	7.13	7 1/8	0.870	7/8	1 3/4	20 1/2	↓
×80	23.5	24.0	24	0.500	1/2	1/4	7.00	7	0.870	7/8	1 3/4	20 1/2	
S20×96	28.2	20.3	20 1/4	0.800	13/16	7/16	7.20	7 1/4	0.920	15/16	1 3/4	16 3/4	4
×86	25.3	20.3	20 1/4	0.660	11/16	3/8	7.06	7	0.920	15/16	1 3/4	16 3/4	4
S20×75	22.0	20.0	20	0.635	5/8	5/16	6.39	6 3/8	0.795	13/16	1 5/8	16 3/4	3 1/2[g]
×66	19.4	20.0	20	0.505	1/2	1/4	6.26	6 1/4	0.795	13/16	1 5/8	16 3/4	3 1/2[g]
S18×70	20.5	18.0	18	0.711	11/16	3/8	6.25	6 1/4	0.691	11/16	1 1/2	15	3 1/2[g]
×54.7	16.0	18.0	18	0.461	7/16	1/4	6.00	6	0.691	11/16	1 1/2	15	3 1/2[g]
S15×50	14.7	15.0	15	0.550	9/16	5/16	5.64	5 5/8	0.622	5/8	1 3/8	12 1/4	3 1/2[g]
×42.9	12.6	15.0	15	0.411	7/16	1/4	5.50	5 1/2	0.622	5/8	1 3/8	12 1/4	3 1/2[g]
S12×50	14.7	12.0	12	0.687	11/16	3/8	5.48	5 1/2	0.659	11/16	1 7/16	9 1/8	3[g]
×40.8	11.9	12.0	12	0.462	7/16	1/4	5.25	5 1/4	0.659	11/16	1 7/16	9 1/8	3[g]
S12×35	10.2	12.0	12	0.428	7/16	1/4	5.08	5 1/8	0.544	9/16	1 3/16	9 5/8	3[g]
×31.8	9.31	12.0	12	0.350	3/8	3/16	5.00	5	0.544	9/16	1 3/16	9 5/8	3[g]
S10×35	10.3	10.0	10	0.594	5/8	5/16	4.94	5	0.491	1/2	1 1/8	7 3/4	2 3/4[g]
×25.4	7.45	10.0	10	0.311	5/16	3/16	4.66	4 5/8	0.491	1/2	1 1/8	7 3/4	2 3/4[g]
S8×23	6.76	8.00	8	0.441	7/16	1/4	4.17	4 1/8	0.425	7/16	1	6	2 1/4[g]
×18.4	5.40	8.00	8	0.271	1/4	1/8	4.00	4	0.425	7/16	1	6	2 1/4[g]
S6×17.25	5.05	6.00	6	0.465	7/16	1/4	3.57	3 5/8	0.359	3/8	13/16	4 3/8	–
×12.5	3.66	6.00	6	0.232	1/4	1/8	3.33	3 3/8	0.359	3/8	13/16	4 3/8	–
S5×10	2.93	5.00	5	0.214	3/16	1/8	3.00	3	0.326	5/16	3/4	3 1/2	–
S4×9.5	2.79	4.00	4	0.326	5/16	3/16	2.80	2 3/4	0.293	5/16	3/4	2 1/2	–
×7.7	2.26	4.00	4	0.193	3/16	1/8	2.66	2 5/8	0.293	5/16	3/4	2 1/2	–
S3×7.5	2.20	3.00	3	0.349	3/8	3/16	2.51	2 1/2	0.260	1/4	5/8	1 3/4	–
×5.7	1.66	3.00	3	0.170	3/16	1/8	2.33	2 3/8	0.260	1/4	5/8	1 3/4	–

[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
– Indicates flange is too narrow to establish a workable gage.

Table 1-3 (continued)
S-Shapes
Properties

S-SHAPES

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
121	3.69	25.9	3160	258	9.43	306	83.0	20.6	1.53	36.3	1.94	23.4	12.8	11400
106	3.61	33.4	2940	240	9.71	279	76.8	19.5	1.57	33.4	1.93	23.4	10.1	10500
100	4.16	27.8	2380	199	9.01	239	47.4	13.1	1.27	24.0	1.66	23.1	7.59	6350
90	4.09	33.1	2250	187	9.21	222	44.7	12.5	1.30	22.4	1.66	23.1	6.05	5980
80	4.02	41.4	2100	175	9.47	204	42.0	12.0	1.34	20.8	1.67	23.1	4.89	5620
96	3.91	21.1	1670	165	7.71	198	49.9	13.9	1.33	24.9	1.71	19.4	8.40	4690
86	3.84	25.6	1570	155	7.89	183	46.6	13.2	1.36	23.1	1.71	19.4	6.65	4370
75	4.02	26.6	1280	128	7.62	152	29.5	9.25	1.16	16.7	1.49	19.2	4.59	2720
66	3.93	33.5	1190	119	7.83	139	27.5	8.78	1.19	15.4	1.49	19.2	3.58	2530
70	4.52	21.5	923	103	6.70	124	24.0	7.69	1.08	14.3	1.42	17.3	4.10	1800
54.7	4.34	33.2	801	89.0	7.07	104	20.7	6.91	1.14	12.1	1.42	17.3	2.33	1550
50	4.53	22.7	485	64.7	5.75	77.0	15.6	5.53	1.03	10.0	1.32	14.4	2.12	805
42.9	4.42	30.4	446	59.4	5.95	69.2	14.3	5.19	1.06	9.08	1.31	14.4	1.54	737
50	4.16	13.7	303	50.6	4.55	60.9	15.6	5.69	1.03	10.3	1.32	11.3	2.77	501
40.8	3.98	20.6	270	45.1	4.76	52.7	13.5	5.13	1.06	8.86	1.30	11.3	1.69	433
35	4.67	23.1	228	38.1	4.72	44.6	9.84	3.88	0.980	6.80	1.22	11.5	1.05	323
31.8	4.60	28.3	217	36.2	4.83	41.8	9.33	3.73	1.00	6.44	1.21	11.5	0.878	306
35	5.03	13.4	147	29.4	3.78	35.4	8.30	3.36	0.899	6.19	1.16	9.51	1.29	188
25.4	4.75	25.6	123	24.6	4.07	28.3	6.73	2.89	0.950	4.99	1.14	9.51	0.603	152
23	4.91	14.1	64.7	16.2	3.09	19.2	4.27	2.05	0.795	3.67	0.999	7.58	0.550	61.2
18.4	4.71	22.9	57.5	14.4	3.26	16.5	3.69	1.84	0.827	3.18	0.985	7.58	0.335	52.9
17.25	4.97	9.67	26.2	8.74	2.28	10.5	2.29	1.28	0.673	2.35	0.859	5.64	0.371	18.2
12.5	4.64	19.4	22.0	7.34	2.45	8.45	1.80	1.08	0.702	1.86	0.831	5.64	0.167	14.3
10	4.61	16.8	12.3	4.90	2.05	5.66	1.19	0.795	0.638	1.37	0.754	4.67	0.114	6.52
9.5	4.77	8.33	6.76	3.38	1.56	4.04	0.887	0.635	0.564	1.13	0.698	3.71	0.120	3.05
7.7	4.54	14.1	6.05	3.03	1.64	3.50	0.748	0.562	0.576	0.970	0.676	3.71	0.0732	2.57
7.5	4.83	5.38	2.91	1.94	1.15	2.35	0.578	0.461	0.513	0.821	0.638	2.74	0.0896	1.08
5.7	4.48	11.0	2.50	1.67	1.23	1.94	0.447	0.383	0.518	0.656	0.605	2.74	0.0433	0.838

Menu

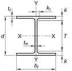


Table 1-4
HP-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Thickness, t_f		Distance k	Distance k_1	Distance T	Distance Workable Gage
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.
HP18×204	60.2	18.3	18 1/4	1.13	1 1/8	9/16	18.1	18 1/8	1.13	1 1/8	2 5/16	1 3/4	13 1/2	7 1/2
×181	53.2	18.0	18	1.00	1	1/2	18.0	18	1.00	1	2 3/16	1 11/16		
×157[f]	46.2	17.7	17 3/4	0.870	7/8	7/16	17.9	17 7/8	0.870	7/8	2 1/16	1 5/8		
×135[f]	39.9	17.5	17 1/2	0.750	3/4	3/8	17.8	17 3/4	0.750	3/4	1 15/16	1 9/16		
HP16×183	54.1	16.5	16 1/2	1.13	1 1/8	9/16	16.3	16 1/2	1.13	1 1/8	2 5/16	1 3/4	11 3/4	5 1/2
×162	47.7	16.3	16 1/4	1.00	1	1/2	16.1	16 1/8	1.00	1	2 3/16	1 11/16		
×141	41.7	16.0	16	0.875	7/8	7/16	16.0	16	0.875	7/8	2 1/16	1 5/8		
×121[f]	35.8	15.8	15 3/4	0.750	3/4	3/8	15.9	15 7/8	0.750	3/4	1 15/16	1 9/16		
×101[f]	29.9	15.5	15 1/2	0.625	5/8	5/16	15.8	15 3/4	0.625	5/8	1 13/16	1 1/2		
×88[c,f]	25.8	15.3	15 3/8	0.540	9/16	5/16	15.7	15 11/16	0.540	9/16	1 3/4	1 7/16		
HP14×117[f]	34.4	14.2	14 1/4	0.805	13/16	7/16	14.9	14 7/8	0.805	13/16	2 1/16	1 5/8	11 1/4	5 1/2
×102[f]	30.1	14.0	14	0.705	11/16	3/8	14.8	14 3/4	0.705	11/16	1 15/16	1 9/16		
×89[f]	26.1	13.8	13 7/8	0.615	5/8	5/16	14.7	14 3/4	0.615	5/8	1 7/8	1 1/2		
×73[c,f]	21.4	13.6	13 5/8	0.505	1/2	1/4	14.6	14 5/8	0.505	1/2	1 3/4	1 7/16		
HP12×89	25.9	12.4	12 3/8	0.720	3/4	3/8	12.3	12 3/8	0.720	3/4	1 5/8	1 3/16	9 1/2	5 1/2
×84	24.6	12.3	12 1/4	0.685	11/16	3/8	12.3	12 1/4	0.685	11/16	1 9/16	1 3/16		
×74[f]	21.8	12.1	12 1/8	0.605	5/8	5/16	12.2	12 1/4	0.610	5/8	1 1/2	1 1/8		
×63[f]	18.4	11.9	12	0.515	1/2	1/4	12.1	12 1/8	0.515	1/2	1 7/16	1 1/16		
×53[c,f]	15.5	11.8	11 3/4	0.435	7/16	1/4	12.0	12	0.435	7/16	1 5/16	1 1/16		
HP10×57	16.7	9.99	10	0.565	9/16	5/16	10.2	10 1/4	0.565	9/16	1 1/4	15/16	7 1/2	5 1/2
×42[f]	12.4	9.70	9 3/4	0.415	7/16	1/4	10.1	10 1/8	0.420	7/16	1 1/8	13/16	7 1/2	5 1/2
HP8×36[f]	10.6	8.02	8	0.445	7/16	1/4	8.16	8 1/8	0.445	7/16	1 1/8	7/8	5 3/4	5 1/2

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.

Table 1-4 (continued)
HP-Shapes
Properties

HP-SHAPES

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	$\frac{J}{S_x h_o}$	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z				J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.		in.^{4}	in.^{6}
204	8.01	12.1	3480	380	7.60	433	1120	124	4.31	191	5.03	17.2	0.00451	29.5	82500
181	9.00	13.6	3020	336	7.53	379	974	108	4.28	167	4.96	17.0	0.00362	20.7	70400
157	10.3	15.6	2570	290	7.46	327	833	93.1	4.25	143	4.92	16.8	0.00285	13.9	59000
135	11.9	18.2	2200	251	7.43	281	706	79.3	4.21	122	4.85	16.8	0.00216	9.12	49500
183	7.21	10.5	2510	304	6.81	349	818	100	3.89	156	4.55	15.4	0.00576	26.9	48300
162	8.05	11.9	2190	269	6.78	306	697	86.6	3.82	134	4.45	15.3	0.00457	18.8	40800
141	9.14	13.6	1870	234	6.70	264	599	74.9	3.79	116	4.40	15.1	0.00365	12.9	34300
121	10.6	15.9	1590	201	6.66	226	504	63.4	3.75	97.6	4.34	15.1	0.00275	8.35	28500
101	12.6	19.0	1300	168	6.59	187	412	52.2	3.71	80.1	4.27	14.9	0.00203	5.07	22800
88	14.5	22.0	1110	145	6.56	161	349	44.5	3.68	68.2	4.21	14.8	0.00161	3.45	19000
117	9.25	14.2	1220	172	5.96	194	443	59.5	3.59	91.4	4.15	13.4	0.00348	8.02	19900
102	10.5	16.2	1050	150	5.92	169	380	51.4	3.56	78.8	4.10	13.3	0.00270	5.39	16800
89	11.9	18.5	904	131	5.88	146	326	44.3	3.53	67.7	4.05	13.2	0.00207	3.59	14200
73	14.4	22.6	729	107	5.84	118	261	35.8	3.49	54.6	4.00	13.1	0.00143	2.01	11200
89	8.54	13.6	693	112	5.17	127	224	36.4	2.94	56.0	3.42	11.7	0.00376	4.92	7640
84	8.97	14.2	650	106	5.14	120	213	34.6	2.94	53.2	3.41	11.6	0.00345	4.24	7140
74	10.0	16.1	569	93.8	5.11	105	186	30.4	2.92	46.6	3.38	11.5	0.00276	2.98	6160
63	11.8	18.9	472	79.1	5.06	88.3	153	25.3	2.88	38.7	3.33	11.4	0.00202	1.83	5000
53	13.8	22.3	393	66.7	5.03	74.0	127	21.1	2.86	32.2	3.29	11.4	0.00148	1.12	4080
57	9.03	13.9	294	58.8	4.18	66.5	101	19.7	2.45	30.3	2.84	9.43	0.00355	1.97	2240
42	12.0	18.9	210	43.4	4.13	48.3	71.7	14.2	2.41	21.8	2.77	9.28	0.00202	0.813	1540
36	9.16	14.2	119	29.8	3.36	33.6	40.3	9.88	1.95	15.2	2.26	7.58	0.00341	0.770	578

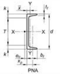


Table 1-5
C-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Average Thickness, t_f		Distance k	Distance T	Distance Workable Gage	r_{ts}	h_o
	in.²	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
C15×50	14.7	15.0	15	0.716	11/16	3/8	3.72	3 3/4	0.650	5/8	1 7/16	12 1/8	2 1/4	1.17	14.4
×40	11.8	15.0	15	0.520	1/2	1/4	3.52	3 1/2	0.650	5/8	1 7/16	↓	2	1.15	14.4
×33.9	10.0	15.0	15	0.400	3/8	3/16	3.40	3 3/8	0.650	5/8	1 7/16	↓	2	1.13	14.4
C12×30	8.81	12.0	12	0.510	1/2	1/4	3.17	3 1/8	0.501	1/2	1 1/8	9 3/4	1 3/4[g]	1.01	11.5
×25	7.34	12.0	12	0.387	3/8	3/16	3.05	3	0.501	1/2	1 1/8	↓	↓	1.00	11.5
×20.7	6.08	12.0	12	0.282	5/16	3/16	2.94	3	0.501	1/2	1 1/8	↓	↓	0.983	11.5
C10×30	8.81	10.0	10	0.673	11/16	3/8	3.03	3	0.436	7/16	1 1/16	8	1 3/4[g]	0.924	9.56
×25	7.35	10.0	10	0.526	1/2	1/4	2.89	2 7/8	0.436	7/16	1 1/16	↓	1 3/4[g]	0.911	9.56
×20	5.87	10.0	10	0.379	3/8	3/16	2.74	2 3/4	0.436	7/16	1 1/16	↓	1 1/2[g]	0.894	9.56
×15.3	4.48	10.0	10	0.240	1/4	1/8	2.60	2 5/8	0.436	7/16	1 1/16	↓	1 1/2[g]	0.868	9.56
C9×20	5.87	9.00	9	0.448	7/16	1/4	2.65	2 5/8	0.413	7/16	1	7	1 1/2[g]	0.850	8.59
×15	4.40	9.00	9	0.285	5/16	3/16	2.49	2 1/2	0.413	7/16	1	↓	1 3/8[g]	0.825	8.59
×13.4	3.94	9.00	9	0.233	1/4	1/8	2.43	2 3/8	0.413	7/16	1	↓	1 3/8[g]	0.814	8.59
C8×18.75	5.51	8.00	8	0.487	1/2	1/4	2.53	2 1/2	0.390	3/8	15/16	6 1/8	1 1/2[g]	0.800	7.61
×13.75	4.03	8.00	8	0.303	5/16	3/16	2.34	2 3/8	0.390	3/8	15/16	↓	1 3/8[g]	0.774	7.61
×11.5	3.37	8.00	8	0.220	1/4	1/8	2.26	2 1/4	0.390	3/8	15/16	↓	1 3/8[g]	0.756	7.61
C7×14.75	4.33	7.00	7	0.419	7/16	1/4	2.30	2 1/4	0.366	3/8	7/8	5 1/4	1 1/4[g]	0.738	6.63
×12.25	3.59	7.00	7	0.314	5/16	3/16	2.19	2 1/4	0.366	3/8	7/8	↓	↓	0.722	6.63
×9.8	2.87	7.00	7	0.210	3/16	1/8	2.09	2 1/8	0.366	3/8	7/8	↓	↓	0.698	6.63
C6×13	3.82	6.00	6	0.437	7/16	1/4	2.16	2 1/8	0.343	5/16	13/16	4 3/8	1 3/8[g]	0.689	5.66
×10.5	3.07	6.00	6	0.314	5/16	3/16	2.03	2	0.343	5/16	13/16	↓	1 1/8[g]	0.669	5.66
×8.2	2.39	6.00	6	0.200	3/16	1/8	1.92	1 7/8	0.343	5/16	13/16	↓	1 1/8[g]	0.643	5.66
C5×9	2.64	5.00	5	0.325	5/16	3/16	1.89	1 7/8	0.320	5/16	3/4	3 1/2	1 1/8[g]	0.616	4.68
×6.7	1.97	5.00	5	0.190	3/16	1/8	1.75	1 3/4	0.320	5/16	3/4	3 1/2	–	0.584	4.68
C4×7.25	2.13	4.00	4	0.321	5/16	3/16	1.72	1 3/4	0.296	5/16	3/4	2 1/2	1[g]	0.563	3.70
×6.25	1.84	4.00	4	0.247	1/4	1/8	1.65	1 5/8	0.296	5/16	3/4	↓	–	0.549	3.70
×5.4	1.58	4.00	4	0.184	3/16	1/8	1.58	1 5/8	0.296	5/16	3/4	↓	–	0.528	3.70
×4.5	1.34	4.00	4	0.125	1/8	1/16	1.52	1 1/2	0.296	5/16	3/4	↓	–	0.506	3.70
C3×6	1.76	3.00	3	0.356	3/8	3/16	1.60	1 5/8	0.273	1/4	11/16	1 5/8	–	0.519	2.73
×5	1.47	3.00	3	0.258	1/4	1/8	1.50	1 1/2	0.273	1/4	11/16	↓	–	0.496	2.73
×4.1	1.20	3.00	3	0.170	3/16	1/8	1.41	1 3/8	0.273	1/4	11/16	↓	–	0.469	2.73
×3.5	1.09	3.00	3	0.132	1/8	1/16	1.37	1 3/8	0.273	1/4	11/16	↓	–	0.456	2.73

[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
– Indicates flange is too narrow to establish a workable gage.

Table 1-5 (continued)
C-Shapes
Properties

C-SHAPES

Nominal Wt.	Shear Ctr., e_o	Axis X-X				Axis Y-Y						Torsional Properties			
		I	S	r	Z	I	S	r	$\bar{x}$	Z	x_p	J	C_w	$\bar{r}_o$	H
lb/ft	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.	
50	0.583	404	53.8	5.24	68.5	11.0	3.77	0.865	0.799	8.14	0.490	2.65	492	5.49	0.937
40	0.767	348	46.5	5.43	57.5	9.17	3.34	0.883	0.778	6.84	0.392	1.45	410	5.71	0.927
33.9	0.896	315	42.0	5.61	50.8	8.07	3.09	0.901	0.788	6.19	0.332	1.01	358	5.94	0.920
30	0.618	162	27.0	4.29	33.8	5.12	2.05	0.762	0.674	4.32	0.367	0.861	151	4.54	0.919
25	0.746	144	24.0	4.43	29.4	4.45	1.87	0.779	0.674	3.82	0.306	0.538	130	4.72	0.909
20.7	0.870	129	21.5	4.61	25.6	3.86	1.72	0.797	0.698	3.47	0.253	0.369	112	4.93	0.899
30	0.368	103	20.7	3.43	26.7	3.93	1.65	0.668	0.649	3.78	0.441	1.22	79.5	3.63	0.921
25	0.494	91.1	18.2	3.52	23.1	3.34	1.47	0.675	0.617	3.18	0.367	0.687	68.3	3.76	0.912
20	0.636	78.9	15.8	3.67	19.4	2.80	1.31	0.690	0.606	2.70	0.294	0.368	56.9	3.93	0.900
15.3	0.796	67.3	13.5	3.88	15.9	2.27	1.15	0.711	0.634	2.34	0.224	0.209	45.5	4.19	0.884
20	0.515	60.9	13.5	3.22	16.9	2.41	1.17	0.640	0.583	2.46	0.326	0.427	39.4	3.46	0.899
15	0.681	51.0	11.3	3.40	13.6	1.91	1.01	0.659	0.586	2.04	0.245	0.208	31.0	3.69	0.882
13.4	0.742	47.8	10.6	3.48	12.6	1.75	0.954	0.666	0.601	1.94	0.219	0.168	28.2	3.79	0.875
18.75	0.431	43.9	11.0	2.82	13.9	1.97	1.01	0.598	0.565	2.17	0.344	0.434	25.1	3.05	0.894
13.75	0.604	36.1	9.02	2.99	11.0	1.52	0.848	0.613	0.554	1.73	0.252	0.186	19.2	3.26	0.874
11.5	0.697	32.5	8.14	3.11	9.63	1.31	0.775	0.623	0.572	1.57	0.211	0.130	16.5	3.41	0.862
14.75	0.441	27.2	7.78	2.51	9.75	1.37	0.772	0.561	0.532	1.63	0.309	0.267	13.1	2.75	0.875
12.25	0.538	24.2	6.92	2.59	8.46	1.16	0.696	0.568	0.525	1.42	0.257	0.161	11.2	2.86	0.862
9.8	0.647	21.2	6.07	2.72	7.19	0.957	0.617	0.578	0.541	1.26	0.205	0.0996	9.15	3.02	0.845
13	0.380	17.3	5.78	2.13	7.29	1.05	0.638	0.524	0.514	1.35	0.318	0.237	7.19	2.37	0.858
10.5	0.486	15.1	5.04	2.22	6.18	0.860	0.561	0.529	0.500	1.14	0.256	0.128	5.91	2.48	0.842
8.2	0.599	13.1	4.35	2.34	5.16	0.687	0.488	0.536	0.512	0.987	0.199	0.0736	4.70	2.65	0.824
9	0.427	8.89	3.56	1.84	4.39	0.624	0.444	0.486	0.478	0.913	0.264	0.109	2.93	2.10	0.815
6.7	0.552	7.48	2.99	1.95	3.55	0.470	0.372	0.489	0.484	0.757	0.215	0.0549	2.22	2.26	0.790
7.25	0.386	4.58	2.29	1.47	2.84	0.425	0.337	0.447	0.459	0.695	0.266	0.0817	1.24	1.75	0.767
6.25	0.447	4.19	2.10	1.51	2.55	0.374	0.312	0.451	0.453	0.623	0.233	0.0549	1.07	1.81	0.753
5.4	0.501	3.85	1.92	1.56	2.29	0.312	0.277	0.444	0.457	0.565	0.231	0.0399	0.921	1.88	0.742
4.5	0.556	3.53	1.77	1.62	2.05	0.265	0.253	0.445	0.473	0.495	0.305	0.0306	0.778	1.97	0.727
6	0.322	2.07	1.38	1.09	1.74	0.300	0.263	0.413	0.455	0.543	0.294	0.0725	0.462	1.40	0.690
5	0.392	1.85	1.23	1.12	1.52	0.241	0.228	0.405	0.439	0.464	0.245	0.0425	0.379	1.45	0.673
4.1	0.461	1.65	1.10	1.18	1.32	0.191	0.196	0.398	0.437	0.399	0.262	0.0269	0.307	1.53	0.655
3.5	0.493	1.57	1.04	1.20	1.24	0.169	0.182	0.394	0.443	0.364	0.296	0.0226	0.276	1.57	0.646

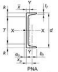


Table 1-6
MC-Shapes
Dimensions

Shape	Area, A	Depth, d		Web: Thickness, t_w		Web: $\frac{t_w}{2}$	Flange: Width, b_f		Flange: Average Thickness, t_f		Distance: k	Distance: T	Distance: Workable Gage	r_{ts}	h_o
	in.²	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
MC18×58	17.1	18.0	18	0.700	11/16	3/8	4.20	4 1/4	0.625	5/8	1 7/16	15 1/8	2 1/2	1.35	17.4
×51.9	15.3	18.0	18	0.600	5/8	5/16	4.10	4 1/8	0.625	5/8	1 7/16	↓	↓	1.35	17.4
×45.8	13.5	18.0	18	0.500	1/2	1/4	4.00	4	0.625	5/8	1 7/16	↓	↓	1.34	17.4
×42.7	12.6	18.0	18	0.450	7/16	1/4	3.95	4	0.625	5/8	1 7/16	↓	↓	1.34	17.4
MC13×50	14.7	13.0	13	0.787	13/16	7/16	4.41	4 3/8	0.610	5/8	1 7/16	10 1/8	2 1/2	1.41	12.4
×40	11.7	13.0	13	0.560	9/16	5/16	4.19	4 1/8	0.610	5/8	1 7/16	↓	↓	1.38	12.4
×35	10.3	13.0	13	0.447	7/16	1/4	4.07	4 1/8	0.610	5/8	1 7/16	↓	↓	1.35	12.4
×31.8	9.35	13.0	13	0.375	3/8	3/16	4.00	4	0.610	5/8	1 7/16	↓	↓	1.34	12.4
MC12×50	14.7	12.0	12	0.835	13/16	7/16	4.14	4 1/8	0.700	11/16	1 5/16	9 3/8	2 1/2	1.37	11.3
×45	13.2	12.0	12	0.710	11/16	3/8	4.01	4	0.700	11/16	1 5/16	↓	↓	1.35	11.3
×40	11.8	12.0	12	0.590	9/16	5/16	3.89	3 7/8	0.700	11/16	1 5/16	↓	↓	1.33	11.3
×35	10.3	12.0	12	0.465	7/16	1/4	3.77	3 3/4	0.700	11/16	1 5/16	↓	↓	1.30	11.3
×31	9.12	12.0	12	0.370	3/8	3/16	3.67	3 5/8	0.700	11/16	1 5/16	↓	2 1/4	1.28	11.3
MC12×14.3[c]	4.18	12.0	12	0.250	1/4	1/8	2.12	2 1/8	0.313	5/16	3/4	10 1/2	1 1/4[g]	0.672	11.7
MC12×10.6[c]	3.10	12.0	12	0.190	3/16	1/8	1.50	1 1/2	0.309	5/16	3/4	10 1/2	–	0.478	11.7
MC10×41.1	12.1	10.0	10	0.796	13/16	7/16	4.32	4 3/8	0.575	9/16	1 5/16	7 3/8	2 1/2[g]	1.44	9.43
×33.6	9.87	10.0	10	0.575	9/16	5/16	4.10	4 1/8	0.575	9/16	1 5/16	↓	↓	1.40	9.43
×28.5	8.37	10.0	10	0.425	7/16	1/4	3.95	4	0.575	9/16	1 5/16	↓	↓	1.36	9.43
MC10×25	7.34	10.0	10	0.380	3/8	3/16	3.41	3 3/8	0.575	9/16	1 5/16	7 3/8	2[g]	1.17	9.43
×22	6.45	10.0	10	0.290	5/16	3/16	3.32	3 3/8	0.575	9/16	1 5/16	7 3/8	2[g]	1.14	9.43
MC10×8.4[c]	2.46	10.0	10	0.170	3/16	1/8	1.50	1 1/2	0.280	1/4	3/4	8 1/2	–	0.486	9.72
×6.5[c]	1.95	10.0	10	0.152	1/8	1/16	1.17	1 1/8	0.202	3/16	9/16	8 7/8	–	0.363	9.80
MC9×25.4	7.47	9.00	9	0.450	7/16	1/4	3.50	3 1/2	0.550	9/16	1 1/4	6 1/2	2[g]	1.20	8.45
×23.9	7.02	9.00	9	0.400	3/8	3/16	3.45	3 1/2	0.550	9/16	1 1/4	6 1/2	2[g]	1.18	8.45
MC8×22.8	6.70	8.00	8	0.427	7/16	1/4	3.50	3 1/2	0.525	1/2	1 3/16	5 5/8	2[g]	1.20	7.48
×21.4	6.28	8.00	8	0.375	3/8	3/16	3.45	3 1/2	0.525	1/2	1 3/16	5 5/8	2[g]	1.18	7.48
MC8×20	5.87	8.00	8	0.400	3/8	3/16	3.03	3	0.500	1/2	1 1/8	5 3/4	2[g]	1.03	7.50
×18.7	5.50	8.00	8	0.353	3/8	3/16	2.98	3	0.500	1/2	1 1/8	5 3/4	2[g]	1.02	7.50
MC8×8.5	2.50	8.00	8	0.179	3/16	1/8	1.87	1 7/8	0.311	5/16	13/16	6 3/8	1 1/8[g]	0.624	7.69

[c] Shape is slender for compression with F_y = 36 ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
– Indicates flange is too narrow to establish a workable gage.

Table 1-6 (continued)
MC-Shapes
Properties

MC18–MC8

Nom-inal Wt.	Shear Ctr., e_o	Axis X-X				Axis Y-Y						Torsional Properties			
		I	S	r	Z	I	S	r	$\bar{x}$	Z	x_p	J	C_w	$\bar{r}_o$	H
lb/ft	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.	
58	0.695	675	75.0	6.29	95.4	17.6	5.28	1.02	0.862	10.7	0.474	2.81	1070	6.56	0.944
51.9	0.797	627	69.6	6.41	87.3	16.3	5.02	1.03	0.858	9.86	0.424	2.03	985	6.70	0.939
45.8	0.909	578	64.2	6.55	79.2	14.9	4.77	1.05	0.866	9.14	0.374	1.45	897	6.87	0.933
42.7	0.969	554	61.5	6.64	75.1	14.3	4.64	1.07	0.877	8.82	0.349	1.23	852	6.97	0.930
50	0.815	314	48.3	4.62	60.8	16.4	4.77	1.06	0.974	10.2	0.566	2.96	558	5.07	0.875
40	1.03	273	41.9	4.82	51.2	13.7	4.24	1.08	0.963	8.66	0.452	1.55	462	5.32	0.859
35	1.16	252	38.8	4.95	46.5	12.3	3.97	1.09	0.980	8.04	0.396	1.13	412	5.50	0.849
31.8	1.24	239	36.7	5.05	43.4	11.4	3.79	1.10	1.00	7.69	0.360	0.937	380	5.64	0.842
50	0.741	269	44.9	4.28	56.5	17.4	5.64	1.09	1.05	10.9	0.613	3.23	411	4.77	0.859
45	0.844	251	41.9	4.36	52.0	15.8	5.30	1.09	1.04	10.1	0.550	2.33	373	4.88	0.851
40	0.952	234	39.0	4.46	47.7	14.2	4.98	1.10	1.04	9.31	0.490	1.69	336	5.01	0.842
35	1.07	216	36.0	4.59	43.2	12.6	4.64	1.11	1.05	8.62	0.428	1.24	297	5.18	0.831
31	1.17	202	33.7	4.71	39.7	11.3	4.37	1.11	1.08	8.15	0.425	1.00	267	5.34	0.822
14.3	0.435	76.1	12.7	4.27	15.9	1.00	0.574	0.489	0.377	1.21	0.174	0.117	32.8	4.37	0.965
10.6	0.284	55.3	9.22	4.22	11.6	0.378	0.307	0.349	0.269	0.635	0.129	0.0596	11.7	4.27	0.983
41.1	0.864	157	31.5	3.61	39.3	15.7	4.85	1.14	1.09	9.49	0.604	2.26	269	4.26	0.790
33.6	1.06	139	27.8	3.75	33.7	13.1	4.35	1.15	1.09	8.28	0.494	1.20	224	4.47	0.770
28.5	1.21	126	25.3	3.89	30.0	11.3	3.99	1.16	1.12	7.59	0.419	0.791	193	4.68	0.752
25	1.03	110	22.0	3.87	26.2	7.25	2.96	0.993	0.953	5.65	0.367	0.638	124	4.46	0.803
22	1.12	102	20.5	3.99	23.9	6.40	2.75	0.997	0.990	5.29	0.467	0.510	110	4.62	0.791
8.4	0.332	31.9	6.39	3.61	7.92	0.326	0.268	0.364	0.284	0.548	0.123	0.0413	7.00	3.68	0.972
6.5	0.182	22.9	4.59	3.43	5.90	0.133	0.137	0.262	0.194	0.284	0.0975	0.0191	2.76	3.46	0.988
25.4	0.986	87.9	19.5	3.43	23.5	7.57	2.99	1.01	0.970	5.70	0.415	0.691	104	4.08	0.770
23.9	1.04	84.9	18.9	3.48	22.5	7.14	2.89	1.01	0.981	5.51	0.390	0.599	98.0	4.15	0.763
22.8	1.04	63.8	15.9	3.09	19.1	7.01	2.81	1.02	1.01	5.37	0.419	0.572	75.2	3.84	0.715
21.4	1.09	61.5	15.4	3.13	18.2	6.58	2.71	1.02	1.02	5.18	0.452	0.495	70.8	3.91	0.707
20	0.843	54.4	13.6	3.04	16.4	4.42	2.02	0.867	0.840	3.86	0.367	0.441	47.8	3.58	0.779
18.7	0.889	52.4	13.1	3.09	15.6	4.15	1.95	0.868	0.849	3.72	0.344	0.380	45.0	3.65	0.773
8.5	0.542	23.3	5.82	3.05	6.95	0.624	0.431	0.500	0.428	0.875	0.156	0.0587	8.21	3.24	0.910

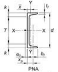


Table 1-6 (continued)
MC-Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, t_w		Web $\frac{t_w}{2}$	Flange Width, b_f		Flange Average Thickness, t_f		Distance k	Distance T	Distance Workable Gage	r_{ts}	h_o
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
MC7×22.7	6.67	7.00	7	0.503	1/2	1/4	3.60	3 5/8	0.500	1/2	1 1/8	4 3/4	2[g]	1.23	6.50
×19.1	5.61	7.00	7	0.352	3/8	3/16	3.45	3 1/2	0.500	1/2	1 1/8	4 3/4	2[g]	1.19	6.50
MC6×18	5.29	6.00	6	0.379	3/8	3/16	3.50	3 1/2	0.475	1/2	1 1/16	3 7/8	2[g]	1.20	5.53
×15.3	4.49	6.00	6	0.340	5/16	3/16	3.50	3 1/2	0.385	3/8	7/8	4 1/4	2[g]	1.20	5.62
MC6×16.3	4.79	6.00	6	0.375	3/8	3/16	3.00	3	0.475	1/2	1 1/16	3 7/8	1 3/4[g]	1.03	5.53
×15.1	4.44	6.00	6	0.316	5/16	3/16	2.94	3	0.475	1/2	1 1/16	3 7/8	1 3/4[g]	1.01	5.53
MC6×12	3.53	6.00	6	0.310	5/16	3/16	2.50	2 1/2	0.375	3/8	7/8	4 1/4	1 1/2[g]	0.856	5.63
MC6×7	2.09	6.00	6	0.179	3/16	1/8	1.88	1 7/8	0.291	5/16	3/4	4 1/2	–	0.638	5.71
×6.5	1.95	6.00	6	0.155	1/8	1/16	1.85	1 7/8	0.291	5/16	3/4	4 1/2	–	0.631	5.71
MC4×13.8	4.03	4.00	4	0.500	1/2	1/4	2.50	2 1/2	0.500	1/2	1	2	–	0.851	3.50
MC3×7.1	2.11	3.00	3	0.312	5/16	3/16	1.94	2	0.351	3/8	13/16	1 3/8	–	0.657	2.65

[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.

– Indicates flange is too narrow to establish a workable gage.

Table 1-6 (continued)
MC-Shapes
Properties

MC7–MC3

Nom-inal Wt.	Shear Ctr., e_o	Axis X-X				Axis Y-Y						Torsional Properties			
		I	S	r	Z	I	S	r	$\bar{x}$	Z	x_p	J	C_w	$\bar{r}_o$	H
lb/ft	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.	
22.7	1.01	47.4	13.5	2.67	16.4	7.24	2.83	1.04	1.04	5.38	0.477	0.625	58.3	3.53	0.659
19.1	1.15	43.1	12.3	2.77	14.5	6.06	2.55	1.04	1.08	4.85	0.579	0.407	49.3	3.70	0.638
18	1.17	29.7	9.89	2.37	11.7	5.88	2.47	1.05	1.12	4.68	0.644	0.379	34.6	3.46	0.563
15.3	1.16	25.3	8.44	2.38	9.91	4.91	2.01	1.05	1.05	3.85	0.511	0.223	30.0	3.41	0.579
16.3	0.930	26.0	8.66	2.33	10.4	3.77	1.82	0.887	0.927	3.47	0.465	0.336	22.1	3.11	0.643
15.1	0.982	24.9	8.30	2.37	9.83	3.46	1.73	0.883	0.940	3.30	0.543	0.285	20.5	3.18	0.634
12	0.725	18.7	6.24	2.30	7.47	1.85	1.03	0.724	0.704	1.97	0.294	0.155	11.3	2.80	0.740
7	0.583	11.4	3.81	2.34	4.50	0.603	0.439	0.537	0.501	0.865	0.174	0.0464	4.00	2.63	0.830
6.5	0.612	11.0	3.66	2.38	4.28	0.565	0.422	0.539	0.513	0.836	0.191	0.0412	3.75	2.68	0.824
13.8	0.643	8.85	4.43	1.48	5.53	2.13	1.29	0.727	0.849	2.40	0.508	0.373	4.84	2.23	0.550
7.1	0.574	2.72	1.81	1.14	2.24	0.666	0.518	0.562	0.653	0.998	0.414	0.0928	0.915	1.76	0.516

Menu

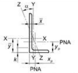


Table 1-7
Angles
Properties

Shape	k	Wt.	Area, A	Axis X-X: I	S	r	$\bar{y}$	Z	y_p	Flexural-Torsional Properties: J	C_w	$\bar{r}_o$
	in.	lb/ft	in.^{2}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.
L12×12×1^3/$_8$	2^1/$_{16}$	105	31.1	413	48.6	3.64	3.50	88.1	1.30	19.9	211	6.51
×1^1/$_4$	1^{15}/$_{16}$	96.4	28.4	381	44.6	3.66	3.45	80.7	1.18	14.9	160	6.54
×1^1/$_8$	1^{13}/$_{16}$	87.2	25.8	350	40.7	3.68	3.41	73.7	1.08	11.1	120	6.58
×1	1^{11}/$_{16}$	77.8	23.0	315	36.5	3.70	3.36	65.9	0.958	7.80	84.5	6.61
L10×10×1^3/$_8$	2^3/$_{16}$	87.1	25.6	231	33.0	3.00	3.00	59.9	1.28	16.4	118	5.36
×1^1/$_4$	2^1/$_{16}$	79.9	23.4	213	30.2	3.02	2.95	54.9	1.17	12.3	89.4	5.39
×1^1/$_8$	1^{15}/$_{16}$	72.3	21.3	196	27.6	3.03	2.90	50.2	1.07	9.21	67.3	5.41
×1	1^{13}/$_{16}$	64.7	19.0	177	24.8	3.05	2.86	45.0	0.950	6.46	47.6	5.46
×^{7}/$_8$	1^{11}/$_{16}$	56.9	16.8	158	21.9	3.07	2.80	39.9	0.840	4.39	32.5	5.47
×^{3}/$_4$	1^9/$_{16}$	49.1	14.5	139	19.2	3.10	2.76	34.6	0.725	2.80	20.9	5.53
L8×8×1^1/$_8$	1^3/$_4$	56.9	16.8	98.1	17.5	2.41	2.40	31.6	1.05	7.13	32.5	4.29
×1	1^5/$_8$	51.0	15.1	89.1	15.8	2.43	2.36	28.5	0.944	5.08	23.4	4.32
×^{7}/$_8$	1^1/$_2$	45.0	13.3	79.7	14.0	2.45	2.31	25.3	0.831	3.46	16.1	4.36
×^{3}/$_4$	1^3/$_8$	38.9	11.5	69.9	12.2	2.46	2.26	22.0	0.719	2.21	10.4	4.39
×^{5}/$_8$	1^1/$_4$	32.7	9.69	59.6	10.3	2.48	2.21	18.6	0.606	1.30	6.16	4.42
×^{9}/$_{16}$	1^3/$_{16}$	29.6	8.77	54.2	9.33	2.49	2.19	16.8	0.548	0.961	4.55	4.43
×^{1}/$_2$	1^1/$_8$	26.4	7.84	48.8	8.36	2.49	2.17	15.1	0.490	0.683	3.23	4.45
L8×6×1	1^1/$_2$	44.2	13.1	80.9	15.1	2.49	2.65	27.3	1.45	4.34	16.3	3.88
×^{7}/$_8$	1^3/$_8$	39.1	11.5	72.4	13.4	2.50	2.60	24.3	1.43	2.96	11.3	3.92
×^{3}/$_4$	1^1/$_4$	33.8	9.99	63.5	11.7	2.52	2.55	21.1	1.34	1.90	7.28	3.95
×^{5}/$_8$	1^1/$_8$	28.5	8.41	54.2	9.86	2.54	2.50	17.9	1.27	1.12	4.33	3.98
×^{9}/$_{16}$	1^1/$_{16}$	25.7	7.61	49.4	8.94	2.55	2.48	16.2	1.24	0.823	3.20	3.99
×^{1}/$_2$	1	23.0	6.80	44.4	8.01	2.55	2.46	14.6	1.20	0.584	2.28	4.01
×^{7}/$_{16}$	^{15}/$_{16}$	20.2	5.99	39.3	7.06	2.56	2.43	12.9	1.15	0.396	1.55	4.02
L8×4×1	1^1/$_2$	37.4	11.1	69.7	14.0	2.51	3.03	24.3	2.45	3.68	12.9	3.75
×^{7}/$_8$	1^3/$_8$	33.1	9.79	62.6	12.5	2.53	2.99	21.7	2.41	2.51	8.89	3.78
×^{3}/$_4$	1^1/$_4$	28.7	8.49	55.0	10.9	2.55	2.94	18.9	2.34	1.61	5.75	3.80
×^{5}/$_8$	1^1/$_8$	24.2	7.16	47.0	9.20	2.56	2.89	16.1	2.27	0.955	3.42	3.83
×^{9}/$_{16}$	1^1/$_{16}$	21.9	6.49	42.9	8.34	2.57	2.86	14.6	2.23	0.704	2.53	3.84
×^{1}/$_2$	1	19.6	5.80	38.6	7.48	2.58	2.84	13.1	2.20	0.501	1.80	3.86
×^{7}/$_{16}$	^{15}/$_{16}$	17.2	5.11	34.2	6.59	2.59	2.81	11.6	2.16	0.340	1.22	3.87
L7×4×^{3}/$_4$	1^1/$_4$	26.2	7.74	37.8	8.39	2.21	2.50	14.8	1.84	1.47	3.97	3.31
×^{5}/$_8$	1^1/$_8$	22.1	6.50	32.4	7.12	2.23	2.45	12.5	1.80	0.868	2.37	3.34
×^{1}/$_2$	1	17.9	5.26	26.6	5.79	2.25	2.40	10.2	1.74	0.456	1.25	3.37
×^{7}/$_{16}$	^{15}/$_{16}$	15.7	4.63	23.6	5.11	2.26	2.38	9.03	1.71	0.310	0.851	3.38
×^{3}/$_8$	^{7}/$_8$	13.6	4.00	20.5	4.42	2.27	2.35	7.81	1.67	0.198	0.544	3.40

Note: For workable gages, refer to Table 1-7A. For width-to-thickness criteria, refer to Table 1-7B.

Table 1-7 (continued)
Angles
Properties

L12–L7

Shape	Axis Y-Y						Axis Z-Z			
	I	S	r	$\bar{x}$	Z	x_p	I	S	r	Tan α
	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	
L12×12×1$^3/_8$	413	48.6	3.64	3.50	88.1	1.30	165	33.3	2.30	1.00
×1$^1/_4$	381	44.6	3.66	3.45	80.7	1.18	152	31.1	2.31	1.00
×1$^1/_8$	350	40.7	3.68	3.41	73.7	1.08	140	29.0	2.33	1.00
×1	315	36.5	3.70	3.36	65.9	0.958	126	26.5	2.34	1.00
L10×10×1$^3/_8$	231	33.0	3.00	3.00	59.8	1.28	93.3	22.0	1.91	1.00
×1$^1/_4$	213	30.2	3.02	2.95	54.9	1.17	85.4	20.5	1.91	1.00
×1$^1/_8$	196	27.6	3.03	2.90	50.2	1.07	78.2	19.1	1.92	1.00
×1	177	24.8	3.05	2.86	45.0	0.950	70.4	17.4	1.92	1.00
×$^7/_8$	158	21.9	3.07	2.80	39.9	0.840	62.8	15.9	1.93	1.00
×$^3/_4$	139	19.2	3.10	2.76	34.6	0.725	55.7	14.3	1.96	1.00
L8×8×1$^1/_8$	98.1	17.5	2.41	2.40	31.6	1.05	40.7	12.0	1.56	1.00
×1	89.1	15.8	2.43	2.36	28.5	0.944	36.8	11.0	1.56	1.00
×$^7/_8$	79.7	14.0	2.45	2.31	25.3	0.831	32.7	10.0	1.57	1.00
×$^3/_4$	69.9	12.2	2.46	2.26	22.0	0.719	28.5	8.91	1.57	1.00
×$^5/_8$	59.6	10.3	2.48	2.21	18.6	0.606	24.2	7.73	1.58	1.00
×$^9/_{16}$	54.2	9.33	2.49	2.19	16.8	0.548	21.9	7.06	1.58	1.00
×$^1/_2$	48.8	8.36	2.49	2.17	15.1	0.490	19.8	6.45	1.59	1.00
L8×6×1	38.8	8.92	1.72	1.65	16.2	0.819	21.3	7.61	1.28	0.542
×$^7/_8$	34.9	7.94	1.74	1.60	14.4	0.719	18.9	6.70	1.28	0.546
×$^3/_4$	30.8	6.92	1.75	1.56	12.5	0.624	16.6	5.85	1.29	0.550
×$^5/_8$	26.4	5.88	1.77	1.51	10.5	0.526	14.1	4.91	1.29	0.554
×$^9/_{16}$	24.1	5.34	1.78	1.49	9.52	0.476	12.8	4.46	1.30	0.556
×$^1/_2$	21.7	4.79	1.79	1.46	8.52	0.425	11.5	3.98	1.30	0.557
×$^7/_{16}$	19.3	4.23	1.80	1.44	7.50	0.374	10.2	3.52	1.31	0.559
L8×4×1	11.6	3.94	1.03	1.04	7.73	0.694	7.83	3.45	0.844	0.247
×$^7/_8$	10.5	3.51	1.04	0.997	6.77	0.612	6.97	3.04	0.846	0.252
×$^3/_4$	9.37	3.07	1.05	0.949	5.82	0.531	6.14	2.65	0.850	0.257
×$^5/_8$	8.11	2.62	1.06	0.902	4.86	0.448	5.24	2.24	0.856	0.262
×$^9/_{16}$	7.44	2.38	1.07	0.878	4.39	0.406	4.78	2.03	0.859	0.264
×$^1/_2$	6.75	2.15	1.08	0.854	3.91	0.363	4.32	1.82	0.863	0.266
×$^7/_{16}$	6.03	1.90	1.09	0.829	3.42	0.319	3.84	1.61	0.867	0.268
L7×4×$^3/_4$	9.00	3.01	1.08	1.00	5.60	0.553	5.63	2.56	0.855	0.324
×$^5/_8$	7.79	2.56	1.10	0.958	4.69	0.464	4.81	2.17	0.860	0.329
×$^1/_2$	6.48	2.10	1.11	0.910	3.77	0.376	3.94	1.75	0.866	0.334
×$^7/_{16}$	5.79	1.86	1.12	0.886	3.31	0.331	3.50	1.55	0.869	0.337
×$^3/_8$	5.06	1.61	1.12	0.861	2.84	0.286	3.04	1.33	0.873	0.339

Note: For workable gages, refer to Table 1-7A. For width-to-thickness criteria, refer to Table 1-7B.

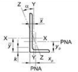


Table 1-7 (continued)
Angles
Properties

Shape	k	Wt.	Area, A	Axis X-X						Flexural-Torsional Properties		
				I	S	r	$\bar{y}$	Z	y_p	J	C_w	$\bar{r}_o$
	in.	lb/ft	in.^{2}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.
L6×6×1	1 1/2	37.4	11.0	35.4	8.55	1.79	1.86	15.4	0.917	3.68	9.24	3.18
×7/8	1 3/8	33.1	9.75	31.9	7.61	1.81	1.81	13.7	0.813	2.51	6.41	3.21
×3/4	1 1/4	28.7	8.46	28.1	6.64	1.82	1.77	11.9	0.705	1.61	4.17	3.24
×5/8	1 1/8	24.2	7.13	24.1	5.64	1.84	1.72	10.1	0.594	0.955	2.50	3.28
×9/16	1 1/16	21.9	6.45	22.0	5.12	1.85	1.70	9.18	0.538	0.704	1.85	3.29
×1/2	1	19.6	5.77	19.9	4.59	1.86	1.67	8.22	0.481	0.501	1.32	3.31
×7/16	15/16	17.2	5.08	17.6	4.06	1.86	1.65	7.25	0.423	0.340	0.899	3.32
×3/8	7/8	14.9	4.38	15.4	3.51	1.87	1.62	6.27	0.365	0.218	0.575	3.34
×5/16	13/16	12.4	3.67	13.0	2.95	1.88	1.60	5.26	0.306	0.129	0.338	3.35
L6×4×7/8	1 3/8	27.2	8.00	27.7	7.13	1.86	2.12	12.7	1.43	2.03	4.04	2.82
×3/4	1 1/4	23.6	6.94	24.5	6.23	1.88	2.07	11.1	1.37	1.31	2.64	2.85
×5/8	1 1/8	20.0	5.86	21.0	5.29	1.89	2.03	9.44	1.31	0.775	1.59	2.88
×9/16	1 1/16	18.1	5.31	19.2	4.81	1.90	2.00	8.59	1.28	0.572	1.18	2.90
×1/2	1	16.2	4.75	17.3	4.31	1.91	1.98	7.71	1.25	0.407	0.843	2.91
×7/16	15/16	14.3	4.18	15.4	3.81	1.92	1.95	6.81	1.22	0.276	0.575	2.93
×3/8	7/8	12.3	3.61	13.4	3.30	1.93	1.93	5.89	1.19	0.177	0.369	2.94
×5/16	13/16	10.3	3.03	11.4	2.77	1.94	1.90	4.96	1.15	0.104	0.217	2.96
L6×3 1/2×1/2	1	15.3	4.50	16.6	4.23	1.92	2.07	7.49	1.50	0.386	0.779	2.88
×3/8	7/8	11.7	3.44	12.9	3.23	1.93	2.02	5.74	1.41	0.168	0.341	2.90
×5/16	13/16	9.80	2.89	10.9	2.72	1.94	2.00	4.84	1.38	0.0990	0.201	2.92
L5×5×7/8	1 3/8	27.2	8.00	17.8	5.16	1.49	1.56	9.31	0.800	2.07	3.53	2.64
×3/4	1 1/4	23.6	6.98	15.7	4.52	1.50	1.52	8.14	0.698	1.33	2.32	2.67
×5/8	1 1/8	20.0	5.90	13.6	3.85	1.52	1.47	6.93	0.590	0.792	1.40	2.70
×1/2	1	16.2	4.79	11.3	3.15	1.53	1.42	5.66	0.479	0.417	0.744	2.73
×7/16	15/16	14.3	4.22	10.0	2.78	1.54	1.40	5.00	0.422	0.284	0.508	2.74
×3/8	7/8	12.3	3.65	8.76	2.41	1.55	1.37	4.33	0.365	0.183	0.327	2.76
×5/16	13/16	10.3	3.07	7.44	2.04	1.56	1.35	3.65	0.307	0.108	0.193	2.77
L5×3 1/2×3/4	1 3/16	19.8	5.85	13.9	4.26	1.55	1.74	7.60	1.10	1.09	1.52	2.36
×5/8	1 1/16	16.8	4.93	12.0	3.63	1.56	1.69	6.50	1.06	0.651	0.918	2.39
×1/2	15/16	13.6	4.00	10.0	2.97	1.58	1.65	5.33	1.00	0.343	0.491	2.42
×3/8	13/16	10.4	3.05	7.75	2.28	1.59	1.60	4.09	0.933	0.150	0.217	2.45
×5/16	3/4	8.70	2.56	6.58	1.92	1.60	1.57	3.45	0.904	0.0883	0.128	2.47
×1/4	11/16	7.00	2.07	5.36	1.55	1.61	1.55	2.78	0.860	0.0464	0.0670	2.48

Note: For workable gages, refer to Table 1-7A. For width-to-thickness criteria, refer to Table 1-7B.

Table 1-7 (continued)
Angles
Properties

L6–L5

Shape	Axis Y-Y						Axis Z-Z			
	I	S	r	$\bar{x}$	Z	x_p	I	S	r	Tan α
	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	
L6×6×1	35.4	8.55	1.79	1.86	15.4	0.917	14.9	5.67	1.17	1.00
×7/8	31.9	7.61	1.81	1.81	13.7	0.813	13.3	5.20	1.17	1.00
×3/4	28.1	6.64	1.82	1.77	11.9	0.705	11.6	4.64	1.17	1.00
×5/8	24.1	5.64	1.84	1.72	10.1	0.594	9.81	4.04	1.17	1.00
×9/16	22.0	5.12	1.85	1.70	9.18	0.538	8.90	3.71	1.18	1.00
×1/2	19.9	4.59	1.86	1.67	8.22	0.481	8.06	3.42	1.18	1.00
×7/16	17.6	4.06	1.86	1.65	7.25	0.423	7.05	3.03	1.18	1.00
×3/8	15.4	3.51	1.87	1.62	6.27	0.365	6.21	2.71	1.19	1.00
×5/16	13.0	2.95	1.88	1.60	5.26	0.306	5.20	2.30	1.19	1.00
L6×4×7/8	9.70	3.37	1.10	1.12	6.26	0.667	5.82	2.91	0.854	0.421
×3/4	8.63	2.95	1.12	1.07	5.42	0.578	5.08	2.50	0.856	0.428
×5/8	7.48	2.52	1.13	1.03	4.56	0.488	4.32	2.12	0.859	0.435
×9/16	6.86	2.29	1.14	1.00	4.13	0.443	3.93	1.91	0.861	0.438
×1/2	6.22	2.06	1.14	0.981	3.69	0.396	3.54	1.72	0.864	0.440
×7/16	5.56	1.83	1.15	0.957	3.24	0.348	3.14	1.51	0.867	0.443
×3/8	4.86	1.58	1.16	0.933	2.79	0.301	2.73	1.31	0.870	0.446
×5/16	4.13	1.34	1.17	0.908	2.33	0.253	2.31	1.09	0.874	0.449
L6×3½×½	4.24	1.59	0.968	0.829	2.88	0.375	2.59	1.34	0.756	0.343
×3/8	3.33	1.22	0.984	0.781	2.18	0.287	2.01	1.02	0.763	0.349
×5/16	2.84	1.03	0.991	0.756	1.82	0.241	1.70	0.859	0.767	0.352
L5×5×7/8	17.8	5.16	1.49	1.56	9.31	0.800	7.60	3.44	0.971	1.00
×3/4	15.7	4.52	1.50	1.52	8.14	0.698	6.55	3.05	0.972	1.00
×5/8	13.6	3.85	1.52	1.47	6.93	0.590	5.62	2.70	0.975	1.00
×1/2	11.3	3.15	1.53	1.42	5.66	0.479	4.64	2.31	0.980	1.00
×7/16	10.0	2.78	1.54	1.40	5.00	0.422	4.04	2.04	0.983	1.00
×3/8	8.76	2.41	1.55	1.37	4.33	0.365	3.55	1.83	0.986	1.00
×5/16	7.44	2.04	1.56	1.35	3.65	0.307	3.00	1.57	0.990	1.00
L5×3½×¾	5.52	2.20	0.974	0.993	4.07	0.585	3.23	1.90	0.744	0.464
×5/8	4.80	1.88	0.987	0.947	3.43	0.493	2.74	1.59	0.746	0.472
×1/2	4.02	1.55	1.00	0.901	2.79	0.400	2.26	1.30	0.750	0.479
×3/8	3.15	1.19	1.02	0.854	2.12	0.305	1.73	0.983	0.755	0.485
×5/16	2.69	1.01	1.02	0.829	1.77	0.256	1.47	0.826	0.758	0.489
×1/4	2.20	0.816	1.03	0.804	1.42	0.207	1.19	0.665	0.761	0.491

Note: For workable gages, refer to Table 1-7A. For width-to-thickness criteria, refer to Table 1-7B.

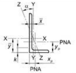


Table 1-7 (continued)
Angles
Properties

Shape	k	Wt.	Area, A	Axis X-X						Flexural-Torsional Properties		
				I	S	r	ȳ	Z	y_p	J	C_w	$\bar{r}_o$
	in.	lb/ft	in.²	in.⁴	in.³	in.	in.	in.³	in.	in.⁴	in.⁶	in.
L5×3×1/2	15/16	12.8	3.75	9.43	2.89	1.58	1.74	5.12	1.25	0.322	0.444	2.38
×7/16	7/8	11.3	3.31	8.41	2.56	1.59	1.72	4.53	1.22	0.220	0.304	2.39
×3/8	13/16	9.80	2.86	7.35	2.22	1.60	1.69	3.93	1.19	0.141	0.196	2.41
×5/16	3/4	8.20	2.41	6.24	1.87	1.61	1.67	3.32	1.14	0.0832	0.116	2.42
×1/4	11/16	6.60	1.94	5.09	1.51	1.62	1.64	2.68	1.12	0.0438	0.0606	2.43
L4×4×3/4	1 1/8	18.5	5.44	7.62	2.79	1.18	1.27	5.02	0.680	1.02	1.12	2.10
×5/8	1	15.7	4.61	6.62	2.38	1.20	1.22	4.28	0.576	0.610	0.680	2.13
×1/2	7/8	12.8	3.75	5.52	1.96	1.21	1.18	3.50	0.469	0.322	0.366	2.16
×7/16	13/16	11.3	3.30	4.93	1.73	1.22	1.15	3.10	0.413	0.220	0.252	2.18
×3/8	3/4	9.80	2.86	4.32	1.50	1.23	1.13	2.69	0.358	0.141	0.162	2.19
×5/16	11/16	8.20	2.40	3.67	1.27	1.24	1.11	2.26	0.300	0.0832	0.0963	2.21
×1/4	5/8	6.60	1.93	3.00	1.03	1.25	1.08	1.82	0.241	0.0438	0.0505	2.22
L4×3 1/2×1/2	7/8	11.9	3.50	5.30	1.92	1.23	1.24	3.46	0.500	0.301	0.302	2.03
×3/8	3/4	9.10	2.68	4.15	1.48	1.25	1.20	2.66	0.427	0.132	0.134	2.06
×5/16	11/16	7.70	2.25	3.53	1.25	1.25	1.17	2.24	0.400	0.0782	0.0798	2.08
×1/4	5/8	6.20	1.82	2.89	1.01	1.26	1.14	1.81	0.360	0.0412	0.0419	2.09
L4×3×5/8	1	13.6	3.99	6.01	2.28	1.23	1.37	4.08	0.808	0.529	0.472	1.91
×1/2	7/8	11.1	3.25	5.02	1.87	1.24	1.32	3.36	0.750	0.281	0.255	1.94
×3/8	3/4	8.50	2.49	3.94	1.44	1.26	1.27	2.60	0.680	0.123	0.114	1.97
×5/16	11/16	7.20	2.09	3.36	1.22	1.27	1.25	2.19	0.656	0.0731	0.0676	1.98
×1/4	5/8	5.80	1.69	2.75	0.988	1.27	1.22	1.77	0.620	0.0386	0.0356	1.99
L3 1/2×3 1/2×1/2	7/8	11.1	3.25	3.63	1.48	1.05	1.05	2.66	0.464	0.281	0.238	1.87
×7/16	13/16	9.80	2.89	3.25	1.32	1.06	1.03	2.36	0.413	0.192	0.164	1.89
×3/8	3/4	8.50	2.50	2.86	1.15	1.07	1.00	2.06	0.357	0.123	0.106	1.90
×5/16	11/16	7.20	2.10	2.44	0.969	1.08	0.979	1.74	0.300	0.0731	0.0634	1.92
×1/4	5/8	5.80	1.70	2.00	0.787	1.09	0.954	1.41	0.243	0.0386	0.0334	1.93
L3 1/2×3×1/2	7/8	10.2	3.02	3.45	1.45	1.07	1.12	2.61	0.480	0.260	0.191	1.75
×7/16	13/16	9.10	2.67	3.10	1.29	1.08	1.09	2.32	0.449	0.178	0.132	1.76
×3/8	3/4	7.90	2.32	2.73	1.12	1.09	1.07	2.03	0.407	0.114	0.0858	1.78
×5/16	11/16	6.60	1.95	2.33	0.951	1.09	1.05	1.72	0.380	0.0680	0.0512	1.79
×1/4	5/8	5.40	1.58	1.92	0.773	1.10	1.02	1.39	0.340	0.0360	0.0270	1.80
L3 1/2×2 1/2×1/2	7/8	9.40	2.77	3.24	1.41	1.08	1.20	2.52	0.730	0.234	0.159	1.66
×3/8	3/4	7.20	2.12	2.56	1.09	1.10	1.15	1.96	0.673	0.103	0.0714	1.69
×5/16	11/16	6.10	1.79	2.20	0.925	1.11	1.13	1.67	0.636	0.0611	0.0426	1.71
×1/4	5/8	4.90	1.45	1.81	0.753	1.12	1.10	1.36	0.600	0.0322	0.0225	1.72

Note: For workable gages, refer to Table 1-7A. For width-to-thickness criteria, refer to Table 1-7B.

Table 1-7 (continued)
Angles
Properties

L5–L3½

Shape	Axis Y-Y						Axis Z-Z			
	I	S	r	$\bar{x}$	Z	x_p	I	S	r	Tan α
	in.⁴	in.³	in.	in.	in.³	in.	in.⁴	in.³	in.	
L5×3×½	2.55	1.13	0.824	0.746	2.08	0.375	1.55	0.957	0.642	0.357
×7/16	2.29	1.00	0.831	0.722	1.82	0.331	1.37	0.840	0.644	0.361
×3/8	2.01	0.874	0.838	0.698	1.57	0.286	1.20	0.727	0.646	0.364
×5/16	1.72	0.739	0.846	0.673	1.31	0.241	1.01	0.608	0.649	0.368
×¼	1.41	0.600	0.853	0.648	1.05	0.194	0.825	0.491	0.652	0.371
L4×4×¾	7.62	2.79	1.18	1.27	5.02	0.680	3.25	1.81	0.774	1.00
×5/8	6.62	2.38	1.20	1.22	4.28	0.576	2.76	1.60	0.774	1.00
×½	5.52	1.96	1.21	1.18	3.50	0.469	2.25	1.35	0.776	1.00
×7/16	4.93	1.73	1.22	1.15	3.10	0.413	1.99	1.22	0.777	1.00
×3/8	4.32	1.50	1.23	1.13	2.69	0.358	1.73	1.08	0.779	1.00
×5/16	3.67	1.27	1.24	1.11	2.26	0.300	1.46	0.930	0.781	1.00
×¼	3.00	1.03	1.25	1.08	1.82	0.241	1.19	0.778	0.783	1.00
L4×3½×½	3.76	1.50	1.04	0.994	2.69	0.438	1.79	1.16	0.716	0.750
×3/8	2.96	1.16	1.05	0.947	2.06	0.335	1.39	0.939	0.719	0.755
×5/16	2.52	0.980	1.06	0.923	1.74	0.281	1.16	0.806	0.721	0.757
×¼	2.07	0.794	1.07	0.897	1.40	0.228	0.953	0.653	0.723	0.759
L4×3×5/8	2.85	1.34	0.845	0.867	2.45	0.499	1.59	1.13	0.631	0.534
×½	2.40	1.10	0.858	0.822	1.99	0.406	1.30	0.929	0.633	0.542
×3/8	1.89	0.851	0.873	0.775	1.52	0.311	1.00	0.699	0.636	0.551
×5/16	1.62	0.721	0.880	0.750	1.28	0.261	0.849	0.590	0.638	0.554
×¼	1.33	0.585	0.887	0.725	1.03	0.211	0.692	0.474	0.639	0.558
L3½×3½×½	3.63	1.48	1.05	1.05	2.66	0.464	1.51	1.02	0.679	1.00
×7/16	3.25	1.32	1.06	1.03	2.36	0.413	1.33	0.911	0.681	1.00
×3/8	2.86	1.15	1.07	1.00	2.06	0.357	1.17	0.830	0.683	1.00
×5/16	2.44	0.969	1.08	0.979	1.74	0.300	0.984	0.713	0.685	1.00
×¼	2.00	0.787	1.09	0.954	1.41	0.243	0.802	0.594	0.688	1.00
L3½×3×½	2.32	1.09	0.877	0.869	1.97	0.431	1.15	0.846	0.618	0.713
×7/16	2.09	0.971	0.885	0.846	1.75	0.381	1.02	0.773	0.620	0.717
×3/8	1.84	0.847	0.892	0.823	1.52	0.331	0.894	0.693	0.622	0.720
×5/16	1.58	0.718	0.900	0.798	1.28	0.279	0.758	0.602	0.624	0.722
×¼	1.30	0.585	0.908	0.773	1.04	0.226	0.622	0.486	0.628	0.725
L3½×2½×½	1.36	0.756	0.701	0.701	1.39	0.396	0.781	0.651	0.532	0.485
×3/8	1.09	0.589	0.716	0.655	1.07	0.303	0.609	0.499	0.535	0.495
×5/16	0.937	0.501	0.723	0.632	0.900	0.256	0.518	0.418	0.538	0.500
×¼	0.775	0.410	0.731	0.607	0.728	0.207	0.426	0.341	0.541	0.504

Note: For workable gages, refer to Table 1-7A. For width-to-thickness criteria, refer to Table 1-7B.

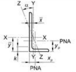


Table 1-7 (continued)
Angles
Properties

Shape	k	Wt.	Area, A	Axis X-X						Flexural-Torsional Properties		
				I	S	r	ȳ	Z	y_p	J	C_w	$\bar{r}_o$
	in.	lb/ft	in.²	in.⁴	in.³	in.	in.	in.³	in.	in.⁴	in.⁶	in.
L3×3×1/2	7/8	9.40	2.76	2.20	1.06	0.895	0.929	1.91	0.460	0.230	0.144	1.59
×7/16	13/16	8.30	2.43	1.98	0.946	0.903	0.907	1.70	0.405	0.157	0.100	1.60
×3/8	3/4	7.20	2.11	1.75	0.825	0.910	0.884	1.48	0.352	0.101	0.0652	1.62
×5/16	11/16	6.10	1.78	1.50	0.699	0.918	0.860	1.26	0.297	0.0597	0.0390	1.64
×1/4	5/8	4.90	1.44	1.23	0.569	0.926	0.836	1.02	0.240	0.0313	0.0206	1.65
×3/16	9/16	3.71	1.09	0.948	0.433	0.933	0.812	0.774	0.182	0.0136	0.00899	1.67
L3×2 1/2×1/2	7/8	8.50	2.50	2.07	1.03	0.910	0.995	1.86	0.500	0.213	0.112	1.46
×7/16	13/16	7.60	2.22	1.87	0.921	0.917	0.972	1.66	0.463	0.146	0.0777	1.48
×3/8	3/4	6.60	1.93	1.65	0.803	0.924	0.949	1.45	0.427	0.0943	0.0507	1.49
×5/16	11/16	5.60	1.63	1.41	0.681	0.932	0.925	1.23	0.392	0.0560	0.0304	1.51
×1/4	5/8	4.50	1.32	1.16	0.555	0.940	0.900	1.00	0.360	0.0296	0.0161	1.52
×3/16	9/16	3.39	1.00	0.899	0.423	0.947	0.874	0.761	0.333	0.0130	0.00705	1.54
L3×2×1/2	13/16	7.70	2.26	1.92	1.00	0.922	1.08	1.78	0.740	0.192	0.0908	1.39
×3/8	11/16	5.90	1.75	1.54	0.779	0.937	1.03	1.39	0.667	0.0855	0.0413	1.42
×5/16	5/8	5.00	1.48	1.32	0.662	0.945	1.01	1.19	0.632	0.0510	0.0248	1.43
×1/4	9/16	4.10	1.20	1.09	0.541	0.953	0.980	0.969	0.600	0.0270	0.0132	1.45
×3/16	1/2	3.07	0.917	0.847	0.414	0.961	0.952	0.743	0.555	0.0119	0.00576	1.46
L2 1/2×2 1/2×1/2	3/4	7.70	2.26	1.22	0.716	0.735	0.803	1.29	0.452	0.188	0.0791	1.30
×3/8	5/8	5.90	1.73	0.972	0.558	0.749	0.758	1.01	0.346	0.0833	0.0362	1.33
×5/16	9/16	5.00	1.46	0.837	0.474	0.756	0.735	0.853	0.292	0.0495	0.0218	1.35
×1/4	1/2	4.10	1.19	0.692	0.387	0.764	0.711	0.695	0.238	0.0261	0.0116	1.36
×3/16	7/16	3.07	0.901	0.535	0.295	0.771	0.687	0.529	0.180	0.0114	0.00510	1.38
L2 1/2×2×3/8	5/8	5.30	1.55	0.914	0.546	0.766	0.826	0.982	0.433	0.0746	0.0268	1.22
×5/16	9/16	4.50	1.32	0.790	0.465	0.774	0.803	0.839	0.388	0.0444	0.0162	1.23
×1/4	1/2	3.62	1.07	0.656	0.381	0.782	0.779	0.688	0.360	0.0235	0.00868	1.25
×3/16	7/16	2.75	0.818	0.511	0.293	0.790	0.754	0.529	0.319	0.0103	0.00382	1.26
L2 1/2×1 1/2×1/4	1/2	3.19	0.947	0.594	0.364	0.792	0.866	0.644	0.606	0.0209	0.00694	1.19
×3/16	7/16	2.44	0.724	0.464	0.280	0.801	0.839	0.497	0.569	0.00921	0.00306	1.20
L2×2×3/8	5/8	4.70	1.37	0.476	0.348	0.591	0.632	0.629	0.343	0.0658	0.0174	1.05
×5/16	9/16	3.92	1.16	0.414	0.298	0.598	0.609	0.537	0.290	0.0393	0.0106	1.06
×1/4	1/2	3.19	0.944	0.346	0.244	0.605	0.586	0.440	0.236	0.0209	0.00572	1.08
×3/16	7/16	2.44	0.722	0.271	0.188	0.612	0.561	0.338	0.181	0.00921	0.00254	1.09
×1/8	3/8	1.65	0.491	0.189	0.129	0.620	0.534	0.230	0.123	0.00293	0.000789	1.10

Note: For workable gages, refer to Table 1-7A. For width-to-thickness criteria, refer to Table 1-7B.

Table 1-7 (continued)
Angles
Properties

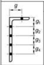
L3–L2

Shape	Axis Y-Y						Axis Z-Z			
	I	S	r	$\bar{x}$	Z	x_p	I	S	r	Tan α
	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	
L3×3×1/2	2.20	1.06	0.895	0.929	1.91	0.460	0.922	0.704	0.580	1.00
×7/16	1.98	0.946	0.903	0.907	1.70	0.405	0.817	0.638	0.580	1.00
×3/8	1.75	0.825	0.910	0.884	1.48	0.352	0.716	0.573	0.581	1.00
×5/16	1.50	0.699	0.918	0.860	1.26	0.297	0.606	0.497	0.583	1.00
×1/4	1.23	0.569	0.926	0.836	1.02	0.240	0.490	0.415	0.585	1.00
×3/16	0.948	0.433	0.933	0.812	0.774	0.182	0.373	0.324	0.586	1.00
L3×2 1/2×1/2	1.29	0.736	0.718	0.746	1.34	0.417	0.665	0.568	0.516	0.666
×7/16	1.17	0.656	0.724	0.724	1.19	0.370	0.594	0.521	0.516	0.671
×3/8	1.03	0.573	0.731	0.701	1.03	0.322	0.514	0.463	0.517	0.675
×5/16	0.888	0.487	0.739	0.677	0.873	0.272	0.435	0.403	0.518	0.679
×1/4	0.734	0.397	0.746	0.653	0.707	0.220	0.355	0.329	0.520	0.683
×3/16	0.568	0.303	0.753	0.627	0.536	0.167	0.271	0.246	0.521	0.687
L3×2×1/2	0.667	0.470	0.543	0.580	0.887	0.377	0.409	0.411	0.425	0.413
×3/8	0.539	0.368	0.555	0.535	0.679	0.292	0.319	0.313	0.426	0.426
×5/16	0.467	0.314	0.562	0.511	0.572	0.247	0.271	0.263	0.428	0.432
×1/4	0.390	0.258	0.569	0.487	0.463	0.200	0.223	0.214	0.431	0.437
×3/16	0.305	0.198	0.577	0.462	0.351	0.153	0.173	0.163	0.435	0.442
L2 1/2×2 1/2×1/2	1.22	0.716	0.735	0.803	1.29	0.452	0.526	0.461	0.481	1.00
×3/8	0.972	0.558	0.749	0.758	1.01	0.346	0.400	0.374	0.481	1.00
×5/16	0.837	0.474	0.756	0.735	0.853	0.292	0.338	0.325	0.481	1.00
×1/4	0.692	0.387	0.764	0.711	0.695	0.238	0.276	0.273	0.482	1.00
×3/16	0.535	0.295	0.771	0.687	0.529	0.180	0.209	0.215	0.482	1.00
L2 1/2×2×3/8	0.513	0.361	0.574	0.578	0.657	0.310	0.273	0.295	0.419	0.612
×5/16	0.446	0.309	0.581	0.555	0.557	0.264	0.233	0.261	0.420	0.618
×1/4	0.372	0.253	0.589	0.532	0.454	0.214	0.192	0.213	0.423	0.624
×3/16	0.292	0.195	0.597	0.508	0.347	0.164	0.148	0.162	0.426	0.628
L2 1/2×1 1/2×1/4	0.160	0.142	0.411	0.372	0.261	0.189	0.0977	0.120	0.321	0.354
×3/16	0.126	0.110	0.418	0.347	0.198	0.145	0.0754	0.0906	0.324	0.360
L2×2×3/8	0.476	0.348	0.591	0.632	0.629	0.343	0.203	0.227	0.386	1.00
×5/16	0.414	0.298	0.598	0.609	0.537	0.290	0.172	0.200	0.386	1.00
×1/4	0.346	0.244	0.605	0.586	0.440	0.236	0.142	0.171	0.387	1.00
×3/16	0.271	0.188	0.612	0.561	0.338	0.181	0.109	0.137	0.389	1.00
×1/8	0.189	0.129	0.620	0.534	0.230	0.123	0.0756	0.100	0.391	1.00

Note: For workable gages, refer to Table 1-7A. For width-to-thickness criteria, refer to Table 1-7B.

Menu

Table 1-7A
Workable Gages in Angle Legs, in.



Leg	12	10	8	7	6	5	4	3½	3	2½	2	1¾	1½	1⅜	1¼	1
g	6	5	4½	4	3½	3	2½	2	1¾	1⅜	1⅛	1	⅞	⅞	¾	⅝
g_1	3	3	3	2½	2¼	2	–	–	–	–	–	–	–	–	–	–
g_2	2½	2½	3	3	2½	2	–	–	–	–	–	–	–	–	–	–
g_3	2½	2½	–	–	–	–	–	–	–	–	–	–	–	–	–	–
g_4	2½	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Note: Other gages are permitted to suit specific requirements subject to clearances and edge distance limitations.

Menu

Table 1-7B
Width-to-Thickness Criteria for Angles

$F_y = 36$ ksi				$F_y = 50$ ksi			
	Compression	Flexure			Compression	Flexure	
t	Nonslender up to	Compact up to	Noncompact up to	t	Nonslender up to	Compact up to	Noncompact up to
	Width of angle leg, in.				Width of angle leg, in.		
1 3/8	12	12	–	1 3/8	12	12	–
1 1/4	↓	↓	–	1 1/4	↓	↓	–
1 1/8	↓	↓	–	1 1/8	↓	↓	–
1	↓	↓	–	1	10	↓	–
7/8	10	10	–	7/8	8	10	–
3/4	8	10	–	3/4	8	8	10
5/8	8	8	–	5/8	6	8	–
9/16	7	8	–	9/16	6	7	8
1/2	6	7	8	1/2	5	6	↓
7/16	5	6	↓	7/16	4	5	↓
3/8	4	5	↓	3/8	4	4	↓
5/16	4	4	6	5/16	3	4	6
1/4	3	3 1/2	5	1/4	2 1/2	3	5
3/16	2	2 1/2	3	3/16	2	2	3
1/8	1 1/2	1 1/2	2	1/8	1	1 1/2	2

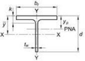


Table 1-8
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem Thickness, t_w		Stem $\frac{t_w}{2}$	Stem Area	Flange Width, b_f		Flange Thickness, t_f		Distance k_{des}	Distance k_{det}	Distance Workable Gage
	in.^{2}	in.		in.		in.	in.^{2}	in.		in.		in.	in.	in.
WT22×167.5[c]	49.2	22.0	22	1.03	1	1/2	22.6	15.9	16	1.77	1 3/4	2.56	3	5 1/2
×145[c]	42.6	21.8	21 3/4	0.865	7/8	7/16	18.9	15.8	15 7/8	1.58	1 9/16	2.36	2 13/16	
×131[c]	38.5	21.7	21 5/8	0.785	13/16	7/16	17.0	15.8	15 3/4	1.42	1 7/16	2.20	2 5/8	
×115[c,v]	33.9	21.5	21 1/2	0.710	11/16	3/8	15.2	15.8	15 3/4	1.22	1 1/4	2.01	2 7/16	
WT20×327.5[h]	96.4	21.8	21 3/4	1.97	2	1	42.9	16.9	16 7/8	3.54	3 9/16	4.72	4 13/16	7 1/2
×296.5[h]	87.2	21.5	21 1/2	1.79	1 13/16	15/16	38.5	16.7	16 3/4	3.23	3 1/4	4.41	4 1/2	
×251.5[h]	74.0	21.0	21	1.54	1 9/16	13/16	32.3	16.4	16 3/8	2.76	2 3/4	3.94	4	
×215.5[h]	63.3	20.6	20 5/8	1.34	1 5/16	11/16	27.6	16.2	16 1/4	2.36	2 3/8	3.54	3 5/8	
×198.5[h]	58.3	20.5	20 1/2	1.22	1 1/4	5/8	25.0	16.1	16 1/8	2.20	2 3/16	3.38	3 1/2	
×186[h]	54.7	20.3	20 3/8	1.16	1 3/16	5/8	23.6	16.1	16 1/8	2.05	2 1/16	3.23	3 5/16	
×181[c,h]	53.2	20.3	20 1/4	1.12	1 1/8	9/16	22.7	16.0	16	2.01	2	3.19	3 1/4	
×162[c]	47.7	20.1	20 1/8	1.00	1	1/2	20.1	15.9	15 7/8	1.81	1 13/16	2.99	3 1/16	
×148.5[c]	43.6	19.9	19 7/8	0.930	15/16	1/2	18.5	15.8	15 7/8	1.65	1 5/8	2.83	2 15/16	
×138.5[c]	40.7	19.8	19 7/8	0.830	13/16	7/16	16.5	15.8	15 7/8	1.58	1 9/16	2.76	2 7/8	
×124.5[c]	36.7	19.7	19 3/4	0.750	3/4	3/8	14.8	15.8	15 3/4	1.42	1 7/16	2.60	2 11/16	
×107.5[c,v]	31.8	19.5	19 1/2	0.650	5/8	5/16	12.7	15.8	15 3/4	1.22	1 1/4	2.40	2 1/2	
×99.5[c,v]	29.2	19.3	19 3/8	0.650	5/8	5/16	12.6	15.8	15 3/4	1.07	1 1/16	2.25	2 5/16	
WT20×196[h]	57.8	20.8	20 3/4	1.42	1 7/16	3/4	29.4	12.4	12 3/8	2.52	2 1/2	3.70	3 13/16	7 1/2
×165.5[h]	48.8	20.4	20 3/8	1.22	1 1/4	5/8	24.9	12.2	12 1/8	2.13	2 1/8	3.31	3 3/8	
×163.5[h]	47.9	20.4	20 3/8	1.18	1 3/16	5/8	24.1	12.1	12 1/8	2.13	2 1/8	3.31	3 3/8	
×147[c]	43.1	20.2	20 1/4	1.06	1 1/16	9/16	21.4	12.0	12	1.93	1 15/16	3.11	3 3/16	
×139[c]	41.0	20.1	20 1/8	1.03	1	1/2	20.6	12.0	12	1.81	1 13/16	2.99	3 1/16	
×132[c]	38.7	20.0	20	0.960	15/16	1/2	19.2	11.9	11 7/8	1.73	1 3/4	2.91	3	
×117.5[c]	34.6	19.8	19 7/8	0.830	13/16	7/16	16.5	11.9	11 7/8	1.58	1 9/16	2.76	2 7/8	
×105.5[c]	31.1	19.7	19 5/8	0.750	3/4	3/8	14.8	11.8	11 3/4	1.42	1 7/16	2.60	2 11/16	
×91.5[c,v]	26.7	19.5	19 1/2	0.650	5/8	5/16	12.7	11.8	11 3/4	1.20	1 3/16	2.38	2 1/2	
×83.5[c,v]	24.5	19.3	19 1/4	0.650	5/8	5/16	12.5	11.8	11 3/4	1.03	1	2.21	2 5/16	
×74.5[c,v]	21.9	19.1	19 1/8	0.630	5/8	5/16	12.0	11.8	11 3/4	0.830	13/16	2.01	2 1/8	

[c] Shape is slender for compression with $F_y = 50$ ksi.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 50$ ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT22–WT20

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
167.5	4.50	21.4	2170	131	6.63	5.53	234	1.54	600	75.2	3.49	118	37.2	438
145	5.02	25.2	1830	111	6.54	5.26	196	1.35	521	65.9	3.49	102	25.4	275
131	5.57	27.6	1640	99.4	6.53	5.19	176	1.22	462	58.6	3.47	90.9	18.6	200
115	6.45	30.3	1440	88.6	6.53	5.17	157	1.07	398	50.5	3.43	78.3	12.4	139
327.5	2.39	11.1	3730	234	6.22	5.85	426	2.85	1440	170	3.86	271	293	3190
296.5	2.58	12.0	3310	209	6.16	5.66	379	2.61	1260	151	3.80	240	221	2340
251.5	2.98	13.6	2730	174	6.07	5.38	314	2.25	1020	124	3.72	197	138	1400
215.5	3.44	15.4	2290	148	6.01	5.18	266	1.95	843	104	3.65	164	88.2	881
198.5	3.66	16.8	2070	134	5.96	5.03	240	1.81	771	95.7	3.63	150	70.6	677
186	3.93	17.5	1930	126	5.95	4.98	225	1.70	709	88.3	3.60	138	57.7	558
181	3.99	18.1	1870	122	5.92	4.91	217	1.66	691	86.3	3.60	135	54.2	511
162	4.40	20.1	1650	108	5.88	4.77	192	1.50	609	76.6	3.57	119	39.6	362
148.5	4.80	21.4	1500	98.9	5.87	4.71	176	1.38	546	69.0	3.54	107	30.5	279
138.5	5.03	23.9	1360	88.6	5.78	4.50	157	1.29	522	65.9	3.58	102	25.7	218
124.5	5.55	26.3	1210	79.4	5.75	4.41	140	1.16	463	58.8	3.55	90.8	19.0	158
107.5	6.45	30.0	1030	68.0	5.71	4.28	120	1.01	398	50.5	3.54	77.8	12.4	101
99.5	7.39	29.7	988	66.5	5.81	4.47	117	0.929	347	44.1	3.45	68.2	9.12	83.5
196	2.45	14.6	2270	153	6.27	5.94	275	2.33	401	64.9	2.64	106	85.4	796
165.5	2.86	16.7	1880	128	6.21	5.74	231	2.00	322	52.9	2.57	85.7	52.5	484
163.5	2.85	17.3	1840	125	6.19	5.66	224	1.98	320	52.7	2.58	85.0	51.4	449
147	3.11	19.1	1630	111	6.14	5.51	199	1.80	281	46.7	2.55	75.0	38.2	322
139	3.31	19.5	1550	106	6.14	5.51	191	1.71	261	43.5	2.52	69.9	32.4	282
132	3.45	20.8	1450	99.2	6.11	5.41	178	1.63	246	41.3	2.52	66.0	27.9	233
117.5	3.77	23.9	1260	85.7	6.04	5.17	153	1.45	222	37.3	2.54	59.0	20.6	156
105.5	4.17	26.3	1120	76.7	6.01	5.08	137	1.31	195	33.0	2.51	52.1	15.2	113
91.5	4.92	30.0	955	65.7	5.98	4.97	117	1.13	165	28.0	2.49	44.0	9.65	71.2
83.5	5.76	29.7	899	63.7	6.05	5.19	115	1.10	141	23.9	2.40	37.8	6.99	62.9
74.5	7.11	30.3	815	59.7	6.10	5.45	108	1.72	114	19.4	2.29	30.9	4.66	51.9

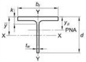


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem				Flange				Distance		
				Thickness, t_w		$\frac{t_w}{2}$	Area	Width, b_f		Thickness, t_f		k		Workable Gage
												k_{des}	k_{det}	
	in.^{2}	in.		in.		in.	in.^{2}	in.		in.		in.	in.	in.
WT18×462.5[h]	136	21.6	21 5/8	3.02	3	1 1/2	65.2	18.6	18 5/8	4.53	4 1/2	5.28	5 3/8	7 1/2
×426.5[h]	126	21.6	21 5/8	2.52	2 1/2	1 1/4	54.4	18.2	18 1/4	4.53	4 1/2	5.28	5 3/8	
×401[h]	118	21.3	21 1/4	2.38	2 3/8	1 3/16	50.7	18.0	18	4.29	4 5/16	5.04	5 1/8	
×361.5[h]	107	20.9	20 7/8	2.17	2 3/16	1 1/8	45.4	17.8	17 3/4	3.90	3 7/8	4.65	4 11/16	
×326[h]	96.2	20.5	20 1/2	1.97	2	1	40.4	17.6	17 5/8	3.54	3 9/16	4.49	4 13/16	
×264.5[h]	77.8	19.9	19 7/8	1.61	1 5/8	13/16	32.0	17.2	17 1/4	2.91	2 15/16	3.86	4 3/16	
×243.5[h]	71.7	19.7	19 5/8	1.50	1 1/2	3/4	29.5	17.1	17 1/8	2.68	2 11/16	3.63	4	
×220.5[h]	64.9	19.4	19 3/8	1.36	1 3/8	11/16	26.4	17.0	17	2.44	2 7/16	3.39	3 3/4	
×197.5[h]	58.1	19.2	19 1/4	1.22	1 1/4	5/8	23.4	16.8	16 7/8	2.20	2 3/16	3.15	3 7/16	
×180.5[h]	53.0	19.0	19	1.12	1 1/8	9/16	21.3	16.7	16 3/4	2.01	2	2.96	3 5/16	
×165[c]	48.4	18.8	18 7/8	1.02	1	1/2	19.2	16.6	16 5/8	1.85	1 7/8	2.80	3 1/8	
×151[c]	44.5	18.7	18 5/8	0.945	15/16	1/2	17.6	16.7	16 5/8	1.68	1 11/16	2.63	3	
×141[c]	41.5	18.6	18 1/2	0.885	7/8	7/16	16.4	16.6	16 5/8	1.57	1 9/16	2.52	2 7/8	
×131[c]	38.5	18.4	18 3/8	0.840	13/16	7/16	15.5	16.6	16 1/2	1.44	1 7/16	2.39	2 3/4	
×123.5[c]	36.3	18.3	18 3/8	0.800	13/16	7/16	14.7	16.5	16 1/2	1.35	1 3/8	2.30	2 5/8	
×115.5[c]	34.1	18.2	18 1/4	0.760	3/4	3/8	13.9	16.5	16 1/2	1.26	1 1/4	2.21	2 9/16	
WT18×128[c]	37.6	18.7	18 3/4	0.960	15/16	1/2	18.0	12.2	12 1/4	1.73	1 3/4	2.48	2 15/16	5 1/2
×116[c]	34.0	18.6	18 1/2	0.870	7/8	7/16	16.1	12.1	12 1/8	1.57	1 9/16	2.32	2 13/16	
×105[c]	30.9	18.3	18 3/8	0.830	13/16	7/16	15.2	12.2	12 1/8	1.36	1 3/8	2.11	2 5/8	
×97[c]	28.5	18.2	18 1/4	0.765	3/4	3/8	14.0	12.1	12 1/8	1.26	1 1/4	2.01	2 1/2	
×91[c]	26.8	18.2	18 1/8	0.725	3/4	3/8	13.2	12.1	12 1/8	1.18	1 3/16	1.93	2 3/8	
×85[c]	25.0	18.1	18 1/8	0.680	11/16	3/8	12.3	12.0	12	1.10	1 1/8	1.85	2 3/8	
×80[c]	23.5	18.0	18	0.650	5/8	5/16	11.7	12.0	12	1.02	1	1.77	2 1/4	
×75[c]	22.1	17.9	17 7/8	0.625	5/8	5/16	11.2	12.0	12	0.940	15/16	1.69	2 3/16	
×67.5[c,v]	19.9	17.8	17 3/4	0.600	5/8	5/16	10.7	12.0	12	0.790	13/16	1.54	2 1/16	
WT16.5×193.5[h]	57.0	18.0	18	1.26	1 1/4	5/8	22.6	16.2	16 1/4	2.28	2 1/4	3.07	3 9/16	5 1/2
×177[h]	52.1	17.8	17 3/4	1.16	1 3/16	5/8	20.6	16.1	16 1/8	2.09	2 1/16	2.88	3 3/8	
×159	46.8	17.6	17 5/8	1.04	1 1/16	9/16	18.3	16.0	16	1.89	1 7/8	2.68	3 3/16	
×145.5[c]	42.8	17.4	17 3/8	0.960	15/16	1/2	16.7	15.9	15 7/8	1.73	1 3/4	2.52	2 15/16	
×131.5[c]	38.7	17.3	17 1/4	0.870	7/8	7/16	15.0	15.8	15 3/4	1.57	1 9/16	2.36	2 13/16	
×120.5[c]	35.6	17.1	17 1/8	0.830	13/16	7/16	14.2	15.9	15 7/8	1.40	1 3/8	2.19	2 11/16	
×110.5[c]	32.6	17.0	17	0.775	3/4	3/8	13.1	15.8	15 3/4	1.28	1 1/4	2.06	2 1/2	
×100.5[c]	29.7	16.8	16 7/8	0.715	11/16	3/8	12.0	15.7	15 3/4	1.15	1 1/8	1.94	2 7/16	

[c] Shape is slender for compression with $F_y = 50$ ksi.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 50$ ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT18–WT16.5

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
462.5	2.05	7.15	5130	337	6.14	6.36	617	3.66	2470	266	4.26	431	707	9680
426.5	2.01	8.57	4480	286	5.96	5.95	533	3.46	2300	253	4.27	403	615	7100
401	2.10	8.95	4110	265	5.90	5.80	491	3.28	2100	233	4.22	372	519	5830
361.5	2.28	9.63	3610	235	5.81	5.55	434	3.01	1850	208	4.16	329	390	4250
326	2.48	10.4	3160	208	5.74	5.35	383	2.73	1610	184	4.10	290	295	3070
264.5	2.96	12.4	2440	164	5.60	4.96	298	2.26	1240	145	4.00	227	163	1600
243.5	3.19	13.1	2220	150	5.57	4.84	272	2.10	1120	131	3.96	206	128	1250
220.5	3.48	14.3	1980	134	5.52	4.69	242	1.91	997	117	3.92	184	96.6	914
197.5	3.83	15.7	1740	119	5.47	4.53	213	1.73	877	104	3.88	162	70.7	652
180.5	4.16	17.0	1570	107	5.43	4.42	192	1.59	786	94.0	3.85	146	54.1	491
165	4.49	18.4	1410	97.0	5.39	4.30	173	1.46	711	85.5	3.83	132	42.0	372
151	4.96	19.8	1280	88.8	5.37	4.22	158	1.33	648	77.8	3.82	120	32.1	285
141	5.29	21.0	1190	82.6	5.36	4.16	146	1.25	599	72.2	3.80	112	26.3	231
131	5.75	21.9	1110	77.5	5.36	4.14	137	1.16	545	65.8	3.76	102	20.8	185
123.5	6.11	22.9	1040	73.3	5.36	4.12	129	1.10	507	61.4	3.74	94.8	17.3	155
115.5	6.54	23.9	978	69.1	5.36	4.10	122	1.03	470	57.0	3.71	88.0	14.3	129
128	3.53	19.5	1210	87.4	5.66	4.92	156	1.54	264	43.2	2.65	68.5	26.4	205
116	3.86	21.4	1080	78.5	5.63	4.82	140	1.40	234	38.6	2.62	60.9	19.7	151
105	4.48	22.0	985	73.1	5.65	4.87	131	1.27	206	33.8	2.58	53.4	13.9	119
97	4.81	23.8	901	67.0	5.62	4.80	120	1.18	187	30.9	2.56	48.8	11.1	92.7
91	5.12	25.1	845	63.1	5.62	4.77	113	1.11	174	28.8	2.55	45.3	9.20	77.6
85	5.47	26.6	786	58.9	5.61	4.73	105	1.04	160	26.6	2.53	41.8	7.51	63.2
80	5.88	27.7	740	55.8	5.61	4.74	100	0.980	147	24.6	2.50	38.6	6.17	53.6
75	6.37	28.6	698	53.1	5.62	4.78	95.5	0.923	135	22.5	2.47	35.4	5.04	46.0
67.5	7.56	29.7	637	49.7	5.66	4.96	90.1	1.23	113	18.9	2.38	29.8	3.48	37.3
193.5	3.55	14.3	1460	107	5.07	4.27	193	1.76	810	100	3.77	156	73.9	615
177	3.85	15.3	1320	96.8	5.03	4.15	174	1.62	729	90.6	3.74	141	57.1	468
159	4.23	16.9	1160	85.8	4.99	4.02	154	1.46	645	80.7	3.71	125	42.1	335
145.5	4.60	18.1	1060	78.3	4.96	3.93	140	1.35	581	73.1	3.68	113	32.5	256
131.5	5.03	19.9	943	70.2	4.93	3.83	125	1.23	517	65.5	3.65	101	24.3	188
120.5	5.66	20.6	872	65.8	4.96	3.84	116	1.12	466	58.8	3.62	90.8	18.0	146
110.5	6.20	21.9	799	60.8	4.95	3.81	107	1.03	420	53.2	3.59	82.1	13.9	113
100.5	6.85	23.5	725	55.5	4.95	3.77	97.8	0.940	375	47.6	3.56	73.3	10.4	84.9

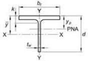


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem Thickness, t_w		$\frac{t_w}{2}$	Stem Area	Flange Width, b_f		Flange Thickness, t_f		k_{des}	k_{det}	Workable Gage
	in.²	in.		in.		in.	in.²	in.		in.		in.	in.	in.
WT16.5×84.5[c]	24.7	16.9	16 7/8	0.670	11/16	3/8	11.3	11.5	11 1/2	1.22	1 1/4	1.92	2 7/16	5 1/2
×76[c]	22.5	16.7	16 3/4	0.635	5/8	5/16	10.6	11.6	11 5/8	1.06	1 1/16	1.76	2 5/16	
×70.5[c]	20.7	16.7	16 5/8	0.605	5/8	5/16	10.1	11.5	11 1/2	0.960	15/16	1.66	2 3/16	
×65[c]	19.1	16.5	16 1/2	0.580	9/16	5/16	9.60	11.5	11 1/2	0.855	7/8	1.56	2 1/8	
×59[c,v]	17.4	16.4	16 3/8	0.550	9/16	5/16	9.04	11.5	11 1/2	0.740	3/4	1.44	2	
WT15×195.5[h]	57.6	16.6	16 5/8	1.36	1 3/8	11/16	22.6	15.6	15 5/8	2.44	2 7/16	3.23	3 3/4	5 1/2
×178.5[h]	52.5	16.4	16 3/8	1.24	1 1/4	5/8	20.3	15.5	15 1/2	2.24	2 1/4	3.03	3 1/2	
×163[h]	48.0	16.2	16 1/4	1.14	1 1/8	9/16	18.5	15.4	15 3/8	2.05	2 1/16	2.84	3 5/16	
×146	43.0	16.0	16	1.02	1	1/2	16.3	15.3	15 1/4	1.85	1 7/8	2.64	3 1/8	
×130.5	38.5	15.8	15 3/4	0.930	15/16	1/2	14.7	15.2	15 1/8	1.65	1 5/8	2.44	2 15/16	
×117.5[c]	34.7	15.7	15 5/8	0.830	13/16	7/16	13.0	15.1	15	1.50	1 1/2	2.29	2 3/4	
×105.5[c]	31.1	15.5	15 1/2	0.775	3/4	3/8	12.0	15.1	15 1/8	1.32	1 5/16	2.10	2 9/16	
×95.5[c]	28.0	15.3	15 3/8	0.710	11/16	3/8	10.9	15.0	15	1.19	1 3/16	1.97	2 1/2	
×86.5[c]	25.4	15.2	15 1/4	0.655	5/8	5/16	10.0	15.0	15	1.07	1 1/16	1.85	2 5/16	
WT15×74[c]	21.8	15.3	15 3/8	0.650	5/8	5/16	10.0	10.5	10 1/2	1.18	1 3/16	1.83	2 1/2	5 1/2
×66[c]	19.5	15.2	15 1/8	0.615	5/8	5/16	9.32	10.5	10 1/2	1.00	1	1.65	2 1/4	
×62[c]	18.2	15.1	15 1/8	0.585	9/16	5/16	8.82	10.5	10 1/2	0.930	15/16	1.58	2 1/4	
×58[c]	17.1	15.0	15	0.565	9/16	5/16	8.48	10.5	10 1/2	0.850	7/8	1.50	2 1/8	
×54[c]	15.9	14.9	14 7/8	0.545	9/16	5/16	8.13	10.5	10 1/2	0.760	3/4	1.41	2	
×49.5[c]	14.5	14.8	14 7/8	0.520	1/2	1/4	7.71	10.5	10 1/2	0.670	11/16	1.32	2	
×45[c,v]	13.2	14.8	14 3/4	0.470	1/2	1/4	6.94	10.4	10 3/8	0.610	5/8	1.26	1 7/8	
WT13.5×269.5[h]	79.3	16.3	16 1/4	1.97	2	1	32.0	15.3	15 1/4	3.54	3 9/16	4.33	4 7/16	5 1/2[g]
×184[h]	54.2	15.2	15 1/4	1.38	1 3/8	11/16	21.0	14.7	14 5/8	2.48	2 1/2	3.27	3 11/16	5 1/2
×168[h]	49.5	15.0	15	1.26	1 1/4	5/8	18.9	14.6	14 1/2	2.28	2 1/4	3.07	3 1/2	
×153.5[h]	45.2	14.8	14 3/4	1.16	1 3/16	5/8	17.2	14.4	14 1/2	2.09	2 1/16	2.88	3 5/16	
×140.5	41.5	14.6	14 5/8	1.06	1 1/16	9/16	15.5	14.4	14 3/8	1.93	1 15/16	2.72	3 1/8	
×129	38.1	14.5	14 1/2	0.980	1	1/2	14.2	14.3	14 1/4	1.77	1 3/4	2.56	3	
×117.5	34.7	14.3	14 3/8	0.910	15/16	1/2	13.0	14.2	14 1/4	1.61	1 5/8	2.40	2 7/8	
×108.5	32.0	14.2	14 1/4	0.830	13/16	7/16	11.8	14.1	14 1/8	1.50	1 1/2	2.29	2 11/16	
×97[c]	28.6	14.1	14	0.750	3/4	3/8	10.5	14.0	14	1.34	1 5/16	2.13	2 9/16	
×89[c]	26.3	13.9	13 7/8	0.725	3/4	3/8	10.1	14.1	14 1/8	1.19	1 3/16	1.98	2 3/8	
×80.5[c]	23.8	13.8	13 3/4	0.660	11/16	3/8	9.10	14.0	14	1.08	1 1/16	1.87	2 5/16	
×73[c]	21.6	13.7	13 3/4	0.605	5/8	5/16	8.28	14.0	14	0.975	1	1.76	2 3/16	

[c] Shape is slender for compression with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 50$ ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT16.5–WT13.5

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
84.5	4.71	25.2	649	51.1	5.12	4.21	90.8	1.08	155	27.0	2.50	42.1	8.81	55.4
76	5.48	26.3	592	47.4	5.14	4.26	84.5	0.967	136	23.6	2.47	36.9	6.16	43.0
70.5	6.01	27.6	552	44.7	5.15	4.29	79.8	0.901	123	21.3	2.43	33.4	4.84	35.4
65	6.73	28.4	513	42.1	5.18	4.36	75.6	0.832	109	18.9	2.38	29.7	3.67	29.3
59	7.76	29.8	469	39.2	5.20	4.47	70.8	0.862	93.5	16.3	2.32	25.6	2.64	23.4
195.5	3.19	12.2	1220	96.9	4.61	4.00	177	1.85	774	99.2	3.67	155	86.3	636
178.5	3.45	13.2	1090	87.2	4.56	3.87	159	1.70	693	89.6	3.64	140	66.6	478
163	3.75	14.2	981	78.8	4.52	3.76	143	1.56	622	81.0	3.60	126	51.2	361
146	4.12	15.7	861	69.6	4.48	3.62	125	1.41	549	71.9	3.58	111	37.5	257
130.5	4.59	17.0	765	62.4	4.46	3.54	112	1.27	480	63.3	3.53	97.9	26.9	184
117.5	5.02	18.9	674	55.1	4.41	3.41	98.2	1.15	427	56.8	3.51	87.5	20.1	133
105.5	5.74	20.0	610	50.5	4.43	3.39	89.5	1.03	378	50.1	3.49	77.2	14.1	96.[illegible]
95.5	6.35	21.5	549	45.7	4.42	3.34	80.8	0.935	336	44.7	3.46	68.9	10.5	71.[illegible]
86.5	7.04	23.2	497	41.7	4.42	3.31	73.5	0.851	299	39.9	3.42	61.4	7.78	53.[illegible]
74	4.44	23.5	466	40.6	4.63	3.84	72.2	1.04	114	21.7	2.28	33.9	7.24	37.6
66	5.27	24.7	421	37.4	4.66	3.90	66.8	0.921	98.0	18.6	2.25	29.2	4.85	28.5
62	5.65	25.8	396	35.3	4.66	3.90	63.1	0.867	90.4	17.2	2.23	27.0	3.98	23.9
58	6.17	26.5	373	33.7	4.67	3.94	60.4	0.815	82.1	15.6	2.19	24.6	3.21	20.5
54	6.89	27.3	349	32.0	4.69	4.01	57.7	0.757	73.0	13.9	2.15	21.9	2.49	17.3
49.5	7.80	28.5	322	30.0	4.71	4.09	54.4	0.912	63.9	12.2	2.10	19.3	1.88	14.3
45	8.52	31.5	290	27.1	4.69	4.04	49.0	0.835	57.3	11.0	2.09	17.3	1.41	10.5
269.5	2.15	8.30	1530	128	4.39	4.34	242	2.60	1060	138	3.65	218	247	1740
184	2.96	11.0	939	81.7	4.16	3.71	151	1.85	655	89.3	3.48	140	84.5	532
168	3.19	11.9	839	73.4	4.12	3.58	135	1.70	587	80.8	3.45	126	65.4	401
153.5	3.46	12.8	753	66.4	4.08	3.47	121	1.56	527	72.9	3.41	113	50.5	304
140.5	3.72	13.8	677	59.9	4.04	3.35	109	1.44	477	66.4	3.39	103	39.6	232
129	4.03	14.8	613	54.7	4.02	3.27	98.9	1.33	430	60.2	3.36	93.3	30.7	178
117.5	4.41	15.7	556	50.0	4.00	3.20	89.9	1.22	384	54.2	3.33	83.8	23.4	135
108.5	4.71	17.1	502	45.2	3.96	3.10	81.1	1.13	352	49.9	3.32	77.0	18.8	105
97	5.24	18.8	444	40.3	3.94	3.02	71.8	1.02	309	44.1	3.29	67.8	13.5	74.3
89	5.92	19.2	414	38.2	3.97	3.04	67.7	0.932	278	39.4	3.25	60.8	10.0	57.7
80.5	6.49	20.9	372	34.4	3.95	2.98	60.8	0.849	248	35.4	3.23	54.5	7.53	42.7
73	7.16	22.6	336	31.2	3.95	2.94	55.0	0.772	222	31.7	3.20	48.8	5.62	31.7

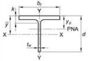


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem: Thickness, t_w		Stem: $\frac{t_w}{2}$	Stem: Area	Flange: Width, b_f		Flange: Thickness, t_f		Distance: k, k_{des}	Distance: k, k_{det}	Distance: Workable Gage
	in.^{2}	in.		in.		in.	in.^{2}	in.		in.		in.	in.	in.
WT13.5×64.5[c]	18.9	13.8	13 7/8	0.610	5/8	5/16	8.43	10.0	10	1.10	1 1/8	1.70	2 5/16	5 1/2
×57[c]	16.8	13.6	13 5/8	0.570	9/16	5/16	7.78	10.1	10 1/8	0.930	15/16	1.53	2 1/8	
×51[c]	15.0	13.5	13 1/2	0.515	1/2	1/4	6.98	10.0	10	0.830	13/16	1.43	2 1/16	
×47[c]	13.8	13.5	13 1/2	0.490	1/2	1/4	6.60	10.0	10	0.745	3/4	1.34	1 15/16	
×42[c]	12.4	13.4	13 3/8	0.460	7/16	1/4	6.14	10.0	10	0.640	5/8	1.24	1 7/8	
WT12×185[h]	54.5	14.0	14	1.52	1 1/2	3/4	21.3	13.7	13 5/8	2.72	2 3/4	3.22	4	5 1/2
×167.5[h]	49.1	13.8	13 3/4	1.38	1 3/8	11/16	19.0	13.5	13 1/2	2.48	2 1/2	2.98	3 3/4	
×153[h]	44.9	13.6	13 5/8	1.26	1 1/4	5/8	17.1	13.4	13 3/8	2.28	2 1/4	2.78	3 9/16	
×139.5[h]	41.0	13.4	13 3/8	1.16	1 3/16	5/8	15.5	13.3	13 1/4	2.09	2 1/16	2.59	3 3/8	
×125	36.8	13.2	13 1/8	1.04	1 1/16	9/16	13.7	13.2	13 1/8	1.89	1 7/8	2.39	3 1/8	
×114.5	33.6	13.0	13	0.960	15/16	1/2	12.5	13.1	13 1/8	1.73	1 3/4	2.23	3	
×103.5	30.3	12.9	12 7/8	0.870	7/8	7/16	11.2	13.0	13	1.57	1 9/16	2.07	2 7/8	
×96	28.2	12.7	12 3/4	0.810	13/16	7/16	10.3	13.0	13	1.46	1 7/16	1.96	2 3/4	
×88	25.8	12.6	12 5/8	0.750	3/4	3/8	9.47	12.9	12 7/8	1.34	1 5/16	1.84	2 5/8	
×81	23.9	12.5	12 1/2	0.705	11/16	3/8	8.81	13.0	13	1.22	1 1/4	1.72	2 1/2	
×73[c]	21.5	12.4	12 3/8	0.650	5/8	5/16	8.04	12.9	12 7/8	1.09	1 1/16	1.59	2 3/8	
×65.5[c]	19.3	12.2	12 1/4	0.605	5/8	5/16	7.41	12.9	12 7/8	0.960	15/16	1.46	2 1/4	
×58.5[c]	17.2	12.1	12 1/8	0.550	9/16	5/16	6.67	12.8	12 3/4	0.850	7/8	1.35	2 1/8	
×52[c]	15.3	12.0	12	0.500	1/2	1/4	6.02	12.8	12 3/4	0.750	3/4	1.25	2 1/16	
WT12×51.5[c]	15.1	12.3	12 1/4	0.550	9/16	5/16	6.75	9.00	9	0.980	1	1.48	2 1/4	5 1/2
×47[c]	13.8	12.2	12 1/8	0.515	1/2	1/4	6.26	9.07	9 1/8	0.875	7/8	1.38	2 1/8	
×42[c]	12.4	12.1	12	0.470	1/2	1/4	5.66	9.02	9	0.770	3/4	1.27	2 1/16	
×38[c]	11.2	12.0	12	0.440	7/16	1/4	5.26	8.99	9	0.680	11/16	1.18	1 15/16	5 1/2[g]
×34[c]	10.0	11.9	11 7/8	0.415	7/16	1/4	4.92	8.97	9	0.585	9/16	1.09	1 7/8	5 1/2[g]
WT12×31[c]	9.11	11.9	11 7/8	0.430	7/16	1/4	5.10	7.04	7	0.590	9/16	1.09	1 1/2	3 1/2
×27.5[c,v]	8.10	11.8	11 3/4	0.395	3/8	3/16	4.66	7.01	7	0.505	1/2	1.01	1 7/16	3 1/2

[c] Shape is slender for compression with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 50$ ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT13.5–WT12

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
64.5	4.55	22.6	323	31.0	4.13	3.39	55.1	0.945	92.2	18.4	2.21	28.8	5.55	24.0
57	5.41	23.9	289	28.3	4.15	3.42	50.4	0.832	79.3	15.8	2.18	24.6	3.65	17.5
51	6.03	26.2	258	25.3	4.14	3.37	45.0	0.750	69.6	13.9	2.15	21.7	2.63	12.6
47	6.70	27.6	239	23.8	4.16	3.41	42.4	0.692	62.0	12.4	2.12	19.4	2.01	10.2
42	7.78	29.1	216	21.9	4.18	3.48	39.2	0.621	52.8	10.6	2.07	16.6	1.40	7.79
185	2.51	9.20	779	74.7	3.78	3.57	140	1.99	581	85.1	3.27	133	100	553
167.5	2.73	10.0	686	66.3	3.73	3.42	123	1.82	513	75.9	3.23	119	75.6	405
153	2.94	10.8	611	59.4	3.69	3.29	110	1.67	460	68.6	3.20	107	58.4	305
139.5	3.18	11.6	546	53.6	3.65	3.18	98.8	1.54	412	61.9	3.17	96.3	45.1	230
125	3.49	12.7	478	47.2	3.61	3.05	86.5	1.39	362	54.9	3.14	85.2	33.2	165
114.5	3.79	13.5	431	42.9	3.58	2.96	78.1	1.28	326	49.7	3.11	77.0	25.5	125
103.5	4.14	14.8	382	38.3	3.55	2.87	69.3	1.17	289	44.4	3.08	68.6	19.1	91.[illegible]
96	4.43	15.7	350	35.2	3.53	2.80	63.5	1.09	265	40.9	3.07	63.1	15.3	72.[illegible]
88	4.81	16.8	319	32.2	3.51	2.74	57.8	1.00	240	37.2	3.04	57.3	11.9	55.[illegible]
81	5.31	17.7	293	29.9	3.50	2.70	53.3	0.921	221	34.2	3.05	52.6	9.22	43.8
73	5.92	19.1	264	27.2	3.50	2.66	48.2	0.833	195	30.3	3.01	46.6	6.70	31.9
65.5	6.70	20.2	238	24.8	3.52	2.65	43.9	0.750	170	26.5	2.97	40.7	4.74	23.1
58.5	7.53	22.0	212	22.3	3.51	2.62	39.2	0.672	149	23.2	2.94	35.7	3.35	16.4
52	8.50	24.0	189	20.0	3.51	2.59	35.1	0.600	130	20.3	2.91	31.2	2.35	11.6
51.5	4.59	22.4	204	22.0	3.67	3.01	39.2	0.841	59.7	13.3	1.99	20.7	3.53	12.3
47	5.18	23.7	186	20.3	3.67	2.99	36.1	0.764	54.5	12.0	1.98	18.7	2.62	9.57
42	5.86	25.7	166	18.3	3.67	2.97	32.5	0.685	47.2	10.5	1.95	16.3	1.84	6.90
38	6.61	27.3	151	16.9	3.68	3.00	30.1	0.622	41.3	9.18	1.92	14.3	1.34	5.30
34	7.66	28.7	137	15.6	3.70	3.06	27.9	0.560	35.2	7.85	1.87	12.3	0.932	4.08
31	5.97	27.7	131	15.6	3.79	3.46	28.4	1.28	17.2	4.90	1.38	7.85	0.850	3.92
27.5	6.94	29.9	117	14.1	3.80	3.50	25.6	1.53	14.5	4.15	1.34	6.65	0.588	2.93

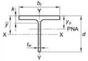


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem: Thickness, t_w		Stem: $\frac{t_w}{2}$	Stem: Area	Flange: Width, b_f		Flange: Thickness, t_f		Distance: k k_{des}	Distance: k k_{det}	Distance: Workable Gage
	in.²	in.		in.		in.	in.²	in.		in.		in.	in.	in.
WT10.5×137.5[h]	40.9	12.1	12 1/8	1.22	1 1/4	5/8	14.8	12.9	12 7/8	2.19	2 3/16	3.37	3 7/16	5 1/2
×124	37.0	11.9	11 7/8	1.10	1 1/8	9/16	13.1	12.8	12 3/4	1.99	2	3.17	3 1/4	
×111.5	33.2	11.7	11 3/4	1.00	1	1/2	11.7	12.7	12 3/4	1.79	1 13/16	2.97	3 1/16	
×100.5	29.6	11.5	11 1/2	0.910	15/16	1/2	10.5	12.6	12 5/8	1.63	1 5/8	2.13	2 7/8	
×91	26.8	11.4	11 3/8	0.830	13/16	7/16	9.43	12.5	12 1/2	1.48	1 1/2	1.98	2 3/4	
×83	24.4	11.2	11 1/4	0.750	3/4	3/8	8.43	12.4	12 3/8	1.36	1 3/8	1.86	2 5/8	
×73.5	21.6	11.0	11	0.720	3/4	3/8	7.94	12.5	12 1/2	1.15	1 1/8	1.65	2 7/16	
×66	19.4	10.9	10 7/8	0.650	5/8	5/16	7.09	12.4	12 1/2	1.04	1 1/16	1.54	2 1/4	
×61	17.9	10.8	10 7/8	0.600	5/8	5/16	6.50	12.4	12 3/8	0.960	15/16	1.46	2 1/4	
×55.5[c]	16.3	10.8	10 3/4	0.550	9/16	5/16	5.92	12.3	12 3/8	0.875	7/8	1.38	2 1/8	
×50.5[c]	14.9	10.7	10 5/8	0.500	1/2	1/4	5.34	12.3	12 1/4	0.800	13/16	1.30	2 1/16	
WT10.5×46.5[c]	13.7	10.8	10 3/4	0.580	9/16	5/16	6.27	8.42	8 3/8	0.930	15/16	1.43	1 5/8	5 1/2
×41.5[c]	12.2	10.7	10 3/4	0.515	1/2	1/4	5.52	8.36	8 3/8	0.835	13/16	1.34	1 1/2	
×36.5[c]	10.7	10.6	10 5/8	0.455	7/16	1/4	4.83	8.30	8 1/4	0.740	3/4	1.24	1 7/16	
×34[c]	10.0	10.6	10 5/8	0.430	7/16	1/4	4.54	8.27	8 1/4	0.685	11/16	1.19	1 3/8	
×31[c]	9.13	10.5	10 1/2	0.400	3/8	3/16	4.20	8.24	8 1/4	0.615	5/8	1.12	1 5/16	
×27.5[c]	8.10	10.4	10 3/8	0.375	3/8	3/16	3.90	8.22	8 1/4	0.522	1/2	1.02	1 3/16	
×24[c,f,v]	7.07	10.3	10 1/4	0.350	3/8	3/16	3.61	8.14	8 1/8	0.430	7/16	0.930	1 1/8	
WT10.5×28.5[c]	8.37	10.5	10 1/2	0.405	3/8	3/16	4.26	6.56	6 1/2	0.650	5/8	1.15	1 5/16	3 1/2
×25[c]	7.36	10.4	10 3/8	0.380	3/8	3/16	3.96	6.53	6 1/2	0.535	9/16	1.04	1 1/4	3 1/2[g]
×22[c,v]	6.49	10.3	10 3/8	0.350	3/8	3/16	3.62	6.50	6 1/2	0.450	7/16	0.950	1 1/8	3 1/2[g]

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 50$ ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT10.5

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
137.5	2.95	9.92	420	45.7	3.20	2.90	86.3	1.59	394	61.1	3.10	95.1	53.5	224
124	3.22	10.8	368	40.3	3.15	2.77	75.7	1.45	349	54.5	3.07	84.8	40.2	163
111.5	3.55	11.7	324	35.9	3.12	2.66	66.7	1.31	307	48.3	3.04	74.9	29.6	117
100.5	3.86	12.6	285	31.9	3.10	2.57	58.6	1.18	271	43.1	3.02	66.5	20.4	85.4
91	4.22	13.7	253	28.5	3.07	2.48	52.1	1.07	241	38.6	3.00	59.5	15.3	63.0
83	4.57	14.9	226	25.5	3.04	2.39	46.3	0.983	217	35.0	2.99	53.9	11.8	47.3
73.5	5.44	15.3	204	23.7	3.08	2.39	42.4	0.864	188	30.0	2.95	46.3	7.69	32.5
66	6.01	16.8	181	21.1	3.06	2.33	37.6	0.780	166	26.7	2.93	41.1	5.62	23.4
61	6.45	18.0	166	19.3	3.04	2.28	34.3	0.724	152	24.6	2.91	37.8	4.47	18.4
55.5	7.05	19.6	150	17.5	3.03	2.23	31.0	0.662	137	22.2	2.90	34.1	3.40	13.8
50.5	7.68	21.4	135	15.8	3.01	2.18	27.9	0.605	124	20.2	2.89	30.8	2.60	10.4
46.5	4.53	18.6	144	17.9	3.25	2.74	31.8	0.812	46.4	11.0	1.84	17.3	3.01	[illegible]
41.5	5.00	20.8	127	15.7	3.22	2.66	28.0	0.728	40.7	9.74	1.83	15.2	2.16	[illegible]
36.5	5.60	23.3	110	13.8	3.21	2.60	24.4	0.647	35.3	8.51	1.81	13.3	1.51	[illegible]
34	6.04	24.7	103	12.9	3.20	2.59	22.9	0.606	32.4	7.83	1.80	12.2	1.22	3.62
31	6.70	26.3	93.8	11.9	3.21	2.58	21.1	0.554	28.7	6.97	1.77	10.9	0.913	2.78
27.5	7.87	27.7	84.4	10.9	3.23	2.64	19.4	0.493	24.2	5.89	1.73	9.18	0.617	2.08
24	9.47	29.4	74.9	9.90	3.26	2.74	17.8	0.459	19.4	4.76	1.66	7.44	0.400	1.52
28.5	5.04	25.9	90.4	11.8	3.29	2.85	21.2	0.638	15.3	4.67	1.35	7.40	0.884	2.50
25	6.10	27.4	80.3	10.7	3.30	2.93	19.4	0.771	12.5	3.82	1.30	6.08	0.570	1.89
22	7.22	29.4	71.1	9.68	3.31	2.98	17.6	1.06	10.3	3.18	1.26	5.07	0.383	1.40

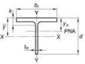


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem Thickness, t_w		Stem $\frac{t_w}{2}$	Stem Area	Flange Width, b_f		Flange Thickness, t_f		Distance k, k_{des}	Distance k, k_{det}	Workable Gage
	in.²	in.		in.		in.	in.²	in.		in.		in.	in.	in.
WT9×155.5[h]	45.8	11.2	11 1/8	1.52	1 1/2	3/4	17.0	12.0	12	2.74	2 3/4	3.24	3 9/16	5 1/2
×141.5[h]	41.7	10.9	10 7/8	1.40	1 3/8	11/16	15.3	11.9	11 7/8	2.50	2 1/2	3.00	3 3/8	
×129[h]	38.0	10.7	10 3/4	1.28	1 1/4	5/8	13.7	11.8	11 3/4	2.30	2 5/16	2.70	3 3/16	
×117[h]	34.3	10.5	10 1/2	1.16	1 3/16	5/8	12.2	11.7	11 5/8	2.11	2 1/8	2.51	3	
×105.5	31.2	10.3	10 3/8	1.06	1 1/16	9/16	11.0	11.6	11 1/2	1.91	1 15/16	2.31	2 13/16	
×96	28.1	10.2	10 1/8	0.960	15/16	1/2	9.77	11.5	11 1/2	1.75	1 3/4	2.15	2 5/8	
×87.5	25.7	10.0	10	0.890	7/8	7/16	8.92	11.4	11 3/8	1.59	1 9/16	1.99	2 7/16	
×79	23.2	9.86	9 7/8	0.810	13/16	7/16	7.99	11.3	11 1/4	1.44	1 7/16	1.84	2 3/8	
×71.5	21.0	9.75	9 3/4	0.730	3/4	3/8	7.11	11.2	11 1/4	1.32	1 5/16	1.72	2 3/16	
×65	19.2	9.63	9 5/8	0.670	11/16	3/8	6.45	11.2	11 1/8	1.20	1 3/16	1.60	2 1/16	
×59.5	17.6	9.49	9 1/2	0.655	5/8	5/16	6.21	11.3	11 1/4	1.06	1 1/16	1.46	1 15/16	
×53	15.6	9.37	9 3/8	0.590	9/16	5/16	5.53	11.2	11 1/4	0.940	15/16	1.34	1 13/16	
×48.5	14.2	9.30	9 1/4	0.535	9/16	5/16	4.97	11.1	11 1/8	0.870	7/8	1.27	1 3/4	
×43[c]	12.7	9.20	9 1/4	0.480	1/2	1/4	4.41	11.1	11 1/8	0.770	3/4	1.17	1 5/8	
×38[c]	11.1	9.11	9 1/8	0.425	7/16	1/4	3.87	11.0	11	0.680	11/16	1.08	1 9/16	
WT9×35.5[c]	10.4	9.24	9 1/4	0.495	1/2	1/4	4.57	7.64	7 5/8	0.810	13/16	1.21	1 1/2	3 1/2[g]
×32.5[c]	9.55	9.18	9 1/8	0.450	7/16	1/4	4.13	7.59	7 5/8	0.750	3/4	1.15	1 7/16	
×30[c]	8.82	9.12	9 1/8	0.415	7/16	1/4	3.78	7.56	7 1/2	0.695	11/16	1.10	1 3/8	
×27.5[c]	8.10	9.06	9	0.390	3/8	3/16	3.53	7.53	7 1/2	0.630	5/8	1.03	1 5/16	
×25[c]	7.34	9.00	9	0.355	3/8	3/16	3.19	7.50	7 1/2	0.570	9/16	0.972	1 1/4	
WT9×23[c]	6.77	9.03	9	0.360	3/8	3/16	3.25	6.06	6	0.605	5/8	1.01	1 1/4	3 1/2[g]
×20[c]	5.88	8.95	9	0.315	5/16	3/16	2.82	6.02	6	0.525	1/2	0.927	1 3/16	
×17.5[c,v]	5.15	8.85	8 7/8	0.300	5/16	3/16	2.66	6.00	6	0.425	7/16	0.827	1 1/8	
WT8×50	14.7	8.49	8 1/2	0.585	9/16	5/16	4.96	10.4	10 3/8	0.985	1	1.39	1 7/8	5 1/2
×44.5	13.1	8.38	8 3/8	0.525	1/2	1/4	4.40	10.4	10 3/8	0.875	7/8	1.28	1 3/4	
×38.5[c]	11.3	8.26	8 1/4	0.455	7/16	1/4	3.76	10.3	10 1/4	0.760	3/4	1.16	1 5/8	
×33.5[c]	9.81	8.17	8 1/8	0.395	3/8	3/16	3.23	10.2	10 1/4	0.665	11/16	1.07	1 9/16	
WT8×28.5[c]	8.39	8.22	8 1/4	0.430	7/16	1/4	3.53	7.12	7 1/8	0.715	11/16	1.12	1 3/8	3 1/2[g]
×25[c]	7.37	8.13	8 1/8	0.380	3/8	3/16	3.09	7.07	7 1/8	0.630	5/8	1.03	1 5/16	
×22.5[c]	6.63	8.07	8 1/8	0.345	3/8	3/16	2.78	7.04	7	0.565	9/16	0.967	1 1/4	
×20[c]	5.89	8.01	8	0.305	5/16	3/16	2.44	7.00	7	0.505	1/2	0.907	1 3/16	3 1/2
×18[c]	5.29	7.93	7 7/8	0.295	5/16	3/16	2.34	6.99	7	0.430	7/16	0.832	1 1/8	3 1/2

[c] Shape is slender for compression with F_y = 50 ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shear strength controlled by buckling effects (C_{v2} < 1.0) with F_y = 50 ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT9–WT8

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
155.5	2.19	7.37	383	46.6	2.89	2.93	90.6	1.91	398	66.2	2.95	104	87.2	339
141.5	2.38	7.79	337	41.5	2.85	2.80	80.2	1.75	352	59.2	2.91	92.5	66.5	251
129	2.56	8.36	298	37.0	2.80	2.68	71.0	1.61	314	53.4	2.88	83.1	51.1	189
117	2.76	9.05	261	32.7	2.75	2.55	62.4	1.48	279	47.9	2.85	74.4	39.1	140
105.5	3.02	9.72	229	29.1	2.72	2.44	55.0	1.34	246	42.7	2.82	66.1	29.1	102
96	3.27	10.6	202	25.8	2.68	2.34	48.5	1.23	220	38.4	2.79	59.4	22.3	75.7
87.5	3.58	11.2	181	23.4	2.66	2.26	43.6	1.13	196	34.4	2.76	53.1	16.8	56.5
79	3.92	12.2	160	20.8	2.63	2.17	38.5	1.02	174	30.7	2.74	47.4	12.5	41.2
71.5	4.25	13.4	142	18.5	2.60	2.09	34.0	0.937	156	27.7	2.72	42.7	9.58	30.7
65	4.65	14.4	127	16.7	2.58	2.02	30.5	0.856	139	24.9	2.70	38.3	7.23	22.8
59.5	5.31	14.5	119	15.9	2.60	2.03	28.7	0.778	126	22.5	2.69	34.5	5.30	17.4
53	5.96	15.9	104	14.1	2.59	1.97	25.2	0.695	110	19.7	2.66	30.2	3.73	12.1
48.5	6.41	17.4	93.8	12.7	2.56	1.91	22.6	0.640	100	18.0	2.65	27.6	2.92	[illegible]
43	7.20	19.2	82.4	11.2	2.55	1.86	19.9	0.570	87.6	15.8	2.63	24.2	2.04	[illegible]
38	8.11	21.4	71.8	9.83	2.54	1.80	17.3	0.505	76.2	13.8	2.61	21.1	1.41	[illegible]
35.5	4.71	18.7	78.2	11.2	2.74	2.26	20.0	0.683	30.1	7.89	1.70	12.3	1.74	3.96
32.5	5.06	20.4	70.7	10.1	2.72	2.20	18.0	0.629	27.4	7.22	1.69	11.2	1.36	3.01
30	5.44	22.0	64.7	9.29	2.71	2.16	16.5	0.583	25.0	6.63	1.68	10.3	1.08	2.35
27.5	5.98	23.2	59.5	8.63	2.71	2.16	15.3	0.538	22.5	5.97	1.67	9.26	0.830	1.84
25	6.57	25.4	53.5	7.79	2.70	2.12	13.8	0.489	20.0	5.35	1.65	8.28	0.619	1.36
23	5.01	25.1	52.1	7.77	2.77	2.33	13.9	0.558	11.3	3.71	1.29	5.84	0.609	1.20
20	5.73	28.4	44.8	6.73	2.76	2.29	12.0	0.489	9.55	3.17	1.27	4.97	0.404	0.788
17.5	7.06	29.5	40.1	6.21	2.79	2.39	11.2	0.450	7.67	2.56	1.22	4.02	0.252	0.598
50	5.29	14.5	76.8	11.4	2.28	1.76	20.7	0.706	93.1	17.9	2.51	27.4	3.85	10.4
44.5	5.92	16.0	67.2	10.1	2.27	1.70	18.1	0.631	81.3	15.7	2.49	24.0	2.72	7.19
38.5	6.77	18.2	56.9	8.59	2.24	1.63	15.3	0.549	69.2	13.4	2.47	20.5	1.78	4.61
33.5	7.70	20.7	48.6	7.36	2.22	1.56	13.0	0.481	59.5	11.6	2.46	17.7	1.19	3.01
28.5	4.98	19.1	48.7	7.77	2.41	1.94	13.8	0.589	21.6	6.06	1.60	9.42	1.10	1.99
25	5.61	21.4	42.3	6.78	2.40	1.89	12.0	0.521	18.6	5.26	1.59	8.15	0.760	1.34
22.5	6.23	23.4	37.8	6.10	2.39	1.86	10.8	0.471	16.4	4.67	1.57	7.22	0.555	0.974
20	6.93	26.3	33.1	5.35	2.37	1.81	9.43	0.421	14.4	4.12	1.56	6.36	0.396	0.673
18	8.12	26.9	30.6	5.05	2.41	1.88	8.93	0.378	12.2	3.50	1.52	5.42	0.272	0.516

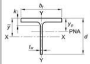


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem				Flange				Distance		
				Thickness, t_w		$\frac{t_w}{2}$	Area	Width, b_f		Thickness, t_f		k		Workable Gage
												k_{des}	k_{det}	
	in.^{2}	in.		in.		in.	in.^{2}	in.		in.		in.	in.	in.
WT8×15.5[c]	4.56	7.94	8	0.275	1/4	1/8	2.18	5.53	5 1/2	0.440	7/16	0.842	1 1/8	3 1/2
×13[c,v]	3.84	7.85	7 7/8	0.250	1/4	1/8	1.96	5.50	5 1/2	0.345	3/8	0.747	1 1/16	3 1/2
WT7×436.5[h]	129	11.8	11 3/4	3.94	3 15/16	2	46.5	18.8	18 3/4	5.51	5 1/2	6.10	6 3/16	8 1/2[g]
×404[h]	119	11.4	11 3/8	3.74	3 3/4	1 7/8	42.6	18.6	18 5/8	5.12	5 1/8	5.71	5 3/4	8 1/2
×365[h]	107	11.2	11 1/4	3.07	3 1/16	1 9/16	34.4	17.9	17 7/8	4.91	4 15/16	5.51	6 3/16	7 1/2[g]
×332.5[h]	97.8	10.8	10 7/8	2.83	2 13/16	1 7/16	30.6	17.7	17 5/8	4.52	4 1/2	5.12	5 13/16	7 1/2[g]
×302.5[h]	89.0	10.5	10 1/2	2.60	2 5/8	1 5/16	27.1	17.4	17 3/8	4.16	4 3/16	4.76	5 7/16	7 1/2
×275[h]	80.9	10.1	10 1/8	2.38	2 3/8	1 3/16	24.1	17.2	17 1/4	3.82	3 13/16	4.42	5 1/8	
×250[h]	73.5	9.80	9 3/4	2.19	2 3/16	1 1/8	21.5	17.0	17	3.50	3 1/2	4.10	4 13/16	
×227.5[h]	66.9	9.51	9 1/2	2.02	2	1	19.2	16.8	16 7/8	3.21	3 3/16	3.81	4 1/2	
×213[h]	62.7	9.34	9 3/8	1.88	1 7/8	15/16	17.5	16.7	16 3/4	3.04	3 1/16	3.63	4 5/16	
×199[h]	58.4	9.15	9 1/8	1.77	1 3/4	7/8	16.2	16.6	16 5/8	2.85	2 7/8	3.44	4 1/8	
×185[h]	54.4	8.96	9	1.66	1 11/16	13/16	14.8	16.5	16 1/2	2.66	2 11/16	3.26	3 15/16	
×171[h]	50.3	8.77	8 3/4	1.54	1 9/16	13/16	13.5	16.4	16 3/8	2.47	2 1/2	3.07	3 3/4	
×155.5[h]	45.7	8.56	8 1/2	1.41	1 7/16	3/4	12.1	16.2	16 1/4	2.26	2 1/4	2.86	3 9/16	
×141.5[h]	41.6	8.37	8 3/8	1.29	1 5/16	11/16	10.8	16.1	16 1/8	2.07	2 1/16	2.67	3 3/8	
×128.5	37.8	8.19	8 1/4	1.18	1 3/16	5/8	9.62	16.0	16	1.89	1 7/8	2.49	3 3/16	
×116.5	34.2	8.02	8	1.07	1 1/16	9/16	8.58	15.9	15 7/8	1.72	1 3/4	2.32	3	
×105.5	31.0	7.86	7 7/8	0.980	1	1/2	7.70	15.8	15 3/4	1.56	1 9/16	2.16	2 7/8	
×96.5	28.4	7.74	7 3/4	0.890	7/8	7/16	6.89	15.7	15 3/4	1.44	1 7/16	2.04	2 3/4	
×88	25.9	7.61	7 5/8	0.830	13/16	7/16	6.32	15.7	15 5/8	1.31	1 5/16	1.91	2 5/8	
×79.5	23.4	7.49	7 1/2	0.745	3/4	3/8	5.58	15.6	15 5/8	1.19	1 3/16	1.79	2 1/2	
×72.5	21.3	7.39	7 3/8	0.680	11/16	3/8	5.03	15.5	15 1/2	1.09	1 1/16	1.69	2 3/8	
WT7×66	19.4	7.33	7 3/8	0.645	5/8	5/16	4.73	14.7	14 3/4	1.03	1	1.63	2 5/16	5 1/2
×60	17.7	7.24	7 1/4	0.590	9/16	5/16	4.27	14.7	14 5/8	0.940	15/16	1.54	2 1/4	
×54.5	16.0	7.16	7 1/8	0.525	1/2	1/4	3.76	14.6	14 5/8	0.860	7/8	1.46	2 3/16	
×49.5[f]	14.6	7.08	7 1/8	0.485	1/2	1/4	3.43	14.6	14 5/8	0.780	3/4	1.38	2 1/16	
×45[f]	13.2	7.01	7	0.440	7/16	1/4	3.08	14.5	14 1/2	0.710	11/16	1.31	2	
WT7×41	12.0	7.16	7 1/8	0.510	1/2	1/4	3.65	10.1	10 1/8	0.855	7/8	1.45	1 11/16	5 1/2
×37	10.9	7.09	7 1/8	0.450	7/16	1/4	3.19	10.1	10 1/8	0.785	13/16	1.38	1 5/8	
×34	10.0	7.02	7	0.415	7/16	1/4	2.91	10.0	10	0.720	3/4	1.31	1 9/16	
×30.5[c]	8.96	6.95	7	0.375	3/8	3/16	2.60	10.0	10	0.645	5/8	1.24	1 1/2	

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 50$ ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT8–WT7

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
15.5	6.28	28.9	27.5	4.64	2.45	2.02	8.27	0.413	6.20	2.24	1.17	3.51	0.230	0.366
13	7.97	31.4	23.5	4.09	2.47	2.09	7.36	0.372	4.79	1.74	1.12	2.73	0.130	0.243
436.5	1.71	2.99	1040	131	2.84	3.88	281	3.43	3080	328	4.89	511	1110	8980
404	1.82	3.05	898	116	2.75	3.69	249	3.20	2770	298	4.82	465	898	7000
365	1.82	3.65	739	95.4	2.62	3.47	211	3.00	2360	264	4.69	408	714	5250
332.5	1.95	3.82	622	82.1	2.52	3.25	182	2.77	2080	236	4.62	365	555	3920
302.5	2.09	4.04	524	70.6	2.43	3.05	157	2.55	1840	211	4.55	326	430	2930
275	2.25	4.24	442	60.9	2.34	2.85	136	2.35	1630	189	4.49	292	331	2180
250	2.43	4.47	375	52.7	2.26	2.67	117	2.16	1440	169	4.43	261	254	1620
227.5	2.62	4.71	321	45.9	2.19	2.51	102	1.99	1280	152	4.38	234	196	1210
213	2.75	4.97	287	41.4	2.14	2.40	91.7	1.88	1180	141	4.34	217	164	991
199	2.92	5.17	257	37.6	2.10	2.30	82.9	1.76	1090	131	4.31	201	135	801
185	3.10	5.40	229	33.9	2.05	2.19	74.4	1.65	994	121	4.27	185	110	640
171	3.31	5.69	203	30.4	2.01	2.09	66.2	1.54	903	110	4.24	169	88.3	502
155.5	3.59	6.07	176	26.7	1.96	1.97	57.7	1.41	807	99.4	4.20	152	67.5	375
141.5	3.89	6.49	153	23.5	1.92	1.86	50.4	1.29	722	89.7	4.17	137	51.8	281
128.5	4.23	6.94	133	20.7	1.88	1.75	43.9	1.18	645	80.7	4.13	123	39.3	209
116.5	4.62	7.50	116	18.2	1.84	1.65	38.2	1.08	576	72.5	4.10	110	29.6	154
105.5	5.06	8.02	102	16.2	1.81	1.57	33.4	0.980	513	65.0	4.07	98.9	22.2	113
96.5	5.45	8.70	89.8	14.4	1.78	1.49	29.4	0.903	466	59.3	4.05	90.1	17.3	87.2
88	5.97	9.17	80.5	13.0	1.76	1.43	26.3	0.827	419	53.5	4.02	81.3	13.2	65.2
79.5	6.54	10.1	70.2	11.4	1.73	1.35	22.8	0.751	374	48.1	4.00	73.0	9.84	47.9
72.5	7.11	10.9	62.5	10.2	1.71	1.29	20.2	0.688	338	43.7	3.98	66.2	7.56	36.3
66	7.15	11.4	57.8	9.57	1.73	1.29	18.6	0.658	274	37.2	3.76	56.5	6.13	26.6
60	7.80	12.3	51.7	8.61	1.71	1.24	16.5	0.602	247	33.7	3.74	51.2	4.67	20.0
54.5	8.49	13.6	45.3	7.56	1.68	1.17	14.4	0.548	223	30.6	3.73	46.3	3.55	15.0
49.5	9.34	14.6	40.9	6.88	1.67	1.14	12.9	0.500	201	27.6	3.71	41.8	2.68	11.1
45	10.2	15.9	36.5	6.16	1.66	1.09	11.5	0.456	181	25.0	3.70	37.8	2.03	8.31
41	5.92	14.0	41.2	7.14	1.85	1.39	13.2	0.593	74.1	14.6	2.48	22.4	2.53	5.63
37	6.41	15.8	36.0	6.25	1.82	1.32	11.5	0.541	66.9	13.3	2.48	20.2	1.93	4.19
34	6.97	16.9	32.6	5.69	1.81	1.29	10.4	0.498	60.7	12.1	2.46	18.4	1.50	3.21
30.5	7.75	18.5	28.9	5.07	1.80	1.25	9.15	0.448	53.7	10.7	2.45	16.4	1.09	2.29

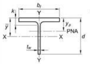


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem: Thickness, t_w		Stem: $\frac{t_w}{2}$	Stem: Area	Flange: Width, b_f		Flange: Thickness, t_f		Distance: k_{des}	Distance: k_{det}	Distance: Workable Gage
	in.²	in.		in.		in.	in.²	in.		in.		in.	in.	in.
WT7×26.5[c]	7.80	6.96	7	0.370	3/8	3/16	2.58	8.06	8	0.660	11/16	1.25	1 1/2	5 1/2
×24[c]	7.07	6.90	6 7/8	0.340	5/16	3/16	2.34	8.03	8	0.595	5/8	1.19	1 7/16	↓
×21.5[c]	6.31	6.83	6 7/8	0.305	5/16	3/16	2.08	8.00	8	0.530	1/2	1.12	1 3/8	↓
WT7×19[c]	5.58	7.05	7	0.310	5/16	3/16	2.19	6.77	6 3/4	0.515	1/2	0.915	1 1/4	3 1/2[g]
×17[c]	5.00	6.99	7	0.285	5/16	3/16	1.99	6.75	6 3/4	0.455	7/16	0.855	1 3/16	3 1/2
×15[c]	4.42	6.92	6 7/8	0.270	1/4	1/8	1.87	6.73	6 3/4	0.385	3/8	0.785	1 1/8	3 1/2
WT7×13[c]	3.85	6.96	7	0.255	1/4	1/8	1.77	5.03	5	0.420	7/16	0.820	1 1/8	2 3/4[g]
×11[c,v]	3.25	6.87	6 7/8	0.230	1/4	1/8	1.58	5.00	5	0.335	5/16	0.735	1 1/16	2 3/4[g]
WT6×168[h]	49.5	8.41	8 3/8	1.78	1 3/4	7/8	14.9	13.4	13 3/8	2.96	2 15/16	3.55	3 7/8	5 1/2
×152.5[h]	44.7	8.16	8 1/8	1.63	1 5/8	13/16	13.3	13.2	13 1/4	2.71	2 11/16	3.30	3 5/8	↓
×139.5[h]	41.0	7.93	7 7/8	1.53	1 1/2	3/4	12.1	13.1	13 1/8	2.47	2 1/2	3.07	3 3/8	↓
×126[h]	37.1	7.71	7 3/4	1.40	1 3/8	11/16	10.7	13.0	13	2.25	2 1/4	2.85	3 1/8	↓
×115[h]	33.8	7.53	7 1/2	1.29	1 5/16	11/16	9.67	12.9	12 7/8	2.07	2 1/16	2.67	2 15/16	↓
×105	30.9	7.36	7 3/8	1.18	1 3/16	5/8	8.68	12.8	12 3/4	1.90	1 7/8	2.50	2 13/16	↓
×95	28.0	7.19	7 1/4	1.06	1 1/16	9/16	7.62	12.7	12 5/8	1.74	1 3/4	2.33	2 5/8	↓
×85	25.0	7.02	7	0.960	15/16	1/2	6.73	12.6	12 5/8	1.56	1 9/16	2.16	2 7/16	↓
×76	22.4	6.86	6 7/8	0.870	7/8	7/16	5.96	12.5	12 1/2	1.40	1 3/8	2.00	2 5/16	↓
×68	20.0	6.71	6 3/4	0.790	13/16	7/16	5.30	12.4	12 3/8	1.25	1 1/4	1.85	2 1/8	↓
×60	17.6	6.56	6 1/2	0.710	11/16	3/8	4.66	12.3	12 3/8	1.11	1 1/8	1.70	2	↓
×53	15.6	6.45	6 1/2	0.610	5/8	5/16	3.93	12.2	12 1/4	0.990	1	1.59	1 7/8	↓
×48	14.1	6.36	6 3/8	0.550	9/16	5/16	3.50	12.2	12 1/8	0.900	7/8	1.50	1 13/16	↓
×43.5	12.8	6.27	6 1/4	0.515	1/2	1/4	3.23	12.1	12 1/8	0.810	13/16	1.41	1 11/16	↓
×39.5	11.6	6.19	6 1/4	0.470	1/2	1/4	2.91	12.1	12 1/8	0.735	3/4	1.33	1 5/8	↓
×36	10.6	6.13	6 1/8	0.430	7/16	1/4	2.63	12.0	12	0.670	11/16	1.27	1 9/16	↓
×32.5[f]	9.54	6.06	6	0.390	3/8	3/16	2.36	12.0	12	0.605	5/8	1.20	1 1/2	↓
WT6×29	8.52	6.10	6 1/8	0.360	3/8	3/16	2.19	10.0	10	0.640	5/8	1.24	1 1/2	5 1/2
×26.5	7.78	6.03	6	0.345	3/8	3/16	2.08	10.0	10	0.575	9/16	1.18	1 3/8	5 1/2
WT6×25	7.30	6.10	6 1/8	0.370	3/8	3/16	2.26	8.08	8 1/8	0.640	5/8	1.14	1 1/2	5 1/2
×22.5	6.56	6.03	6	0.335	5/16	3/16	2.02	8.05	8	0.575	9/16	1.08	1 3/8	↓
×20[c]	5.84	5.97	6	0.295	5/16	3/16	1.76	8.01	8	0.515	1/2	1.02	1 3/8	↓

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[h] Flange thickness greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 50$ ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT7–WT6

Nominal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
26.5	6.11	18.8	27.6	4.94	1.88	1.38	8.87	0.484	28.8	7.15	1.92	11.0	0.967	1.46
24	6.75	20.3	24.9	4.49	1.88	1.35	8.00	0.440	25.7	6.40	1.91	9.80	0.723	1.07
21.5	7.54	22.4	21.9	3.98	1.86	1.31	7.05	0.395	22.6	5.65	1.89	8.64	0.522	0.751
19	6.57	22.7	23.3	4.22	2.04	1.54	7.45	0.412	13.3	3.94	1.55	6.07	0.398	0.554
17	7.41	24.5	20.9	3.83	2.04	1.53	6.74	0.371	11.6	3.45	1.53	5.32	0.284	0.400
15	8.74	25.6	19.0	3.55	2.07	1.58	6.25	0.329	9.79	2.91	1.49	4.49	0.190	0.287
13	5.98	27.3	17.3	3.31	2.12	1.72	5.89	0.383	4.45	1.77	1.08	2.76	0.179	0.207
11	7.46	29.9	14.8	2.91	2.14	1.76	5.20	0.325	3.50	1.40	1.04	2.19	0.104	0.134
168	2.26	4.72	190	31.2	1.96	2.31	68.4	1.84	593	88.6	3.47	137	120	481
152.5	2.45	5.01	162	27.0	1.90	2.16	59.1	1.69	525	79.3	3.42	122	92.0	356
139.5	2.66	5.18	141	24.1	1.86	2.05	51.9	1.56	469	71.3	3.38	110	70.9	267
126	2.89	5.51	121	20.9	1.81	1.92	44.8	1.42	414	63.6	3.34	97.9	53.5	195
115	3.11	5.84	106	18.5	1.77	1.82	39.4	1.31	371	57.5	3.31	88.4	41.6	148
105	3.37	6.24	92.1	16.4	1.73	1.72	34.5	1.21	332	51.9	3.28	79.7	32.1	112
95	3.65	6.78	79.0	14.2	1.68	1.62	29.8	1.10	295	46.5	3.25	71.2	24.3	82.1
85	4.03	7.31	67.8	12.3	1.65	1.52	25.6	0.994	259	41.2	3.22	62.9	17.7	58.3
76	4.46	7.89	58.5	10.8	1.62	1.43	22.0	0.896	227	36.4	3.19	55.6	12.8	41.3
68	4.96	8.49	50.6	9.46	1.59	1.35	19.0	0.805	199	32.1	3.16	48.9	9.21	28.9
60	5.57	9.24	43.4	8.22	1.57	1.28	16.2	0.716	172	28.0	3.13	42.7	6.42	19.7
53	6.17	10.6	36.3	6.92	1.53	1.19	13.6	0.637	151	24.7	3.11	37.5	4.55	13.6
48	6.76	11.6	32.0	6.12	1.51	1.13	11.9	0.580	135	22.2	3.09	33.7	3.42	10.1
43.5	7.48	12.2	28.9	5.60	1.50	1.10	10.7	0.527	120	19.9	3.07	30.2	2.54	7.34
39.5	8.22	13.2	25.8	5.03	1.49	1.06	9.49	0.480	108	17.9	3.05	27.1	1.91	5.43
36	8.99	14.3	23.2	4.54	1.48	1.02	8.48	0.439	97.5	16.2	3.04	24.6	1.46	4.07
32.5	9.92	15.5	20.6	4.06	1.47	0.985	7.50	0.398	87.2	14.5	3.02	22.0	1.09	2.97
29	7.82	16.9	19.1	3.76	1.50	1.03	6.97	0.426	53.5	10.7	2.51	16.2	1.05	2.08
26.5	8.69	17.5	17.7	3.54	1.51	1.02	6.46	0.389	47.9	9.58	2.48	14.5	0.788	1.53
25	6.31	16.5	18.7	3.79	1.60	1.17	6.88	0.452	28.2	6.97	1.96	10.6	0.855	1.23
22.5	7.00	18.0	16.6	3.39	1.59	1.13	6.10	0.408	25.0	6.21	1.95	9.47	0.627	0.885
20	7.77	20.2	14.4	2.95	1.57	1.09	5.28	0.365	22.0	5.50	1.94	8.38	0.452	0.620

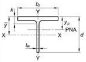


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem				Flange				Distance		
				Thickness, t_w		$\frac{t_w}{2}$	Area	Width, b_f		Thickness, t_f		k		Workable Gage
												k_{des}	k_{det}	
	in.²	in.		in.		in.	in.²	in.		in.		in.	in.	in.
WT6×17.5[c]	5.17	6.25	6 1/4	0.300	5/16	3/16	1.88	6.56	6 1/2	0.520	1/2	0.820	1 3/16	3 1/2
×15[c]	4.40	6.17	6 1/8	0.260	1/4	1/8	1.60	6.52	6 1/2	0.440	7/16	0.740	1 1/8	
×13[c]	3.82	6.11	6 1/8	0.230	1/4	1/8	1.41	6.49	6 1/2	0.380	3/8	0.680	1 1/16	
WT6×11[c]	3.24	6.16	6 1/8	0.260	1/4	1/8	1.60	4.03	4	0.425	7/16	0.725	15/16	2 1/4[g]
×9.5[c]	2.79	6.08	6 1/8	0.235	1/4	1/8	1.43	4.01	4	0.350	3/8	0.650	7/8	
×8[c]	2.36	6.00	6	0.220	1/4	1/8	1.32	3.99	4	0.265	1/4	0.565	13/16	
×7[c,v]	2.08	5.96	6	0.200	3/16	1/8	1.19	3.97	4	0.225	1/4	0.525	3/4	
WT5×56	16.5	5.68	5 5/8	0.755	3/4	3/8	4.29	10.4	10 3/8	1.25	1 1/4	1.75	1 15/16	5 1/2
×50	14.7	5.55	5 1/2	0.680	11/16	3/8	3.77	10.3	10 3/8	1.12	1 1/8	1.62	1 13/16	
×44	13.0	5.42	5 3/8	0.605	5/8	5/16	3.28	10.3	10 1/4	0.990	1	1.49	1 11/16	
×38.5	11.3	5.30	5 1/4	0.530	1/2	1/4	2.81	10.2	10 1/4	0.870	7/8	1.37	1 9/16	
×34	10.0	5.20	5 1/4	0.470	1/2	1/4	2.44	10.1	10 1/8	0.770	3/4	1.27	1 7/16	
×30	8.84	5.11	5 1/8	0.420	7/16	1/4	2.15	10.1	10 1/8	0.680	11/16	1.18	1 3/8	
×27	7.90	5.05	5	0.370	3/8	3/16	1.87	10.0	10	0.615	5/8	1.12	1 5/16	
×24.5	7.21	4.99	5	0.340	5/16	3/16	1.70	10.0	10	0.560	9/16	1.06	1 1/4	
WT5×22.5	6.63	5.05	5	0.350	3/8	3/16	1.77	8.02	8	0.620	5/8	1.12	1 5/16	
×19.5	5.73	4.96	5	0.315	5/16	3/16	1.56	7.99	8	0.530	1/2	1.03	1 3/16	
×16.5	4.85	4.87	4 7/8	0.290	5/16	3/16	1.41	7.96	8	0.435	7/16	0.935	1 1/8	
WT5×15	4.42	5.24	5 1/4	0.300	5/16	3/16	1.57	5.81	5 3/4	0.510	1/2	0.810	1 1/8	2 3/4[g]
×13[c]	3.81	5.17	5 1/8	0.260	1/4	1/8	1.34	5.77	5 3/4	0.440	7/16	0.740	1 1/16	
×11[c]	3.24	5.09	5 1/8	0.240	1/4	1/8	1.22	5.75	5 3/4	0.360	3/8	0.660	15/16	
WT5×9.5[c]	2.81	5.12	5 1/8	0.250	1/4	1/8	1.28	4.02	4	0.395	3/8	0.695	15/16	2 1/4[g]
×8.5[c]	2.50	5.06	5	0.240	1/4	1/8	1.21	4.01	4	0.330	5/16	0.630	7/8	
×7.5[c]	2.21	5.00	5	0.230	1/4	1/8	1.15	4.00	4	0.270	1/4	0.570	13/16	
×6[c,f]	1.77	4.94	4 7/8	0.190	3/16	1/8	0.938	3.96	4	0.210	3/16	0.510	3/4	
WT4×33.5	9.84	4.50	4 1/2	0.570	9/16	5/16	2.57	8.28	8 1/4	0.935	15/16	1.33	1 5/8	5 1/2
×29	8.54	4.38	4 3/8	0.510	1/2	1/4	2.23	8.22	8 1/4	0.810	13/16	1.20	1 1/2	
×24	7.05	4.25	4 1/4	0.400	3/8	3/16	1.70	8.11	8 1/8	0.685	11/16	1.08	1 3/8	
×20	5.87	4.13	4 1/8	0.360	3/8	3/16	1.49	8.07	8 1/8	0.560	9/16	0.954	1 1/4	
×17.5	5.14	4.06	4	0.310	5/16	3/16	1.26	8.02	8	0.495	1/2	0.889	1 3/16	
×15.5[f]	4.56	4.00	4	0.285	5/16	3/16	1.14	8.00	8	0.435	7/16	0.829	1 1/8	

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 50$ ksi.

Table 1-8 (continued)
WT-Shapes
Properties

WT6–WT4

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
17.5	6.31	20.8	16.0	3.23	1.76	1.30	5.71	0.394	12.2	3.73	1.54	5.73	0.369	0.437
15	7.41	23.7	13.5	2.75	1.75	1.27	4.83	0.337	10.2	3.12	1.52	4.78	0.228	0.267
13	8.54	26.6	11.7	2.40	1.75	1.25	4.20	0.295	8.66	2.67	1.51	4.08	0.150	0.174
11	4.74	23.7	11.7	2.59	1.90	1.63	4.63	0.402	2.33	1.15	0.847	1.83	0.146	0.137
9.5	5.72	25.9	10.1	2.28	1.90	1.65	4.11	0.348	1.88	0.939	0.821	1.49	0.0899	0.0934
8	7.53	27.3	8.70	2.04	1.92	1.74	3.72	0.639	1.41	0.706	0.773	1.13	0.0511	0.0678
7	8.82	29.8	7.67	1.83	1.92	1.76	3.32	0.760	1.18	0.593	0.753	0.947	0.0350	0.0493
56	4.17	7.52	28.6	6.40	1.32	1.21	13.4	0.791	118	22.6	2.67	34.6	7.50	16.9
50	4.62	8.16	24.5	5.56	1.29	1.13	11.4	0.711	103	20.0	2.65	30.5	5.41	11.9
44	5.18	8.96	20.8	4.77	1.27	1.06	9.65	0.631	89.3	17.4	2.63	26.5	3.75	8.02
38.5	5.86	10.0	17.4	4.05	1.24	0.990	8.06	0.555	76.8	15.1	2.60	22.9	2.55	5.3[illegible]
34	6.58	11.1	14.9	3.49	1.22	0.932	6.85	0.493	66.7	13.2	2.58	20.0	1.78	3.6[illegible]
30	7.41	12.2	12.9	3.04	1.21	0.884	5.87	0.438	58.1	11.5	2.57	17.5	1.23	2.4[illegible]
27	8.15	13.6	11.1	2.64	1.19	0.836	5.05	0.395	51.7	10.3	2.56	15.6	0.909	1.7[illegible]
24.5	8.93	14.7	10.0	2.39	1.18	0.807	4.52	0.361	46.7	9.34	2.54	14.1	0.693	1.33
22.5	6.47	14.4	10.2	2.47	1.24	0.907	4.65	0.413	26.7	6.65	2.01	10.1	0.753	0.981
19.5	7.53	15.7	8.84	2.16	1.24	0.876	3.99	0.359	22.5	5.64	1.98	8.57	0.487	0.616
16.5	9.15	16.8	7.71	1.93	1.26	0.869	3.48	0.305	18.3	4.60	1.94	7.00	0.291	0.356
15	5.70	17.5	9.28	2.24	1.45	1.10	4.01	0.380	8.35	2.87	1.37	4.41	0.310	0.273
13	6.56	19.9	7.86	1.91	1.44	1.06	3.39	0.330	7.05	2.44	1.36	3.75	0.201	0.173
11	7.99	21.2	6.88	1.72	1.46	1.07	3.02	0.282	5.71	1.99	1.33	3.05	0.119	0.107
9.5	5.09	20.5	6.68	1.74	1.54	1.28	3.10	0.349	2.15	1.07	0.874	1.67	0.116	0.0796
8.5	6.08	21.1	6.06	1.62	1.56	1.32	2.90	0.311	1.78	0.887	0.844	1.40	0.0776	0.0610
7.5	7.41	21.7	5.45	1.50	1.57	1.37	2.71	0.305	1.45	0.723	0.810	1.15	0.0518	0.0475
6	9.43	26.0	4.35	1.22	1.57	1.36	2.20	0.322	1.09	0.551	0.785	0.869	0.0272	0.0255
33.5	4.43	7.89	10.9	3.05	1.05	0.936	6.29	0.594	44.3	10.7	2.12	16.3	2.51	3.56
29	5.07	8.59	9.12	2.61	1.03	0.874	5.25	0.520	37.5	9.13	2.10	13.9	1.66	2.28
24	5.92	10.6	6.85	1.97	0.986	0.777	3.94	0.435	30.5	7.51	2.08	11.4	0.977	1.30
20	7.21	11.5	5.73	1.69	0.988	0.735	3.25	0.364	24.5	6.08	2.04	9.24	0.558	0.715
17.5	8.10	13.1	4.82	1.43	0.968	0.688	2.71	0.321	21.3	5.31	2.03	8.05	0.384	0.480
15.5	9.19	14.0	4.28	1.28	0.969	0.668	2.39	0.285	18.5	4.64	2.02	7.03	0.267	0.327

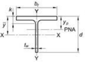


Table 1-8 (continued)
WT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem: Thickness, t_w		Stem: $\frac{t_w}{2}$	Stem: Area	Flange: Width, b_f		Flange: Thickness, t_f		Distance: k, k_{des}	Distance: k, k_{det}	Distance: Workable Gage
	in.²	in.		in.		in.	in.²	in.		in.		in.	in.	in.
WT4×14	4.12	4.03	4	0.285	5/16	3/16	1.15	6.54	6 1/2	0.465	7/16	0.859	15/16	4
×12	3.54	3.97	4	0.245	1/4	1/8	0.971	6.50	6 1/2	0.400	3/8	0.794	7/8	4
WT4×10.5	3.08	4.14	4 1/8	0.250	1/4	1/8	1.04	5.27	5 1/4	0.400	3/8	0.700	7/8	2 3/4[g]
×9	2.63	4.07	4 1/8	0.230	1/4	1/8	0.936	5.25	5 1/4	0.330	5/16	0.630	13/16	2 3/4[g]
WT4×7.5	2.22	4.06	4	0.245	1/4	1/8	0.993	4.02	4	0.315	5/16	0.615	13/16	2 1/4[g]
×6.5	1.92	4.00	4	0.230	1/4	1/8	0.919	4.00	4	0.255	1/4	0.555	3/4	↓
×5[c,f]	1.48	3.95	4	0.170	3/16	1/8	0.671	3.94	4	0.205	3/16	0.505	11/16	↓
WT3×12.5	3.67	3.19	3 1/4	0.320	5/16	3/16	1.02	6.08	6 1/8	0.455	7/16	0.705	15/16	3 1/2
×10	2.94	3.10	3 1/8	0.260	1/4	1/8	0.806	6.02	6	0.365	3/8	0.615	7/8	↓
×7.5[f]	2.21	3.00	3	0.230	1/4	1/8	0.689	5.99	6	0.260	1/4	0.510	3/4	↓
WT3×8	2.37	3.14	3 1/8	0.260	1/4	1/8	0.816	4.03	4	0.405	3/8	0.655	7/8	2 1/4[g]
×6	1.78	3.02	3	0.230	1/4	1/8	0.693	4.00	4	0.280	1/4	0.530	3/4	↓
×4.5[f]	1.34	2.95	3	0.170	3/16	1/8	0.502	3.94	4	0.215	3/16	0.465	11/16	↓
×4.25[f]	1.26	2.92	2 7/8	0.170	3/16	1/8	0.496	3.94	4	0.195	3/16	0.445	11/16	↓
WT2.5×9.5	2.78	2.58	2 5/8	0.270	1/4	1/8	0.695	5.03	5	0.430	7/16	0.730	13/16	2 3/4
×8	2.35	2.51	2 1/2	0.240	1/4	1/8	0.601	5.00	5	0.360	3/8	0.660	3/4	2 3/4
WT2×6.5	1.91	2.08	2 1/8	0.280	1/4	1/8	0.582	4.06	4	0.345	3/8	0.595	3/4	2 1/4

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.

Menu

Table 1-8 (continued)
WT-Shapes
Properties

WT4–WT2

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
14	7.03	14.1	4.23	1.28	1.01	0.734	2.38	0.315	10.8	3.31	1.62	5.04	0.268	0.230
12	8.12	16.2	3.53	1.08	0.999	0.695	1.98	0.272	9.14	2.81	1.61	4.28	0.173	0.144
10.5	6.59	16.6	3.90	1.18	1.12	0.831	2.11	0.292	4.88	1.85	1.26	2.84	0.141	0.0916
9	7.95	17.7	3.41	1.05	1.14	0.834	1.86	0.251	3.98	1.52	1.23	2.33	0.0855	0.0562
7.5	6.37	16.6	3.28	1.07	1.22	0.998	1.91	0.276	1.70	0.849	0.876	1.33	0.0679	0.0382
6.5	7.84	17.4	2.89	0.974	1.23	1.03	1.74	0.240	1.36	0.682	0.843	1.07	0.0433	0.0269
5	9.61	23.2	2.15	0.717	1.20	0.953	1.27	0.188	1.05	0.531	0.840	0.826	0.0212	0.0114
12.5	6.68	10.0	2.29	0.886	0.789	0.610	1.68	0.302	8.53	2.81	1.52	4.28	0.229	0.171
10	8.25	11.9	1.76	0.693	0.774	0.560	1.29	0.244	6.64	2.21	1.50	3.36	0.120	0.0858
7.5	11.5	13.0	1.41	0.577	0.797	0.558	1.03	0.185	4.66	1.56	1.45	2.37	0.0504	0.0342
8	4.98	12.1	1.69	0.685	0.844	0.676	1.25	0.294	2.21	1.10	0.966	1.69	0.111	0.04[illegible]
6	7.14	13.1	1.32	0.564	0.862	0.677	1.01	0.222	1.50	0.748	0.918	1.16	0.0449	0.01[illegible]
4.5	9.16	17.4	0.950	0.408	0.842	0.623	0.720	0.170	1.10	0.557	0.905	0.856	0.0202	0.00[illegible]
4.25	10.1	17.2	0.905	0.397	0.848	0.637	0.700	0.160	0.995	0.505	0.890	0.778	0.0166	0.00620
9.5	5.85	9.56	1.01	0.485	0.604	0.487	0.970	0.276	4.56	1.81	1.28	2.76	0.157	0.0775
8	6.94	10.5	0.845	0.413	0.599	0.458	0.801	0.235	3.75	1.50	1.26	2.28	0.0958	0.0453
6.5	5.88	7.43	0.526	0.321	0.524	0.440	0.616	0.236	1.93	0.950	1.00	1.46	0.0750	0.0233

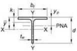


Table 1-9
MT-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem: Thickness, t_w		Stem: $\frac{t_w}{2}$	Stem: Area	Flange: Width, b_f		Flange: Thickness, t_f		Distance: k	Distance: Workable Gage
	in.^{2}	in.		in.		in.	in.^{2}	in.		in.		in.	in.
MT6.25×6.2[c,v]	1.82	6.27	6 1/4	0.155	1/8	1/16	0.971	3.75	3 3/4	0.228	1/4	9/16	–
×5.8[c,v]	1.70	6.25	6 1/4	0.155	1/8	1/16	0.969	3.50	3 1/2	0.211	3/16	9/16	–
MT6×5.9[c]	1.74	6.00	6	0.177	3/16	1/8	1.06	3.07	3 1/8	0.225	1/4	9/16	–
×5.4[c,v]	1.59	5.99	6	0.160	3/16	1/8	0.958	3.07	3 1/8	0.210	3/16	9/16	–
×5[c,v]	1.48	5.99	6	0.149	1/8	1/16	0.892	3.25	3 1/4	0.180	3/16	1/2	–
MT5×4.5[c]	1.33	5.00	5	0.157	3/16	1/8	0.785	2.69	2 3/4	0.206	3/16	9/16	–
×4[c,v]	1.19	4.98	5	0.141	1/8	1/16	0.701	2.69	2 3/4	0.182	3/16	9/16	–
MT5×3.75[c,v]	1.11	5.00	5	0.130	1/8	1/16	0.649	2.69	2 3/4	0.173	3/16	7/16	–
MT4×3.25[c]	0.959	4.00	4	0.135	1/8	1/16	0.540	2.28	2 1/4	0.189	3/16	9/16	–
×3.1[c]	0.911	4.00	4	0.129	1/8	1/16	0.516	2.28	2 1/4	0.177	3/16	7/16	–
MT3×2.2[c]	0.647	3.00	3	0.114	1/8	1/16	0.342	1.84	1 7/8	0.171	3/16	3/8	–
×1.85[c]	0.545	2.96	3	0.0980	1/8	1/16	0.290	2.00	2	0.129	1/8	5/16	–
MT2.5×9.45[t]	2.78	2.50	2 1/2	0.316	5/16	3/16	0.790	5.00	5	0.416	7/16	13/16	2 3/4[g]
MT2×3[f]	0.875	1.90	1 7/8	0.130	1/8	1/16	0.247	3.80	3 3/4	0.160	3/16	1/2	–

[c] Shape is slender for compression with $F_y = 36$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 36$ ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
[t] Shape has tapered flanges while all other MT-shapes have parallel flange surfaces.
[v] Shear strength controlled by buckling effects ($C_{v2} < 1.0$) with $F_y = 36$ ksi.
– Indicates flange is too narrow to establish a workable gage.

Table 1-9 (continued)
MT-Shapes
Properties

MT-SHAPES

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
6.2	8.22	40.4	7.29	1.61	2.01	1.74	2.92	0.372	1.00	0.536	0.746	0.839	0.0246	0.0284
5.8	8.29	40.3	6.94	1.57	2.03	1.84	2.86	0.808	0.756	0.432	0.669	0.684	0.0206	0.0268
5.9	6.82	33.9	6.61	1.61	1.96	1.89	2.89	1.13	0.543	0.354	0.561	0.575	0.0249	0.0337
5.4	7.31	37.4	6.03	1.46	1.95	1.86	2.63	1.05	0.506	0.330	0.566	0.532	0.0196	0.0250
5	9.03	40.2	5.62	1.36	1.96	1.86	2.45	1.08	0.517	0.318	0.594	0.509	0.0145	0.0202
4.5	6.53	31.8	3.47	1.00	1.62	1.54	1.81	0.808	0.336	0.250	0.505	0.403	0.0156	0.0138
4	7.39	35.3	3.08	0.894	1.62	1.52	1.61	0.809	0.296	0.220	0.502	0.354	0.0112	0.00989
3.75	7.77	38.4	2.91	0.836	1.63	1.51	1.51	0.759	0.281	0.209	0.505	0.334	0.00932	0.00792
3.25	6.03	29.6	1.57	0.558	1.29	1.18	1.01	0.472	0.188	0.165	0.444	0.264	0.00917	0.00463
3.1	6.44	31.0	1.50	0.533	1.29	1.18	0.967	0.497	0.176	0.154	0.441	0.247	0.00778	0.00402
2.2	5.38	26.3	0.579	0.268	0.949	0.841	0.483	0.190	0.0897	0.0973	0.374	0.155	0.00494	[illegible]
1.85	7.75	30.2	0.483	0.226	0.945	0.827	0.409	0.174	0.0863	0.0863	0.400	0.136	0.00265	[illegible]
9.45	6.01	7.91	1.05	0.528	0.617	0.512	1.03	0.276	4.35	1.74	1.26	2.66	0.156	0.0732
3	11.9	14.6	0.208	0.133	0.493	0.341	0.241	0.112	0.732	0.385	0.926	0.588	0.00919	0.00193

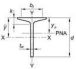


Table 1-10
ST-Shapes
Dimensions

Shape	Area, A	Depth, d		Stem				Flange				Distance	
				Thickness, t_w		$\frac{t_w}{2}$	Area	Width, b_f		Thickness, t_f		k	Workable Gage
	in.^{2}	in.		in.		in.	in.^{2}	in.		in.		in.	in.
ST12×60.5	17.8	12.3	12 1/4	0.800	13/16	7/16	9.80	8.05	8	1.09	1 1/16	2	4
×53	15.6	12.3	12 1/4	0.620	5/8	5/16	7.60	7.87	7 7/8	1.09	1 1/16	2	4
ST12×50	14.7	12.0	12	0.745	3/4	3/8	8.94	7.25	7 1/4	0.870	7/8	1 3/4	4
×45	13.2	12.0	12	0.625	5/8	5/16	7.50	7.13	7 1/8	0.870	7/8	1 3/4	4
×40[c]	11.7	12.0	12	0.500	1/2	1/4	6.00	7.00	7	0.870	7/8	1 3/4	4
ST10×48	14.1	10.2	10 1/8	0.800	13/16	7/16	8.12	7.20	7 1/4	0.920	15/16	1 3/4	4
×43	12.7	10.2	10 1/8	0.660	11/16	3/8	6.70	7.06	7	0.920	15/16	1 3/4	4
ST10×37.5	11.0	10.0	10	0.635	5/8	5/16	6.35	6.39	6 3/8	0.795	13/16	1 5/8	3 1/2[g]
×33	9.70	10.0	10	0.505	1/2	1/4	5.05	6.26	6 1/4	0.795	13/16	1 5/8	3 1/2[g]
ST9×35	10.3	9.00	9	0.711	11/16	3/8	6.40	6.25	6 1/4	0.691	11/16	1 1/2	3 1/2[g]
×27.35	8.02	9.00	9	0.461	7/16	1/4	4.15	6.00	6	0.691	11/16	1 1/2	3 1/2[g]
ST7.5×25	7.34	7.50	7 1/2	0.550	9/16	5/16	4.13	5.64	5 5/8	0.622	5/8	1 3/8	3 1/2[g]
×21.45	6.30	7.50	7 1/2	0.411	7/16	1/4	3.08	5.50	5 1/2	0.622	5/8	1 3/8	3 1/2[g]
ST6×25	7.33	6.00	6	0.687	11/16	3/8	4.12	5.48	5 1/2	0.659	11/16	1 7/16	3[g]
×20.4	5.96	6.00	6	0.462	7/16	1/4	2.77	5.25	5 1/4	0.659	11/16	1 7/16	3[g]
ST6×17.5	5.12	6.00	6	0.428	7/16	1/4	2.57	5.08	5 1/8	0.544	9/16	1 3/16	3[g]
×15.9	4.65	6.00	6	0.350	3/8	3/16	2.10	5.00	5	0.544	9/16	1 3/16	3[g]
ST5×17.5	5.14	5.00	5	0.594	5/8	5/16	2.97	4.94	5	0.491	1/2	1 1/8	2 3/4[g]
×12.7	3.72	5.00	5	0.311	5/16	3/16	1.56	4.66	4 5/8	0.491	1/2	1 1/8	2 3/4[g]
ST4×11.5	3.38	4.00	4	0.441	7/16	1/4	1.76	4.17	4 1/8	0.425	7/16	1	2 1/4[g]
×9.2	2.70	4.00	4	0.271	1/4	1/8	1.08	4.00	4	0.425	7/16	1	2 1/4[g]
ST3×8.6	2.53	3.00	3	0.465	7/16	1/4	1.40	3.57	3 5/8	0.359	3/8	13/16	–
×6.25	1.83	3.00	3	0.232	1/4	1/8	0.696	3.33	3 3/8	0.359	3/8	13/16	–
ST2.5×5	1.46	2.50	2 1/2	0.214	3/16	1/8	0.535	3.00	3	0.326	5/16	3/4	–
ST2×4.75	1.40	2.00	2	0.326	5/16	3/16	0.652	2.80	2 3/4	0.293	5/16	3/4	–
×3.85	1.13	2.00	2	0.193	3/16	1/8	0.386	2.66	2 5/8	0.293	5/16	3/4	–
ST1.5×3.75	1.10	1.50	1 1/2	0.349	3/8	3/16	0.524	2.51	2 1/2	0.260	1/4	5/8	–
×2.85	0.830	1.50	1 1/2	0.170	3/16	1/8	0.255	2.33	2 3/8	0.260	1/4	5/8	–

[c] Shape is slender for compression with F_y = 36 ksi.
[g] The actual size, combination and orientation of fastener components should be compared with the geometry of the cross section to ensure compatibility.
– Indicates flange is too narrow to establish a workable gage.

Table 1-10 (continued)
ST-Shapes
Properties

ST-SHAPES

Nom-inal Wt.	Compact Section Criteria		Axis X-X						Axis Y-Y				Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{d}{t_w}$	I	S	r	$\bar{y}$	Z	y_p	I	S	r	Z	J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{6}
60.5	3.69	15.4	259	30.1	3.82	3.63	54.5	1.26	41.5	10.3	1.53	18.1	6.38	27.5
53	3.61	19.8	216	24.1	3.72	3.28	43.3	1.02	38.4	9.76	1.57	16.7	5.05	15.0
50	4.17	16.1	215	26.3	3.83	3.84	47.5	2.16	23.7	6.55	1.27	12.0	3.76	19.5
45	4.10	19.2	190	22.6	3.79	3.60	41.1	1.42	22.3	6.27	1.30	11.2	3.01	12.1
40	4.02	24.0	162	18.6	3.72	3.30	33.6	0.909	21.0	6.00	1.34	10.4	2.44	6.94
48	3.91	12.7	143	20.3	3.18	3.13	36.9	1.35	25.0	6.93	1.33	12.5	4.16	15.0
43	3.84	15.4	124	17.2	3.13	2.91	31.1	0.972	23.3	6.59	1.36	11.6	3.30	9.17
37.5	4.02	15.7	109	15.8	3.15	3.07	28.6	1.34	14.8	4.62	1.16	8.36	2.28	7.21
33	3.94	19.8	92.9	12.9	3.10	2.81	23.4	0.841	13.7	4.39	1.19	7.70	1.78	4.02
35	4.52	12.7	84.5	14.0	2.87	2.94	25.1	1.78	12.0	3.84	1.08	7.17	2.02	7.03
27.35	4.34	19.5	62.3	9.60	2.79	2.51	17.3	0.737	10.4	3.45	1.14	6.06	1.16	2.26
25	4.53	13.6	40.5	7.72	2.35	2.25	14.0	0.826	7.79	2.76	1.03	4.99	1.05	2.02
21.45	4.42	18.2	32.9	5.99	2.29	2.01	10.8	0.605	7.13	2.59	1.06	4.54	0.765	0.995
25	4.17	8.73	25.1	6.04	1.85	1.84	11.0	0.758	7.79	2.84	1.03	5.16	1.36	1.97
20.4	3.98	13.0	18.9	4.27	1.78	1.58	7.71	0.577	6.74	2.57	1.06	4.43	0.842	0.787
17.5	4.67	14.0	17.2	3.95	1.83	1.65	7.12	0.543	4.92	1.94	0.980	3.40	0.524	0.556
15.9	4.60	17.1	14.8	3.30	1.78	1.51	5.94	0.480	4.66	1.87	1.00	3.22	0.438	0.364
17.5	5.03	8.42	12.5	3.62	1.56	1.56	6.58	0.673	4.15	1.68	0.899	3.10	0.633	0.725
12.7	4.75	16.1	7.79	2.05	1.45	1.20	3.70	0.403	3.36	1.44	0.950	2.49	0.300	0.173
11.5	4.91	9.07	5.00	1.76	1.22	1.15	3.19	0.439	2.13	1.02	0.795	1.84	0.271	0.168
9.2	4.71	14.8	3.49	1.14	1.14	0.942	2.07	0.336	1.84	0.922	0.827	1.59	0.167	0.0642
8.6	4.97	6.45	2.12	1.02	0.915	0.915	1.85	0.394	1.14	0.642	0.673	1.17	0.181	0.0772
6.25	4.64	12.9	1.26	0.547	0.831	0.692	1.01	0.271	0.901	0.541	0.702	0.930	0.0830	0.0197
5	4.60	11.7	0.671	0.348	0.677	0.570	0.650	0.239	0.597	0.398	0.638	0.686	0.0568	0.0100
4.75	4.78	6.13	0.462	0.319	0.575	0.553	0.592	0.250	0.444	0.317	0.564	0.565	0.0590	0.00995
3.85	4.54	10.4	0.307	0.198	0.522	0.448	0.381	0.204	0.374	0.281	0.576	0.485	0.0364	0.00457
3.75	4.83	4.30	0.200	0.187	0.426	0.432	0.351	0.219	0.289	0.230	0.513	0.411	0.0432	0.00496
2.85	4.48	8.82	0.114	0.0970	0.370	0.329	0.196	0.171	0.223	0.192	0.518	0.328	0.0216	0.00189

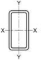


Table 1-11
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	Axis X-X *I*	*S*	*r*	*Z*
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS24×12×3/4	0.698	171.16	47.1	14.2	31.4	3440	287	8.55	359
×5/8	0.581	144.39	39.6	17.7	38.4	2940	245	8.62	304
×1/2	0.465	116.91	32.1	22.8	48.6	2420	202	8.68	248
HSS20×12×3/4	0.698	150.75	41.5	14.2	25.6	2190	219	7.26	270
×5/8	0.581	127.37	35.0	17.7	31.4	1880	188	7.33	230
×1/2	0.465	103.30	28.3	22.8	40.0	1550	155	7.39	188
×3/8	0.349	78.52	21.5	31.4	54.3	1200	120	7.45	144
×5/16	0.291	65.87	18.1	38.2	65.7	1010	101	7.48	122
HSS20×8×5/8	0.581	110.36	30.3	10.8	31.4	1440	144	6.89	185
×1/2	0.465	89.68	24.6	14.2	40.0	1190	119	6.96	152
×3/8	0.349	68.31	18.7	19.9	54.3	926	92.6	7.03	117
×5/16	0.291	57.36	15.7	24.5	65.7	786	78.6	7.07	98.6
HSS20×4×1/2	0.465	76.07	20.9	5.60	40.0	838	83.8	6.33	115
×3/8	0.349	58.10	16.0	8.46	54.3	657	65.7	6.42	89.3
×5/16	0.291	48.86	13.4	10.7	65.7	560	56.0	6.46	75.6
×1/4	0.233	39.43	10.8	14.2	82.8	458	45.8	6.50	61.5
HSS18×6×5/8	0.581	93.34	25.7	7.33	28.0	923	103	6.00	135
×1/2	0.465	76.07	20.9	9.90	35.7	770	85.6	6.07	112
×3/8	0.349	58.10	16.0	14.2	48.6	602	66.9	6.15	86.4
×5/16	0.291	48.86	13.4	17.6	58.9	513	57.0	6.18	73.1
×1/4	0.233	39.43	10.8	22.8	74.3	419	46.5	6.22	59.4
HSS16×12×3/4	0.698	130.33	35.9	14.2	19.9	1270	159	5.95	193
×5/8	0.581	110.36	30.3	17.7	24.5	1090	136	6.00	165
×1/2	0.465	89.68	24.6	22.8	31.4	904	113	6.06	135
×3/8	0.349	68.31	18.7	31.4	42.8	702	87.7	6.12	104
×5/16	0.291	57.36	15.7	38.2	52.0	595	74.4	6.15	87.7
HSS16×8×5/8	0.581	93.34	25.7	10.8	24.5	815	102	5.64	129
×1/2	0.465	76.07	20.9	14.2	31.4	679	84.9	5.70	106
×3/8	0.349	58.10	16.0	19.9	42.8	531	66.3	5.77	82.1
×5/16	0.291	48.86	13.4	24.5	52.0	451	56.4	5.80	69.4
×1/4	0.233	39.43	10.8	31.3	65.7	368	46.1	5.83	56.4

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS24–HSS16

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	S	r	Z	Depth	Width	J	C	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS24×12×$\frac{3}{4}$	1170	195	4.98	221	$20\frac{5}{8}$	$8\frac{5}{8}$	2850	366	5.80
×$\frac{5}{8}$	1000	167	5.03	188	$21\frac{3}{16}$	$9\frac{3}{16}$	2430	310	5.83
×$\frac{1}{2}$	829	138	5.08	154	$21\frac{3}{4}$	$9\frac{3}{4}$	1980	252	5.87
HSS20×12×$\frac{3}{4}$	988	165	4.88	190	$16\frac{5}{8}$	$8\frac{5}{8}$	2220	303	5.13
×$\frac{5}{8}$	851	142	4.93	162	$17\frac{3}{16}$	$9\frac{3}{16}$	1890	257	5.17
×$\frac{1}{2}$	705	117	4.99	132	$17\frac{3}{4}$	$9\frac{3}{4}$	1540	209	5.20
×$\frac{3}{8}$	547	91.1	5.04	102	$18\frac{5}{16}$	$10\frac{5}{16}$	1180	160	5.23
×$\frac{5}{16}$	464	77.3	5.07	85.8	$18\frac{5}{8}$	$10\frac{5}{8}$	997	134	5.25
HSS20×8×$\frac{5}{8}$	338	84.6	3.34	96.4	$17\frac{3}{16}$	$5\frac{3}{16}$	916	167	4.50
×$\frac{1}{2}$	283	70.8	3.39	79.5	$17\frac{3}{4}$	$5\frac{3}{4}$	757	137	4.53
×$\frac{3}{8}$	222	55.6	3.44	61.5	$18\frac{5}{16}$	$6\frac{5}{16}$	586	105	4.57
×$\frac{5}{16}$	189	47.4	3.47	52.0	$18\frac{5}{8}$	$6\frac{5}{8}$	496	88.3	4.58
HSS20×4×$\frac{1}{2}$	58.7	29.3	1.68	34.0	$17\frac{3}{4}$	–	195	63.8	3.87
×$\frac{3}{8}$	47.6	23.8	1.73	26.8	$18\frac{5}{16}$	$2\frac{5}{16}$	156	49.9	3.90
×$\frac{5}{16}$	41.2	20.6	1.75	22.9	$18\frac{5}{8}$	$2\frac{5}{8}$	134	42.4	3.92
×$\frac{1}{4}$	34.3	17.1	1.78	18.7	$18\frac{7}{8}$	$2\frac{7}{8}$	111	34.7	3.93
HSS18×6×$\frac{5}{8}$	158	52.7	2.48	61.0	$15\frac{3}{16}$	$3\frac{3}{16}$	462	109	3.83
×$\frac{1}{2}$	134	44.6	2.53	50.7	$15\frac{3}{4}$	$3\frac{3}{4}$	387	89.9	3.87
×$\frac{3}{8}$	106	35.5	2.58	39.5	$16\frac{5}{16}$	$4\frac{5}{16}$	302	69.5	3.90
×$\frac{5}{16}$	91.3	30.4	2.61	33.5	$16\frac{9}{16}$	$4\frac{9}{16}$	257	58.7	3.92
×$\frac{1}{4}$	75.1	25.0	2.63	27.3	$16\frac{7}{8}$	$4\frac{7}{8}$	210	47.7	3.93
HSS16x12×$\frac{3}{4}$	810	135	4.75	158	$12\frac{5}{8}$	$8\frac{5}{8}$	1610	240	4.47
×$\frac{5}{8}$	700	117	4.80	135	$13\frac{3}{16}$	$9\frac{3}{16}$	1370	204	4.50
×$\frac{1}{2}$	581	96.8	4.86	111	$13\frac{3}{4}$	$9\frac{3}{4}$	1120	166	4.53
×$\frac{3}{8}$	452	75.3	4.91	85.5	$14\frac{5}{16}$	$10\frac{5}{16}$	862	127	4.57
×$\frac{5}{16}$	384	64.0	4.94	72.2	$14\frac{5}{8}$	$10\frac{5}{8}$	727	107	4.58
HSS16×8×$\frac{5}{8}$	274	68.6	3.27	79.2	$13\frac{3}{16}$	$5\frac{3}{16}$	681	132	3.83
×$\frac{1}{2}$	230	57.6	3.32	65.5	$13\frac{3}{4}$	$5\frac{3}{4}$	563	108	3.87
×$\frac{3}{8}$	181	45.3	3.37	50.8	$14\frac{5}{16}$	$6\frac{5}{16}$	436	83.4	3.90
×$\frac{5}{16}$	155	38.7	3.40	43.0	$14\frac{5}{8}$	$6\frac{5}{8}$	369	70.4	3.92
×$\frac{1}{4}$	127	31.7	3.42	35.0	$14\frac{7}{8}$	$6\frac{7}{8}$	300	57.0	3.93

– Indicates flat depth or width is too small to establish a workable flat.

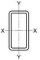


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	Axis X-X			
						I	S	r	Z
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS16×4×5/8	0.581	76.33	21.0	3.88	24.5	539	67.3	5.06	92.9
×1/2	0.465	62.46	17.2	5.60	31.4	455	56.9	5.15	77.3
×3/8	0.349	47.90	13.2	8.46	42.8	360	45.0	5.23	60.2
×5/16	0.291	40.35	11.1	10.7	52.0	308	38.5	5.27	51.1
×1/4	0.233	32.63	8.96	14.2	65.7	253	31.6	5.31	41.7
×3/16	0.174	24.73	6.76	20.0	89.0	193	24.2	5.35	31.7
HSS14×10×5/8	0.581	93.34	25.7	14.2	21.1	687	98.2	5.17	120
×1/2	0.465	76.07	20.9	18.5	27.1	573	81.8	5.23	98.8
×3/8	0.349	58.10	16.0	25.7	37.1	447	63.9	5.29	76.3
×5/16	0.291	48.86	13.4	31.4	45.1	380	54.3	5.32	64.6
×1/4	0.233	39.43	10.8	39.9	57.1	310	44.3	5.35	52.4
HSS14×6×5/8	0.581	76.33	21.0	7.33	21.1	478	68.3	4.77	88.7
×1/2	0.465	62.46	17.2	9.90	27.1	402	57.4	4.84	73.6
×3/8	0.349	47.90	13.2	14.2	37.1	317	45.3	4.91	57.3
×5/16	0.291	40.35	11.1	17.6	45.1	271	38.7	4.94	48.6
×1/4	0.233	32.63	8.96	22.8	57.1	222	31.7	4.98	39.6
×3/16	0.174	24.73	6.76	31.5	77.5	170	24.3	5.01	30.1
HSS14×4×5/8	0.581	67.82	18.7	3.88	21.1	373	53.3	4.47	73.1
×1/2	0.465	55.66	15.3	5.60	27.1	317	45.3	4.55	61.0
×3/8	0.349	42.79	11.8	8.46	37.1	252	36.0	4.63	47.8
×5/16	0.291	36.10	9.92	10.7	45.1	216	30.9	4.67	40.6
×1/4	0.233	29.23	8.03	14.2	57.1	178	25.4	4.71	33.2
×3/16	0.174	22.18	6.06	20.0	77.5	137	19.5	4.74	25.3
HSS12×10×1/2	0.465	69.27	19.0	18.5	22.8	395	65.9	4.56	78.8
×3/8	0.349	53.00	14.6	25.7	31.4	310	51.6	4.61	61.1
×5/16	0.291	44.60	12.2	31.4	38.2	264	44.0	4.64	51.7
×1/4	0.233	36.03	9.90	39.9	48.5	216	36.0	4.67	42.1
HSS12×8×5/8	0.581	76.33	21.0	10.8	17.7	397	66.1	4.34	82.1
×1/2	0.465	62.46	17.2	14.2	22.8	333	55.6	4.41	68.1
×3/8	0.349	47.90	13.2	19.9	31.4	262	43.7	4.47	53.0
×5/16	0.291	40.35	11.1	24.5	38.2	224	37.4	4.50	44.9
×1/4	0.233	32.63	8.96	31.3	48.5	184	30.6	4.53	36.6
×3/16	0.174	24.73	6.76	43.0	66.0	140	23.4	4.56	27.8

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS16-HSS12

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	S	r	Z	Depth	Width	J	C	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS16×4×5/8	54.1	27.0	1.60	32.5	13 3/16	–	174	60.5	3.17
×1/2	47.0	23.5	1.65	27.4	13 3/4	–	150	50.7	3.20
×3/8	38.3	19.1	1.71	21.7	14 5/16	2 5/16	120	39.7	3.23
×5/16	33.2	16.6	1.73	18.5	14 5/8	2 5/8	103	33.8	3.25
×1/4	27.7	13.8	1.76	15.2	14 7/8	2 7/8	85.2	27.6	3.27
×3/16	21.5	10.8	1.78	11.7	15 3/16	3 3/16	65.5	21.1	3.28
HSS14×10×5/8	407	81.5	3.98	95.1	11 3/16	7 3/16	832	146	3.83
×1/2	341	68.1	4.04	78.5	11 3/4	7 3/4	685	120	3.87
×3/8	267	53.4	4.09	60.7	12 5/16	8 5/16	528	91.8	3.90
×5/16	227	45.5	4.12	51.4	12 9/16	8 9/16	446	77.4	3.92
×1/4	186	37.2	4.14	41.8	12 7/8	8 7/8	362	62.6	3.93
HSS14×6×5/8	124	41.2	2.43	48.4	11 3/16	3 3/16	334	83.7	3.17
×1/2	105	35.1	2.48	40.4	11 3/4	3 3/4	279	69.3	3.20
×3/8	84.1	28.0	2.53	31.6	12 5/16	4 5/16	219	53.7	3.23
×5/16	72.3	24.1	2.55	26.9	12 9/16	4 9/16	186	45.5	3.25
×1/4	59.6	19.9	2.58	22.0	12 7/8	4 7/8	152	36.9	3.27
×3/16	45.9	15.3	2.61	16.7	13 3/16	5 3/16	116	28.0	3.28
HSS14×4×5/8	47.2	23.6	1.59	28.5	11 1/4	–	148	52.6	2.83
×1/2	41.2	20.6	1.64	24.1	11 3/4	–	127	44.1	2.87
×3/8	33.6	16.8	1.69	19.1	12 1/4	2 1/4	102	34.6	2.90
×5/16	29.2	14.6	1.72	16.4	12 5/8	2 5/8	87.7	29.5	2.92
×1/4	24.4	12.2	1.74	13.5	12 7/8	2 7/8	72.4	24.1	2.93
×3/16	19.0	9.48	1.77	10.3	13 1/8	3 1/8	55.8	18.4	2.95
HSS12×10×1/2	298	59.7	3.96	69.6	9 3/4	7 3/4	545	102	3.53
×3/8	234	46.9	4.01	54.0	10 5/16	8 5/16	421	78.3	3.57
×5/16	200	40.0	4.04	45.7	10 9/16	8 9/16	356	66.1	3.58
×1/4	164	32.7	4.07	37.2	10 7/8	8 7/8	289	53.5	3.60
HSS12×8×5/8	210	52.5	3.16	61.9	9 3/16	5 3/16	454	97.7	3.17
×1/2	178	44.4	3.21	51.5	9 3/4	5 3/4	377	80.4	3.20
×3/8	140	35.1	3.27	40.1	10 5/16	6 5/16	293	62.1	3.23
×5/16	120	30.1	3.29	34.1	10 9/16	6 9/16	248	52.4	3.25
×1/4	98.8	24.7	3.32	27.8	10 7/8	6 7/8	202	42.5	3.27
×3/16	75.7	18.9	3.35	21.1	11 1/8	7 1/8	153	32.2	3.28

– Indicates flat depth or width is too small to establish a workable flat.

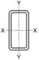


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	Axis X-X			
						I	S	r	Z
	in.	lb/ft	in.²			in.⁴	in.³	in.	in.³
HSS12×6×5/8	0.581	67.82	18.7	7.33	17.7	321	53.4	4.14	68.8
×1/2	0.465	55.66	15.3	9.90	22.8	271	45.2	4.21	57.4
×3/8	0.349	42.79	11.8	14.2	31.4	215	35.9	4.28	44.8
×5/16	0.291	36.10	9.92	17.6	38.2	184	30.7	4.31	38.1
×1/4	0.233	29.23	8.03	22.8	48.5	151	25.2	4.34	31.1
×3/16	0.174	22.18	6.06	31.5	66.0	116	19.4	4.38	23.7
HSS12×4×5/8	0.581	59.32	16.4	3.88	17.7	245	40.8	3.87	55.5
×1/2	0.465	48.85	13.5	5.60	22.8	210	34.9	3.95	46.7
×3/8	0.349	37.69	10.4	8.46	31.4	168	28.0	4.02	36.7
×5/16	0.291	31.84	8.76	10.7	38.2	144	24.1	4.06	31.3
×1/4	0.233	25.82	7.10	14.2	48.5	119	19.9	4.10	25.6
×3/16	0.174	19.63	5.37	20.0	66.0	91.8	15.3	4.13	19.6
HSS12×3 1/2×3/8	0.349	36.41	10.0	7.03	31.4	156	26.0	3.94	34.7
×5/16	0.291	30.78	8.46	9.03	38.2	134	22.4	3.98	29.6
HSS12×3×5/16	0.291	29.72	8.17	7.31	38.2	124	20.7	3.90	27.9
×1/4	0.233	24.12	6.63	9.88	48.5	103	17.2	3.94	22.9
×3/16	0.174	18.35	5.02	14.2	66.0	79.6	13.3	3.98	17.5
HSS12×2×5/16	0.291	27.59	7.59	3.87	38.2	104	17.4	3.71	24.5
×1/4	0.233	22.42	6.17	5.58	48.5	86.9	14.5	3.75	20.1
×3/16	0.174	17.08	4.67	8.49	66.0	67.4	11.2	3.80	15.5
HSS10×8×5/8	0.581	67.82	18.7	10.8	14.2	253	50.5	3.68	62.2
×1/2	0.465	55.66	15.3	14.2	18.5	214	42.7	3.73	51.9
×3/8	0.349	42.79	11.8	19.9	25.7	169	33.9	3.79	40.5
×5/16	0.291	36.10	9.92	24.5	31.4	145	29.0	3.82	34.4
×1/4	0.233	29.23	8.03	31.3	39.9	119	23.8	3.85	28.1
×3/16	0.174	22.18	6.06	43.0	54.5	91.4	18.3	3.88	21.4
HSS10×6×5/8	0.581	59.32	16.4	7.33	14.2	201	40.2	3.50	51.3
×1/2	0.465	48.85	13.5	9.90	18.5	171	34.3	3.57	43.0
×3/8	0.349	37.69	10.4	14.2	25.7	137	27.4	3.63	33.8
×5/16	0.291	31.84	8.76	17.6	31.4	118	23.5	3.66	28.8
×1/4	0.233	25.82	7.10	22.8	39.9	96.9	19.4	3.69	23.6
×3/16	0.174	19.63	5.37	31.5	54.5	74.6	14.9	3.73	18.0

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS12–HSS10

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS12×6×5/8	107	35.5	2.39	42.1	9 3/16	3 3/16	271	71.1	2.83
×1/2	91.1	30.4	2.44	35.2	9 3/4	3 3/4	227	59.0	2.87
×3/8	72.9	24.3	2.49	27.7	10 5/16	4 5/16	178	45.8	2.90
×5/16	62.8	20.9	2.52	23.6	10 9/16	4 9/16	152	38.8	2.92
×1/4	51.9	17.3	2.54	19.3	10 7/8	4 7/8	124	31.6	2.93
×3/16	40.0	13.3	2.57	14.7	11 3/16	5 3/16	94.6	24.0	2.95
HSS12×4×5/8	40.4	20.2	1.57	24.5	9 3/16	–	122	44.6	2.50
×1/2	35.3	17.7	1.62	20.9	9 3/4	–	105	37.5	2.53
×3/8	28.9	14.5	1.67	16.6	10 5/16	2 5/16	84.1	29.5	2.57
×5/16	25.2	12.6	1.70	14.2	10 5/8	2 5/8	72.4	25.2	2.58
×1/4	21.0	10.5	1.72	11.7	10 7/8	2 7/8	59.8	20.6	2.60
×3/16	16.4	8.20	1.75	9.00	11 3/16	3 3/16	46.1	15.7	2.62
HSS12×3 1/2×3/8	21.3	12.2	1.46	14.0	10 5/16	–	64.7	25.5	2.48
×5/16	18.6	10.6	1.48	12.1	10 5/8	–	56.0	21.8	2.50
HSS12×3×5/16	13.1	8.73	1.27	10.0	10 5/8	–	41.3	18.4	2.42
×1/4	11.1	7.38	1.29	8.28	10 7/8	–	34.5	15.1	2.43
×3/16	8.72	5.81	1.32	6.40	11 3/16	2 3/16	26.8	11.6	2.45
HSS12×2×5/16	5.10	5.10	0.820	6.05	10 5/8	–	17.6	11.6	2.25
×1/4	4.41	4.41	0.845	5.08	10 7/8	–	15.1	9.64	2.27
×3/16	3.55	3.55	0.872	3.97	11 3/16	–	12.0	7.49	2.28
HSS10×8×5/8	178	44.5	3.09	53.3	7 3/16	5 3/16	346	80.4	2.83
×1/2	151	37.8	3.14	44.5	7 3/4	5 3/4	288	66.4	2.87
×3/8	120	30.0	3.19	34.8	8 5/16	6 5/16	224	51.4	2.90
×5/16	103	25.7	3.22	29.6	8 5/8	6 5/8	190	43.5	2.92
×1/4	84.7	21.2	3.25	24.2	8 7/8	6 7/8	155	35.3	2.93
×3/16	65.1	16.3	3.28	18.4	9 3/16	7 3/16	118	26.7	2.95
HSS10×6×5/8	89.4	29.8	2.34	35.8	7 3/16	3 3/16	209	58.6	2.50
×1/2	76.8	25.6	2.39	30.1	7 3/4	3 3/4	176	48.7	2.53
×3/8	61.8	20.6	2.44	23.7	8 5/16	4 5/16	139	37.9	2.57
×5/16	53.3	17.8	2.47	20.2	8 5/8	4 5/8	118	32.2	2.58
×1/4	44.1	14.7	2.49	16.6	8 7/8	4 7/8	96.7	26.2	2.60
×3/16	34.1	11.4	2.52	12.7	9 3/16	5 3/16	73.8	19.9	2.62

– Indicates flat depth or width is too small to establish a workable flat.

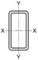


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	Axis X-X *I*	Axis X-X *S*	Axis X-X *r*	Axis X-X *Z*
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS10×5×3/8	0.349	35.13	9.67	11.3	25.7	120	24.1	3.53	30.4
×5/16	0.291	29.72	8.17	14.2	31.4	104	20.8	3.56	26.0
×1/4	0.233	24.12	6.63	18.5	39.9	85.8	17.2	3.60	21.3
×3/16	0.174	18.35	5.02	25.7	54.5	66.2	13.2	3.63	16.3
HSS10×4×5/8	0.581	50.81	14.0	3.88	14.2	149	29.9	3.26	40.3
×1/2	0.465	42.05	11.6	5.60	18.5	129	25.8	3.34	34.1
×3/8	0.349	32.58	8.97	8.46	25.7	104	20.8	3.41	27.0
×5/16	0.291	27.59	7.59	10.7	31.4	90.1	18.0	3.44	23.1
×1/4	0.233	22.42	6.17	14.2	39.9	74.7	14.9	3.48	19.0
×3/16	0.174	17.08	4.67	20.0	54.5	57.8	11.6	3.52	14.6
×1/8	0.116	11.56	3.16	31.5	83.2	39.8	7.97	3.55	10.0
HSS10×3 1/2×1/2	0.465	40.34	11.1	4.53	18.5	118	23.7	3.26	31.9
×3/8	0.349	31.31	8.62	7.03	25.7	96.1	19.2	3.34	25.3
×5/16	0.291	26.53	7.30	9.03	31.4	83.2	16.6	3.38	21.7
×1/4	0.233	21.57	5.93	12.0	39.9	69.1	13.8	3.41	17.9
×3/16	0.174	16.44	4.50	17.1	54.5	53.6	10.7	3.45	13.7
×1/8	0.116	11.13	3.04	27.2	83.2	37.0	7.40	3.49	9.37
HSS10×3×3/8	0.349	30.03	8.27	5.60	25.7	88.0	17.6	3.26	23.7
×5/16	0.291	25.46	7.01	7.31	31.4	76.3	15.3	3.30	20.3
×1/4	0.233	20.72	5.70	9.88	39.9	63.6	12.7	3.34	16.7
×3/16	0.174	15.80	4.32	14.2	54.5	49.4	9.87	3.38	12.8
×1/8	0.116	10.71	2.93	22.9	83.2	34.2	6.83	3.42	8.80
HSS10×2×3/8	0.349	27.48	7.58	2.73	25.7	71.7	14.3	3.08	20.3
×5/16	0.291	23.34	6.43	3.87	31.4	62.6	12.5	3.12	17.5
×1/4	0.233	19.02	5.24	5.58	39.9	52.5	10.5	3.17	14.4
×3/16	0.174	14.53	3.98	8.49	54.5	41.0	8.19	3.21	11.1
×1/8	0.116	9.86	2.70	14.2	83.2	28.5	5.70	3.25	7.65
HSS9×7×5/8	0.581	59.32	16.4	9.05	12.5	174	38.7	3.26	48.3
×1/2	0.465	48.85	13.5	12.1	16.4	149	33.0	3.32	40.5
×3/8	0.349	37.69	10.4	17.1	22.8	119	26.4	3.38	31.8
×5/16	0.291	31.84	8.76	21.1	27.9	102	22.6	3.41	27.1
×1/4	0.233	25.82	7.10	27.0	35.6	84.1	18.7	3.44	22.2
×3/16	0.174	19.63	5.37	37.2	48.7	64.7	14.4	3.47	16.9

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS10–HSS9

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	S	r	Z	Depth	Width	J	C	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS10×5×3/8	40.6	16.2	2.05	18.7	8 5/16	3 5/16	100	31.2	2.40
×5/16	35.2	14.1	2.07	16.0	8 5/8	3 5/8	86.0	26.5	2.42
×1/4	29.3	11.7	2.10	13.2	8 7/8	3 7/8	70.7	21.6	2.43
×3/16	22.7	9.09	2.13	10.1	9 3/16	4 3/16	54.1	16.5	2.45
HSS10×4×5/8	33.5	16.8	1.54	20.6	7 3/16	–	95.7	36.7	2.17
×1/2	29.5	14.7	1.59	17.6	7 3/4	–	82.6	31.0	2.20
×3/8	24.3	12.1	1.64	14.0	8 5/16	2 5/16	66.5	24.4	2.23
×5/16	21.2	10.6	1.67	12.1	8 5/8	2 5/8	57.3	20.9	2.25
×1/4	17.7	8.87	1.70	10.0	8 7/8	2 7/8	47.4	17.1	2.27
×3/16	13.9	6.93	1.72	7.66	9 3/16	3 3/16	36.5	13.1	2.28
×1/8	9.65	4.83	1.75	5.26	9 7/16	3 7/16	25.1	8.90	2.30
HSS10×3 1/2×1/2	21.4	12.2	1.39	14.7	7 3/4	–	63.2	26.5	2.12
×3/8	17.8	10.2	1.44	11.8	8 5/16	–	51.5	21.1	2.15
×5/16	15.6	8.92	1.46	10.2	8 5/8	–	44.6	18.0	2.17
×1/4	13.1	7.51	1.49	8.45	8 7/8	–	37.0	14.8	2.18
×3/16	10.3	5.89	1.51	6.52	9 3/16	2 11/16	28.6	11.4	2.20
×1/8	7.22	4.12	1.54	4.48	9 7/16	2 15/16	19.8	7.75	2.22
HSS10×3×3/8	12.4	8.28	1.22	9.73	8 5/16	–	37.8	17.7	2.07
×5/16	11.0	7.30	1.25	8.42	8 5/8	–	33.0	15.2	2.08
×1/4	9.28	6.19	1.28	6.99	8 7/8	–	27.6	12.5	2.10
×3/16	7.33	4.89	1.30	5.41	9 3/16	2 3/16	21.5	9.64	2.12
×1/8	5.16	3.44	1.33	3.74	9 7/16	2 7/16	14.9	6.61	2.13
HSS10×2×3/8	4.70	4.70	0.787	5.76	8 5/16	–	15.9	11.0	1.90
×5/16	4.24	4.24	0.812	5.06	8 5/8	–	14.2	9.56	1.92
×1/4	3.67	3.67	0.838	4.26	8 7/8	–	12.2	7.99	1.93
×3/16	2.97	2.97	0.864	3.34	9 3/16	–	9.74	6.22	1.95
×1/8	2.14	2.14	0.890	2.33	9 7/16	–	6.90	4.31	1.97
HSS9×7×5/8	117	33.5	2.68	40.5	6 3/16	4 3/16	235	62.0	2.50
×1/2	100	28.7	2.73	34.0	6 3/4	4 3/4	197	51.5	2.53
×3/8	80.4	23.0	2.78	26.7	7 5/16	5 5/16	154	40.0	2.57
×5/16	69.2	19.8	2.81	22.8	7 5/8	5 5/8	131	33.9	2.58
×1/4	57.2	16.3	2.84	18.7	7 7/8	5 7/8	107	27.6	2.60
×3/16	44.1	12.6	2.87	14.3	8 3/16	6 3/16	81.7	20.9	2.62

– Indicates flat depth or width is too small to establish a workable flat.

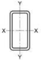


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	Axis X-X I	Axis X-X S	Axis X-X r	Axis X-X Z
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS9×5×5/8	0.581	50.81	14.0	5.61	12.5	133	29.6	3.08	38.5
×1/2	0.465	42.05	11.6	7.75	16.4	115	25.5	3.14	32.5
×3/8	0.349	32.58	8.97	11.3	22.8	92.5	20.5	3.21	25.7
×5/16	0.291	27.59	7.59	14.2	27.9	79.8	17.7	3.24	22.0
×1/4	0.233	22.42	6.17	18.5	35.6	66.1	14.7	3.27	18.1
×3/16	0.174	17.08	4.67	25.7	48.7	51.1	11.4	3.31	13.8
HSS9×3×1/2	0.465	35.24	9.74	3.45	16.4	80.8	18.0	2.88	24.6
×3/8	0.349	27.48	7.58	5.60	22.8	66.3	14.7	2.96	19.7
×5/16	0.291	23.34	6.43	7.31	27.9	57.7	12.8	3.00	16.9
×1/4	0.233	19.02	5.24	9.88	35.6	48.2	10.7	3.04	14.0
×3/16	0.174	14.53	3.98	14.2	48.7	37.6	8.35	3.07	10.8
HSS8×6×5/8	0.581	50.81	14.0	7.33	10.8	114	28.5	2.85	36.1
×1/2	0.465	42.05	11.6	9.90	14.2	98.2	24.6	2.91	30.5
×3/8	0.349	32.58	8.97	14.2	19.9	79.1	19.8	2.97	24.1
×5/16	0.291	27.59	7.59	17.6	24.5	68.3	17.1	3.00	20.6
×1/4	0.233	22.42	6.17	22.8	31.3	56.6	14.2	3.03	16.9
×3/16	0.174	17.08	4.67	31.5	43.0	43.7	10.9	3.06	13.0
HSS8×4×5/8	0.581	42.30	11.7	3.88	10.8	82.0	20.5	2.64	27.4
×1/2	0.465	35.24	9.74	5.60	14.2	71.8	17.9	2.71	23.5
×3/8	0.349	27.48	7.58	8.46	19.9	58.7	14.7	2.78	18.8
×5/16	0.291	23.34	6.43	10.7	24.5	51.0	12.8	2.82	16.1
×1/4	0.233	19.02	5.24	14.2	31.3	42.5	10.6	2.85	13.3
×3/16	0.174	14.53	3.98	20.0	43.0	33.1	8.27	2.88	10.2
×1/8	0.116	9.86	2.70	31.5	66.0	22.9	5.73	2.92	7.02
HSS8×3×1/2	0.465	31.84	8.81	3.45	14.2	58.6	14.6	2.58	20.0
×3/8	0.349	24.93	6.88	5.60	19.9	48.5	12.1	2.65	16.1
×5/16	0.291	21.21	5.85	7.31	24.5	42.4	10.6	2.69	13.9
×1/4	0.233	17.32	4.77	9.88	31.3	35.5	8.88	2.73	11.5
×3/16	0.174	13.25	3.63	14.2	43.0	27.8	6.94	2.77	8.87
×1/8	0.116	9.01	2.46	22.9	66.0	19.3	4.83	2.80	6.11

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS9–HSS8

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.³	ft²/ft
HSS9×5×5/8	52.0	20.8	1.92	25.3	6 3/16	2 3/16	128	42.5	2.17
×1/2	45.2	18.1	1.97	21.5	6 3/4	2 3/4	109	35.6	2.20
×3/8	36.8	14.7	2.03	17.1	7 5/16	3 5/16	86.9	27.9	2.23
×5/16	32.0	12.8	2.05	14.6	7 5/8	3 5/8	74.4	23.8	2.25
×1/4	26.6	10.6	2.08	12.0	7 7/8	3 7/8	61.2	19.4	2.27
×3/16	20.7	8.28	2.10	9.25	8 3/16	4 3/16	46.9	14.8	2.28
HSS9×3×1/2	13.2	8.81	1.17	10.8	6 3/4	–	40.0	19.7	1.87
×3/8	11.2	7.45	1.21	8.80	7 5/16	–	33.1	15.8	1.90
×5/16	9.88	6.59	1.24	7.63	7 5/8	–	28.9	13.6	1.92
×1/4	8.38	5.59	1.27	6.35	7 7/8	–	24.2	11.3	1.93
×3/16	6.64	4.42	1.29	4.92	8 3/16	2 3/16	18.9	8.66	1.95
HSS8×6×5/8	72.3	24.1	2.27	29.5	5 3/16	3 3/16	150	46.0	2.17
×1/2	62.5	20.8	2.32	24.9	5 3/4	3 3/4	127	38.4	2.20
×3/8	50.6	16.9	2.38	19.8	6 5/16	4 5/16	100	30.0	2.23
×5/16	43.8	14.6	2.40	16.9	6 5/8	4 5/8	85.8	25.5	2.25
×1/4	36.4	12.1	2.43	13.9	6 7/8	4 7/8	70.3	20.8	2.27
×3/16	28.2	9.39	2.46	10.7	7 3/16	5 3/16	53.7	15.8	2.28
HSS8×4×5/8	26.6	13.3	1.51	16.6	5 3/16	–	70.3	28.7	1.83
×1/2	23.6	11.8	1.56	14.3	5 3/4	–	61.1	24.4	1.87
×3/8	19.6	9.80	1.61	11.5	6 5/16	2 5/16	49.3	19.3	1.90
×5/16	17.2	8.58	1.63	9.91	6 5/8	2 5/8	42.6	16.5	1.92
×1/4	14.4	7.21	1.66	8.20	6 7/8	2 7/8	35.3	13.6	1.93
×3/16	11.3	5.65	1.69	6.33	7 3/16	3 3/16	27.2	10.4	1.95
×1/8	7.90	3.95	1.71	4.36	7 7/16	3 7/16	18.7	7.10	1.97
HSS8×3×1/2	11.7	7.81	1.15	9.64	5 3/4	–	34.3	17.4	1.70
×3/8	10.0	6.63	1.20	7.88	6 5/16	–	28.5	14.0	1.73
×5/16	8.81	5.87	1.23	6.84	6 5/8	–	24.9	12.1	1.75
×1/4	7.49	4.99	1.25	5.70	6 7/8	–	20.8	10.0	1.77
×3/16	5.94	3.96	1.28	4.43	7 3/16	2 3/16	16.2	7.68	1.78
×1/8	4.20	2.80	1.31	3.07	7 7/16	2 7/16	11.3	5.27	1.80

– Indicates flat depth or width is too small to establish a workable flat.

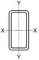


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	Axis X-X			
						I	S	r	Z
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS8×2×3/8	0.349	22.37	6.18	2.73	19.9	38.2	9.56	2.49	13.4
×5/16	0.291	19.08	5.26	3.87	24.5	33.7	8.43	2.53	11.6
×1/4	0.233	15.62	4.30	5.58	31.3	28.5	7.12	2.57	9.68
×3/16	0.174	11.97	3.28	8.49	43.0	22.4	5.61	2.61	7.51
×1/8	0.116	8.16	2.23	14.2	66.0	15.7	3.93	2.65	5.19
HSS7×5×1/2	0.465	35.24	9.74	7.75	12.1	60.6	17.3	2.50	21.9
×3/8	0.349	27.48	7.58	11.3	17.1	49.5	14.1	2.56	17.5
×5/16	0.291	23.34	6.43	14.2	21.1	43.0	12.3	2.59	15.0
×1/4	0.233	19.02	5.24	18.5	27.0	35.9	10.2	2.62	12.4
×3/16	0.174	14.53	3.98	25.7	37.2	27.9	7.96	2.65	9.52
×1/8	0.116	9.86	2.70	40.1	57.3	19.3	5.52	2.68	6.53
HSS7×4×1/2	0.465	31.84	8.81	5.60	12.1	50.7	14.5	2.40	18.8
×3/8	0.349	24.93	6.88	8.46	17.1	41.8	11.9	2.46	15.1
×5/16	0.291	21.21	5.85	10.7	21.1	36.5	10.4	2.50	13.1
×1/4	0.233	17.32	4.77	14.2	27.0	30.5	8.72	2.53	10.8
×3/16	0.174	13.25	3.63	20.0	37.2	23.8	6.81	2.56	8.33
×1/8	0.116	9.01	2.46	31.5	57.3	16.6	4.73	2.59	5.73
HSS7×3×1/2	0.465	28.43	7.88	3.45	12.1	40.7	11.6	2.27	15.8
×3/8	0.349	22.37	6.18	5.60	17.1	34.1	9.73	2.35	12.8
×5/16	0.291	19.08	5.26	7.31	21.1	29.9	8.54	2.38	11.1
×1/4	0.233	15.62	4.30	9.88	27.0	25.2	7.19	2.42	9.22
×3/16	0.174	11.97	3.28	14.2	37.2	19.8	5.65	2.45	7.14
×1/8	0.116	8.16	2.23	22.9	57.3	13.8	3.95	2.49	4.93
HSS7×2×1/4	0.233	13.91	3.84	5.58	27.0	19.8	5.67	2.27	7.64
×3/16	0.174	10.70	2.93	8.49	37.2	15.7	4.49	2.31	5.95
×1/8	0.116	7.31	2.00	14.2	57.3	11.1	3.16	2.35	4.13
HSS6×5×1/2	0.465	31.84	8.81	7.75	9.90	41.1	13.7	2.16	17.2
×3/8	0.349	24.93	6.88	11.3	14.2	33.9	11.3	2.22	13.8
×5/16	0.291	21.21	5.85	14.2	17.6	29.6	9.85	2.25	11.9
×1/4	0.233	17.32	4.77	18.5	22.8	24.7	8.25	2.28	9.87
×3/16	0.174	13.25	3.63	25.7	31.5	19.3	6.44	2.31	7.62
×1/8	0.116	9.01	2.46	40.1	48.7	13.4	4.48	2.34	5.24

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS8–HSS6

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	S	r	Z	Depth	Width	J	C	
	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.³	ft²/ft
HSS8×2×3/8	3.73	3.73	0.777	4.61	6 5/16	–	12.1	8.65	1.57
×5/16	3.38	3.38	0.802	4.06	6 5/8	–	10.9	7.57	1.58
×1/4	2.94	2.94	0.827	3.43	6 7/8	–	9.36	6.35	1.60
×3/16	2.39	2.39	0.853	2.70	7 3/16	–	7.48	4.95	1.62
×1/8	1.72	1.72	0.879	1.90	7 7/16	–	5.30	3.44	1.63
HSS7×5×1/2	35.6	14.2	1.91	17.3	4 3/4	2 3/4	75.8	27.2	1.87
×3/8	29.3	11.7	1.97	13.8	5 5/16	3 5/16	60.6	21.4	1.90
×5/16	25.5	10.2	1.99	11.9	5 5/8	3 5/8	52.1	18.3	1.92
×1/4	21.3	8.53	2.02	9.83	5 7/8	3 7/8	42.9	15.0	1.93
×3/16	16.6	6.65	2.05	7.57	6 3/16	4 3/16	32.9	11.4	1.95
×1/8	11.6	4.63	2.07	5.20	6 7/16	4 7/16	22.5	7.79	1.97
HSS7×4×1/2	20.7	10.4	1.53	12.6	4 3/4	–	50.5	21.1	1.70
×3/8	17.3	8.63	1.58	10.2	5 5/16	2 5/16	41.0	16.8	1.73
×5/16	15.2	7.58	1.61	8.83	5 5/8	2 5/8	35.4	14.4	1.75
×1/4	12.8	6.38	1.64	7.33	5 7/8	2 7/8	29.3	11.8	1.77
×3/16	10.0	5.02	1.66	5.67	6 1/8	3 1/8	22.7	9.07	1.78
×1/8	7.03	3.51	1.69	3.91	6 7/16	3 7/16	15.6	6.20	1.80
HSS7×3×1/2	10.2	6.80	1.14	8.46	4 3/4	–	28.6	15.0	1.53
×3/8	8.71	5.81	1.19	6.95	5 5/16	–	23.9	12.1	1.57
×5/16	7.74	5.16	1.21	6.05	5 5/8	–	20.9	10.5	1.58
×1/4	6.60	4.40	1.24	5.06	5 7/8	–	17.5	8.68	1.60
×3/16	5.24	3.50	1.26	3.94	6 3/16	2 3/16	13.7	6.69	1.62
×1/8	3.71	2.48	1.29	2.73	6 7/16	2 7/16	9.48	4.60	1.63
HSS7×2×1/4	2.58	2.58	0.819	3.02	5 7/8	–	7.95	5.52	1.43
×3/16	2.10	2.10	0.845	2.39	6 3/16	–	6.35	4.32	1.45
×1/8	1.52	1.52	0.871	1.68	6 7/16	–	4.51	3.00	1.47
HSS6×5×1/2	30.8	12.3	1.87	15.2	3 3/4	2 3/4	59.8	23.0	1.70
×3/8	25.5	10.2	1.92	12.2	4 5/16	3 5/16	48.1	18.2	1.73
×5/16	22.3	8.91	1.95	10.5	4 5/8	3 5/8	41.4	15.6	1.75
×1/4	18.7	7.47	1.98	8.72	4 7/8	3 7/8	34.2	12.8	1.77
×3/16	14.6	5.84	2.01	6.73	5 3/16	4 3/16	26.3	9.76	1.78
×1/8	10.2	4.07	2.03	4.63	5 7/16	4 7/16	18.0	6.66	1.80

– Indicates flat depth or width is too small to establish a workable flat.

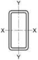


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	Axis X-X			
						I	*S*	*r*	*Z*
	in.	lb/ft	in.²			in.⁴	in.³	in.	in.³
HSS6×4×1/2	0.465	28.43	7.88	5.60	9.90	34.0	11.3	2.08	14.6
×3/8	0.349	22.37	6.18	8.46	14.2	28.3	9.43	2.14	11.9
×5/16	0.291	19.08	5.26	10.7	17.6	24.8	8.27	2.17	10.3
×1/4	0.233	15.62	4.30	14.2	22.8	20.9	6.96	2.20	8.53
×3/16	0.174	11.97	3.28	20.0	31.5	16.4	5.46	2.23	6.60
×1/8	0.116	8.16	2.23	31.5	48.7	11.4	3.81	2.26	4.56
HSS6×3×1/2	0.465	25.03	6.95	3.45	9.90	26.8	8.95	1.97	12.1
×3/8	0.349	19.82	5.48	5.60	14.2	22.7	7.57	2.04	9.90
×5/16	0.291	16.96	4.68	7.31	17.6	20.1	6.69	2.07	8.61
×1/4	0.233	13.91	3.84	9.88	22.8	17.0	5.66	2.10	7.19
×3/16	0.174	10.70	2.93	14.2	31.5	13.4	4.47	2.14	5.59
×1/8	0.116	7.31	2.00	22.9	48.7	9.43	3.14	2.17	3.87
HSS6×2×3/8	0.349	17.27	4.78	2.73	14.2	17.1	5.71	1.89	7.93
×5/16	0.291	14.83	4.10	3.87	17.6	15.3	5.11	1.93	6.95
×1/4	0.233	12.21	3.37	5.58	22.8	13.1	4.37	1.97	5.84
×3/16	0.174	9.42	2.58	8.49	31.5	10.5	3.49	2.01	4.58
×1/8	0.116	6.46	1.77	14.2	48.7	7.42	2.47	2.05	3.19
HSS5×4×1/2	0.465	25.03	6.95	5.60	7.75	21.2	8.49	1.75	10.9
×3/8	0.349	19.82	5.48	8.46	11.3	17.9	7.17	1.81	8.96
×5/16	0.291	16.96	4.68	10.7	14.2	15.8	6.32	1.84	7.79
×1/4	0.233	13.91	3.84	14.2	18.5	13.4	5.35	1.87	6.49
×3/16	0.174	10.70	2.93	20.0	25.7	10.6	4.22	1.90	5.05
×1/8	0.116	7.31	2.00	31.5	40.1	7.42	2.97	1.93	3.50
HSS5×3×1/2	0.465	21.63	6.02	3.45	7.75	16.4	6.57	1.65	8.83
×3/8	0.349	17.27	4.78	5.60	11.3	14.1	5.65	1.72	7.34
×5/16	0.291	14.83	4.10	7.31	14.2	12.6	5.03	1.75	6.42
×1/4	0.233	12.21	3.37	9.88	18.5	10.7	4.29	1.78	5.38
×3/16	0.174	9.42	2.58	14.2	25.7	8.53	3.41	1.82	4.21
×1/8	0.116	6.46	1.77	22.9	40.1	6.03	2.41	1.85	2.93

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS6–HSS5

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	$in.^4$	$in.^3$	in.	$in.^3$	in.	in.	$in.^4$	$in.^3$	ft^2/ft
HSS6×4×1/2	17.8	8.89	1.50	11.0	3 3/4	–	40.3	17.8	1.53
×3/8	14.9	7.47	1.55	8.94	4 5/16	2 5/16	32.8	14.2	1.57
×5/16	13.2	6.58	1.58	7.75	4 5/8	2 5/8	28.4	12.2	1.58
×1/4	11.1	5.56	1.61	6.45	4 7/8	2 7/8	23.6	10.1	1.60
×3/16	8.76	4.38	1.63	5.00	5 3/16	3 3/16	18.2	7.74	1.62
×1/8	6.15	3.08	1.66	3.46	5 7/16	3 7/16	12.6	5.30	1.63
HSS6×3×1/2	8.69	5.79	1.12	7.28	3 3/4	–	23.1	12.7	1.37
×3/8	7.48	4.99	1.17	6.03	4 5/16	–	19.3	10.3	1.40
×5/16	6.67	4.45	1.19	5.27	4 5/8	–	16.9	8.91	1.42
×1/4	5.70	3.80	1.22	4.41	4 7/8	–	14.2	7.39	1.43
×3/16	4.55	3.03	1.25	3.45	5 3/16	2 3/16	11.1	5.71	1.45
×1/8	3.23	2.15	1.27	2.40	5 7/16	2 7/16	7.73	3.93	1.47
HSS6×2×3/8	2.77	2.77	0.760	3.46	4 5/16	–	8.42	6.35	1.23
×5/16	2.52	2.52	0.785	3.07	4 5/8	–	7.60	5.58	1.25
×1/4	2.21	2.21	0.810	2.61	4 7/8	–	6.55	4.70	1.27
×3/16	1.80	1.80	0.836	2.07	5 3/16	–	5.24	3.68	1.28
×1/8	1.31	1.31	0.861	1.46	5 7/16	–	3.72	2.57	1.30
HSS5×4×1/2	14.9	7.43	1.46	9.35	2 3/4	–	30.3	14.5	1.37
×3/8	12.6	6.30	1.52	7.67	3 5/16	2 5/16	24.9	11.7	1.40
×5/16	11.1	5.57	1.54	6.67	3 5/8	2 5/8	21.7	10.1	1.42
×1/4	9.46	4.73	1.57	5.57	3 7/8	2 7/8	18.0	8.32	1.43
×3/16	7.48	3.74	1.60	4.34	4 3/16	3 3/16	14.0	6.41	1.45
×1/8	5.27	2.64	1.62	3.01	4 7/16	3 7/16	9.66	4.39	1.47
HSS5×3×1/2	7.18	4.78	1.09	6.10	2 3/4	–	17.6	10.3	1.20
×3/8	6.25	4.16	1.14	5.10	3 5/16	–	14.9	8.44	1.23
×5/16	5.60	3.73	1.17	4.48	3 5/8	–	13.1	7.33	1.25
×1/4	4.81	3.21	1.19	3.77	3 7/8	–	11.0	6.10	1.27
×3/16	3.85	2.57	1.22	2.96	4 3/16	2 3/16	8.64	4.73	1.28
×1/8	2.75	1.83	1.25	2.07	4 7/16	2 7/16	6.02	3.26	1.30

– Indicates flat depth or width is too small to establish a workable flat.

Menu

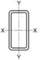


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	Axis X-X I	Axis X-X S	Axis X-X r	Axis X-X Z
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS5×2$^1/_2$×$^1/_4$	0.233	11.36	3.14	7.73	18.5	9.40	3.76	1.73	4.83
×$^3/_{16}$	0.174	8.78	2.41	11.4	25.7	7.51	3.01	1.77	3.79
×$^1/_8$	0.116	6.03	1.65	18.6	40.1	5.34	2.14	1.80	2.65
HSS5×2×$^3/_8$	0.349	14.72	4.09	2.73	11.3	10.4	4.14	1.59	5.71
×$^5/_{16}$	0.291	12.70	3.52	3.87	14.2	9.35	3.74	1.63	5.05
×$^1/_4$	0.233	10.51	2.91	5.58	18.5	8.08	3.23	1.67	4.27
×$^3/_{16}$	0.174	8.15	2.24	8.49	25.7	6.50	2.60	1.70	3.37
×$^1/_8$	0.116	5.61	1.54	14.2	40.1	4.65	1.86	1.74	2.37
HSS4×3×$^3/_8$	0.349	14.72	4.09	5.60	8.46	7.93	3.97	1.39	5.12
×$^5/_{16}$	0.291	12.70	3.52	7.31	10.7	7.14	3.57	1.42	4.51
×$^1/_4$	0.233	10.51	2.91	9.88	14.2	6.15	3.07	1.45	3.81
×$^3/_{16}$	0.174	8.15	2.24	14.2	20.0	4.93	2.47	1.49	3.00
×$^1/_8$	0.116	5.61	1.54	22.9	31.5	3.52	1.76	1.52	2.11
HSS4×2$^1/_2$×$^3/_8$	0.349	13.44	3.74	4.16	8.46	6.77	3.38	1.35	4.48
×$^5/_{16}$	0.291	11.64	3.23	5.59	10.7	6.13	3.07	1.38	3.97
×$^1/_4$	0.233	9.66	2.67	7.73	14.2	5.32	2.66	1.41	3.38
×$^3/_{16}$	0.174	7.51	2.06	11.4	20.0	4.30	2.15	1.44	2.67
×$^1/_8$	0.116	5.18	1.42	18.6	31.5	3.09	1.54	1.47	1.88
HSS4×2×$^3/_8$	0.349	12.17	3.39	2.73	8.46	5.60	2.80	1.29	3.84
×$^5/_{16}$	0.291	10.58	2.94	3.87	10.7	5.13	2.56	1.32	3.43
×$^1/_4$	0.233	8.81	2.44	5.58	14.2	4.49	2.25	1.36	2.94
×$^3/_{16}$	0.174	6.87	1.89	8.49	20.0	3.66	1.83	1.39	2.34
×$^1/_8$	0.116	4.75	1.30	14.2	31.5	2.65	1.32	1.43	1.66
HSS3$^1/_2$×2$^1/_2$×$^3/_8$	0.349	12.17	3.39	4.16	7.03	4.75	2.72	1.18	3.59
×$^5/_{16}$	0.291	10.58	2.94	5.59	9.03	4.34	2.48	1.22	3.20
×$^1/_4$	0.233	8.81	2.44	7.73	12.0	3.79	2.17	1.25	2.74
×$^3/_{16}$	0.174	6.87	1.89	11.4	17.1	3.09	1.76	1.28	2.18
×$^1/_8$	0.116	4.75	1.30	18.6	27.2	2.23	1.28	1.31	1.54
HSS3$^1/_2$×2×$^1/_4$	0.233	7.96	2.21	5.58	12.0	3.17	1.81	1.20	2.36
×$^3/_{16}$	0.174	6.23	1.71	8.49	17.1	2.61	1.49	1.23	1.89
×$^1/_8$	0.116	4.33	1.19	14.2	27.2	1.90	1.09	1.27	1.34

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS5–HSS3$\frac{1}{2}$

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	S	r	Z	Depth	Width	J	C	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS5×2$\frac{1}{2}$×$\frac{1}{4}$	3.13	2.50	0.999	2.95	3$\frac{7}{8}$	–	7.93	4.99	1.18
×$\frac{3}{16}$	2.53	2.03	1.02	2.33	4$\frac{3}{16}$	–	6.26	3.89	1.20
×$\frac{1}{8}$	1.82	1.46	1.05	1.64	4$\frac{7}{16}$	–	4.40	2.70	1.22
HSS5×2×$\frac{3}{8}$	2.28	2.28	0.748	2.88	3$\frac{5}{16}$	–	6.61	5.20	1.07
×$\frac{5}{16}$	2.10	2.10	0.772	2.57	3$\frac{5}{8}$	–	5.99	4.59	1.08
×$\frac{1}{4}$	1.84	1.84	0.797	2.20	3$\frac{7}{8}$	–	5.17	3.88	1.10
×$\frac{3}{16}$	1.51	1.51	0.823	1.75	4$\frac{3}{16}$	–	4.15	3.05	1.12
×$\frac{1}{8}$	1.10	1.10	0.848	1.24	4$\frac{7}{16}$	–	2.95	2.13	1.13
HSS4×3×$\frac{3}{8}$	5.01	3.34	1.11	4.18	2$\frac{5}{16}$	–	10.6	6.59	1.07
×$\frac{5}{16}$	4.52	3.02	1.13	3.69	2$\frac{5}{8}$	–	9.41	5.75	1.08
×$\frac{1}{4}$	3.91	2.61	1.16	3.12	2$\frac{7}{8}$	–	7.96	4.81	1.10
×$\frac{3}{16}$	3.16	2.10	1.19	2.46	3$\frac{3}{16}$	–	6.26	3.74	1.12
×$\frac{1}{8}$	2.27	1.51	1.21	1.73	3$\frac{7}{16}$	–	4.38	2.59	1.13
HSS4×2$\frac{1}{2}$×$\frac{3}{8}$	3.17	2.54	0.922	3.20	2$\frac{5}{16}$	–	7.57	5.32	0.983
×$\frac{5}{16}$	2.89	2.32	0.947	2.85	2$\frac{5}{8}$	–	6.77	4.67	1.00
×$\frac{1}{4}$	2.53	2.02	0.973	2.43	2$\frac{7}{8}$	–	5.78	3.93	1.02
×$\frac{3}{16}$	2.06	1.65	0.999	1.93	3$\frac{1}{8}$	–	4.59	3.08	1.03
×$\frac{1}{8}$	1.49	1.19	1.03	1.36	3$\frac{7}{16}$	–	3.23	2.14	1.05
HSS4×2×$\frac{3}{8}$	1.80	1.80	0.729	2.31	2$\frac{5}{16}$	–	4.83	4.04	0.900
×$\frac{5}{16}$	1.67	1.67	0.754	2.08	2$\frac{5}{8}$	–	4.40	3.59	0.917
×$\frac{1}{4}$	1.48	1.48	0.779	1.79	2$\frac{7}{8}$	–	3.82	3.05	0.933
×$\frac{3}{16}$	1.22	1.22	0.804	1.43	3$\frac{3}{16}$	–	3.08	2.41	0.950
×$\frac{1}{8}$	0.898	0.898	0.830	1.02	3$\frac{7}{16}$	–	2.20	1.69	0.967
HSS3$\frac{1}{2}$×2$\frac{1}{2}$×$\frac{3}{8}$	2.77	2.21	0.904	2.82	–	–	6.16	4.57	0.900
×$\frac{5}{16}$	2.54	2.03	0.930	2.52	2$\frac{1}{8}$	–	5.53	4.03	0.917
×$\frac{1}{4}$	2.23	1.78	0.956	2.16	2$\frac{3}{8}$	–	4.75	3.40	0.933
×$\frac{3}{16}$	1.82	1.46	0.983	1.72	2$\frac{11}{16}$	–	3.78	2.67	0.950
×$\frac{1}{8}$	1.33	1.06	1.01	1.22	2$\frac{15}{16}$	–	2.67	1.87	0.967
HSS3$\frac{1}{2}$×2×$\frac{1}{4}$	1.30	1.30	0.766	1.58	2$\frac{3}{8}$	–	3.16	2.64	0.850
×$\frac{3}{16}$	1.08	1.08	0.792	1.27	2$\frac{11}{16}$	–	2.55	2.09	0.867
×$\frac{1}{8}$	0.795	0.795	0.818	0.912	2$\frac{15}{16}$	–	1.83	1.47	0.883

– Indicates flat depth or width is too small to establish a workable flat.

Menu

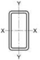


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	Axis X-X I	Axis X-X S	Axis X-X r	Axis X-X Z
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS3½×1½×¼	0.233	7.11	1.97	3.44	12.0	2.55	1.46	1.14	1.98
×3/16	0.174	5.59	1.54	5.62	17.1	2.12	1.21	1.17	1.60
×⅛	0.116	3.90	1.07	9.93	27.2	1.57	0.896	1.21	1.15
HSS3×2½×5/16	0.291	9.51	2.64	5.59	7.31	2.92	1.94	1.05	2.51
×¼	0.233	7.96	2.21	7.73	9.88	2.57	1.72	1.08	2.16
×3/16	0.174	6.23	1.71	11.4	14.2	2.11	1.41	1.11	1.73
×⅛	0.116	4.33	1.19	18.6	22.9	1.54	1.03	1.14	1.23
HSS3×2×5/16	0.291	8.45	2.35	3.87	7.31	2.38	1.59	1.01	2.11
×¼	0.233	7.11	1.97	5.58	9.88	2.13	1.42	1.04	1.83
×3/16	0.174	5.59	1.54	8.49	14.2	1.77	1.18	1.07	1.48
×⅛	0.116	3.90	1.07	14.2	22.9	1.30	0.867	1.10	1.06
HSS3×1½×¼	0.233	6.26	1.74	3.44	9.88	1.68	1.12	0.982	1.51
×3/16	0.174	4.96	1.37	5.62	14.2	1.42	0.945	1.02	1.24
×⅛	0.116	3.48	0.956	9.93	22.9	1.06	0.706	1.05	0.895
HSS3×1×3/16	0.174	4.32	1.19	2.75	14.2	1.07	0.713	0.947	0.989
×⅛	0.116	3.05	0.840	5.62	22.9	0.817	0.545	0.987	0.728
HSS2½×2×¼	0.233	6.26	1.74	5.58	7.73	1.33	1.06	0.874	1.37
×3/16	0.174	4.96	1.37	8.49	11.4	1.12	0.894	0.904	1.12
×⅛	0.116	3.48	0.956	14.2	18.6	0.833	0.667	0.934	0.809
HSS2½×1½×¼	0.233	5.41	1.51	3.44	7.73	1.03	0.822	0.826	1.11
×3/16	0.174	4.32	1.19	5.62	11.4	0.882	0.705	0.860	0.915
×⅛	0.116	3.05	0.840	9.93	18.6	0.668	0.535	0.892	0.671
HSS2½×1×3/16	0.174	3.68	1.02	2.75	11.4	0.646	0.517	0.796	0.713
×⅛	0.116	2.63	0.724	5.62	18.6	0.503	0.403	0.834	0.532
HSS2¼×2×3/16	0.174	4.64	1.28	8.49	9.93	0.859	0.764	0.819	0.952
×⅛	0.116	3.27	0.898	14.2	16.4	0.646	0.574	0.848	0.693
HSS2×1½×3/16	0.174	3.68	1.02	5.62	8.49	0.495	0.495	0.697	0.639
×⅛	0.116	2.63	0.724	9.93	14.2	0.383	0.383	0.728	0.475
HSS2×1×3/16	0.174	3.04	0.845	2.75	8.49	0.350	0.350	0.643	0.480
×⅛	0.116	2.20	0.608	5.62	14.2	0.280	0.280	0.679	0.366

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

HSS3½–HSS2

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.³	ft²/ft
HSS3½×1½×¼	0.638	0.851	0.569	1.06	2 3/8	–	1.79	1.88	0.767
×3/16	0.544	0.725	0.594	0.867	2 11/16	–	1.49	1.51	0.784
×⅛	0.411	0.548	0.619	0.630	2 15/16	–	1.09	1.08	0.800
HSS3×2½×5/16	2.18	1.74	0.908	2.20	–	–	4.34	3.39	0.833
×¼	1.93	1.54	0.935	1.90	–	–	3.74	2.87	0.850
×3/16	1.59	1.27	0.963	1.52	2 3/16	–	3.00	2.27	0.867
×⅛	1.16	0.931	0.990	1.09	2 7/16	–	2.13	1.59	0.883
HSS3×2×5/16	1.24	1.24	0.725	1.58	–	–	2.87	2.60	0.750
×¼	1.11	1.11	0.751	1.38	–	–	2.52	2.23	0.767
×3/16	0.932	0.932	0.778	1.12	2 3/16	–	2.05	1.78	0.784
×⅛	0.692	0.692	0.804	0.803	2 7/16	–	1.47	1.25	0.800
HSS3×1½×¼	0.543	0.725	0.559	0.911	1 7/8	–	1.44	1.58	0.683
×3/16	0.467	0.622	0.584	0.752	2 3/16	–	1.21	1.28	0.700
×⅛	0.355	0.474	0.610	0.550	2 7/16	–	0.886	0.920	0.717
HSS3×1×3/16	0.173	0.345	0.380	0.432	2 3/16	–	0.526	0.792	0.617
×⅛	0.138	0.276	0.405	0.325	2 7/16	–	0.408	0.585	0.633
HSS2½×2×¼	0.930	0.930	0.731	1.17	–	–	1.90	1.82	0.683
×3/16	0.786	0.786	0.758	0.956	–	–	1.55	1.46	0.700
×⅛	0.589	0.589	0.785	0.694	–	–	1.12	1.04	0.717
HSS2½×1½×¼	0.449	0.599	0.546	0.764	–	–	1.10	1.29	0.600
×3/16	0.390	0.520	0.572	0.636	–	–	0.929	1.05	0.617
×⅛	0.300	0.399	0.597	0.469	–	–	0.687	0.759	0.633
HSS2½×1×3/16	0.143	0.285	0.374	0.360	–	–	0.412	0.648	0.534
×⅛	0.115	0.230	0.399	0.274	–	–	0.322	0.483	0.550
HSS2¼×2×3/16	0.713	0.713	0.747	0.877	–	–	1.32	1.30	0.659
×⅛	0.538	0.538	0.774	0.639	–	–	0.957	0.927	0.675
HSS2×1½×3/16	0.313	0.417	0.554	0.521	–	–	0.664	0.822	0.534
×⅛	0.244	0.325	0.581	0.389	–	–	0.496	0.599	0.550
HSS2×1×3/16	0.112	0.225	0.365	0.288	–	–	0.301	0.505	0.450
×⅛	0.0922	0.184	0.390	0.223	–	–	0.238	0.380	0.467

– Indicates flat depth or width is too small to establish a workable flat.

Table 1-12
Square HSS
Dimensions and Properties

HSS22–HSS12

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	I	S	r	Z	Workable Flat	Torsion J	Torsion C	Surface Area
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}	in.	in.^{4}	in.^{3}	ft^2/ft
HSS22×22×7/8	0.814	244.88	67.3	24.1	24.1	4970	452	8.59	530	18 1/16	7890	729	7.10
×3/4	0.698	212.00	58.2	28.5	28.5	4350	395	8.65	462	18 5/8	6860	632	7.13
HSS20×20×7/8	0.814	221.06	60.8	21.6	21.6	3670	367	7.77	433	16 1/16	5870	597	6.43
×3/4	0.698	191.58	52.6	25.6	25.6	3230	323	7.84	378	16 5/8	5110	519	6.47
×5/8	0.581	161.40	44.3	31.5	31.5	2750	275	7.88	320	17 3/16	4320	437	6.50
×1/2	0.465	130.52	35.8	40.0	40.0	2260	226	7.95	261	17 3/4	3510	355	6.53
HSS18×18×7/8	0.814	197.24	54.3	19.2	19.2	2630	292	6.96	346	14 1/16	4220	479	5.77
×3/4	0.698	171.16	47.1	22.8	22.8	2320	258	7.02	302	14 5/8	3690	417	5.80
×5/8	0.581	144.39	39.6	28.1	28.1	1980	220	7.07	257	15 3/16	3120	352	5.83
×1/2	0.465	116.91	32.1	35.7	35.7	1630	181	7.13	210	15 3/4	2540	286	5.87
HSS16×16×7/8	0.814	173.43	47.7	16.7	16.7	1800	225	6.14	268	12 1/16	2920	373	5.10
×3/4	0.698	150.75	41.5	19.9	19.9	1590	199	6.19	235	12 5/8	2560	326	5.13
×5/8	0.581	127.37	35.0	24.5	24.5	1370	171	6.25	200	13 3/16	2170	276	5.17
×1/2	0.465	103.30	28.3	31.4	31.4	1130	141	6.31	164	13 3/4	1770	224	5.20
×3/8	0.349	78.52	21.5	42.8	42.8	873	109	6.37	126	14 5/16	1350	171	5.23
×5/16	0.291	65.87	18.1	52.0	52.0	739	92.3	6.39	106	14 5/8	1140	144	5.25
HSS14×14×7/8	0.814	149.61	41.2	14.3	14.3	1170	167	5.33	201	10 1/16	1910	281	4.43
×3/4	0.698	130.33	35.9	17.0	17.0	1040	149	5.38	177	10 5/8	1680	246	4.47
×5/8	0.581	110.36	30.3	21.1	21.1	897	128	5.44	151	11 3/16	1430	208	4.50
×1/2	0.465	89.68	24.6	27.1	27.1	743	106	5.49	124	11 3/4	1170	170	4.53
×3/8	0.349	68.31	18.7	37.1	37.1	577	82.5	5.55	95.4	12 5/16	900	130	4.57
×5/16	0.291	57.36	15.7	45.1	45.1	490	69.9	5.58	80.5	12 5/8	759	109	4.58
HSS12×12×3/4	0.698	109.91	30.3	14.2	14.2	631	105	4.56	127	8 5/8	1030	177	3.80
×5/8	0.581	93.34	25.7	17.7	17.7	548	91.4	4.62	109	9 3/16	885	151	3.83
×1/2	0.465	76.07	20.9	22.8	22.8	457	76.2	4.68	89.6	9 3/4	728	123	3.87
×3/8	0.349	58.10	16.0	31.4	31.4	357	59.5	4.73	69.2	10 5/16	561	94.6	3.90
×5/16	0.291	48.86	13.4	38.2	38.2	304	50.7	4.76	58.6	10 5/8	474	79.7	3.92
×1/4	0.233	39.43	10.8	48.5	48.5	248	41.4	4.79	47.6	10 7/8	384	64.5	3.93
×3/16	0.174	29.84	8.15	66.0	66.0	189	31.5	4.82	36.0	11 3/16	290	48.6	3.95

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-12 (continued)
Square HSS
Dimensions and Properties

HSS10–HSS6

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	I	S	r	Z	Workable Flat	Torsion J	Torsion C	Surface Area
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}	in.	in.^{4}	in.^{3}	ft^2/ft
HSS10×10×3/4	0.698	89.50	24.7	11.3	11.3	347	69.4	3.75	84.7	6 5/8	578	119	3.13
×5/8	0.581	76.33	21.0	14.2	14.2	304	60.8	3.80	73.2	7 3/16	498	102	3.17
×1/2	0.465	62.46	17.2	18.5	18.5	256	51.2	3.86	60.7	7 3/4	412	84.2	3.20
×3/8	0.349	47.90	13.2	25.7	25.7	202	40.4	3.92	47.2	8 5/16	320	64.8	3.23
×5/16	0.291	40.35	11.1	31.4	31.4	172	34.5	3.94	40.1	8 5/8	271	54.8	3.25
×1/4	0.233	32.63	8.96	39.9	39.9	141	28.3	3.97	32.7	8 7/8	220	44.4	3.27
×3/16	0.174	24.73	6.76	54.5	54.5	108	21.6	4.00	24.8	9 3/16	167	33.6	3.28
HSS9×9×5/8	0.581	67.82	18.7	12.5	12.5	216	47.9	3.40	58.1	6 3/16	356	81.6	2.83
×1/2	0.465	55.66	15.3	16.4	16.4	183	40.6	3.45	48.4	6 3/4	296	67.4	2.87
×3/8	0.349	42.79	11.8	22.8	22.8	145	32.2	3.51	37.8	7 5/16	231	52.1	2.90
×5/16	0.291	36.10	9.92	27.9	27.9	124	27.6	3.54	32.1	7 5/8	196	44.0	2.92
×1/4	0.233	29.23	8.03	35.6	35.6	102	22.7	3.56	26.2	7 7/8	159	35.8	2.93
×3/16	0.174	22.18	6.06	48.7	48.7	78.2	17.4	3.59	20.0	8 3/16	121	27.1	2.95
×1/8	0.116	14.96	4.09	74.6	74.6	53.5	11.9	3.62	13.6	8 7/16	82.0	18.3	2.97
HSS8×8×5/8	0.581	59.32	16.4	10.8	10.8	146	36.5	2.99	44.7	5 3/16	244	63.2	2.50
×1/2	0.465	48.85	13.5	14.2	14.2	125	31.2	3.04	37.5	5 3/4	204	52.4	2.53
×3/8	0.349	37.69	10.4	19.9	19.9	100	24.9	3.10	29.4	6 5/16	160	40.7	2.57
×5/16	0.291	31.84	8.76	24.5	24.5	85.6	21.4	3.13	25.1	6 5/8	136	34.5	2.58
×1/4	0.233	25.82	7.10	31.3	31.3	70.7	17.7	3.15	20.5	6 7/8	111	28.1	2.60
×3/16	0.174	19.63	5.37	43.0	43.0	54.4	13.6	3.18	15.7	7 3/16	84.5	21.3	2.62
×1/8	0.116	13.26	3.62	66.0	66.0	37.4	9.34	3.21	10.7	7 7/16	57.3	14.4	2.63
HSS7×7×5/8	0.581	50.81	14.0	9.05	9.05	93.4	26.7	2.58	33.1	4 3/16	158	47.1	2.17
×1/2	0.465	42.05	11.6	12.1	12.1	80.5	23.0	2.63	27.9	4 3/4	133	39.3	2.20
×3/8	0.349	32.58	8.97	17.1	17.1	65.0	18.6	2.69	22.1	5 5/16	105	30.7	2.23
×5/16	0.291	27.59	7.59	21.1	21.1	56.1	16.0	2.72	18.9	5 5/8	89.7	26.1	2.25
×1/4	0.233	22.42	6.17	27.0	27.0	46.5	13.3	2.75	15.5	5 7/8	73.5	21.3	2.27
×3/16	0.174	17.08	4.67	37.2	37.2	36.0	10.3	2.77	11.9	6 3/16	56.1	16.2	2.28
×1/8	0.116	11.56	3.16	57.3	57.3	24.8	7.09	2.80	8.13	6 7/16	38.2	11.0	2.30
HSS6×6×5/8	0.581	42.30	11.7	7.33	7.33	55.2	18.4	2.17	23.2	3 3/16	94.9	33.4	1.83
×1/2	0.465	35.24	9.74	9.90	9.90	48.3	16.1	2.23	19.8	3 3/4	81.1	28.1	1.87
×3/8	0.349	27.48	7.58	14.2	14.2	39.5	13.2	2.28	15.8	4 5/16	64.6	22.1	1.90
×5/16	0.291	23.34	6.43	17.6	17.6	34.3	11.4	2.31	13.6	4 5/8	55.4	18.9	1.92
×1/4	0.233	19.02	5.24	22.8	22.8	28.6	9.54	2.34	11.2	4 7/8	45.6	15.4	1.93
×3/16	0.174	14.53	3.98	31.5	31.5	22.3	7.42	2.37	8.63	5 3/16	35.0	11.8	1.95
×1/8	0.116	9.86	2.70	48.7	48.7	15.5	5.15	2.39	5.92	5 7/16	23.9	8.03	1.97

Note: For width-to-thickness criteria, refer to Table 1-12A.

Table 1-12 (continued)
Square HSS
Dimensions and Properties

HSS5½-HSS3

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	I	S	r	Z	Workable Flat	Torsion		Surface Area
											J	C	
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}	in.	in.^{4}	in.^{3}	ft^2/ft
HSS5½×5½×3/8	0.349	24.93	6.88	12.8	12.8	29.7	10.8	2.08	13.1	3 13/16	49.0	18.4	1.73
×5/16	0.291	21.21	5.85	15.9	15.9	25.9	9.43	2.11	11.3	4 1/8	42.2	15.7	1.75
×1/4	0.233	17.32	4.77	20.6	20.6	21.7	7.90	2.13	9.32	4 3/8	34.8	12.9	1.77
×3/16	0.174	13.25	3.63	28.6	28.6	17.0	6.17	2.16	7.19	4 11/16	26.7	9.85	1.78
×1/8	0.116	9.01	2.46	44.4	44.4	11.8	4.30	2.19	4.95	4 15/16	18.3	6.72	1.80
HSS5×5×1/2	0.465	28.43	7.88	7.75	7.75	26.0	10.4	1.82	13.1	2 3/4	44.6	18.7	1.53
×3/8	0.349	22.37	6.18	11.3	11.3	21.7	8.68	1.87	10.6	3 5/16	36.1	14.9	1.57
×5/16	0.291	19.08	5.26	14.2	14.2	19.0	7.62	1.90	9.16	3 5/8	31.2	12.8	1.58
×1/4	0.233	15.62	4.30	18.5	18.5	16.0	6.41	1.93	7.61	3 7/8	25.8	10.5	1.60
×3/16	0.174	11.97	3.28	25.7	25.7	12.6	5.03	1.96	5.89	4 3/16	19.9	8.08	1.62
×1/8	0.116	8.16	2.23	40.1	40.1	8.80	3.52	1.99	4.07	4 7/16	13.7	5.53	1.63
HSS4½×4½×1/2	0.465	25.03	6.95	6.68	6.68	18.1	8.03	1.61	10.2	2 1/4	31.3	14.8	1.37
×3/8	0.349	19.82	5.48	9.89	9.89	15.3	6.79	1.67	8.36	2 13/16	25.7	11.9	1.40
×5/16	0.291	16.96	4.68	12.5	12.5	13.5	6.00	1.70	7.27	3 1/8	22.3	10.2	1.42
×1/4	0.233	13.91	3.84	16.3	16.3	11.4	5.08	1.73	6.06	3 3/8	18.5	8.44	1.43
×3/16	0.174	10.70	2.93	22.9	22.9	9.02	4.01	1.75	4.71	3 11/16	14.4	6.49	1.45
×1/8	0.116	7.31	2.00	35.8	35.8	6.35	2.82	1.78	3.27	3 15/16	9.92	4.45	1.47
HSS4×4×1/2	0.465	21.63	6.02	5.60	5.60	11.9	5.97	1.41	7.70	–	21.0	11.2	1.20
×3/8	0.349	17.27	4.78	8.46	8.46	10.3	5.13	1.47	6.39	2 5/16	17.5	9.14	1.23
×5/16	0.291	14.83	4.10	10.7	10.7	9.14	4.57	1.49	5.59	2 5/8	15.3	7.91	1.25
×1/4	0.233	12.21	3.37	14.2	14.2	7.80	3.90	1.52	4.69	2 7/8	12.8	6.56	1.27
×3/16	0.174	9.42	2.58	20.0	20.0	6.21	3.10	1.55	3.67	3 3/16	10.0	5.07	1.28
×1/8	0.116	6.46	1.77	31.5	31.5	4.40	2.20	1.58	2.56	3 7/16	6.91	3.49	1.30
HSS3½×3½×3/8	0.349	14.72	4.09	7.03	7.03	6.49	3.71	1.26	4.69	–	11.2	6.77	1.07
×5/16	0.291	12.70	3.52	9.03	9.03	5.84	3.34	1.29	4.14	2 1/8	9.89	5.90	1.08
×1/4	0.233	10.51	2.91	12.0	12.0	5.04	2.88	1.32	3.50	2 3/8	8.35	4.92	1.10
×3/16	0.174	8.15	2.24	17.1	17.1	4.05	2.31	1.35	2.76	2 11/16	6.56	3.83	1.12
×1/8	0.116	5.61	1.54	27.2	27.2	2.90	1.66	1.37	1.93	2 15/16	4.58	2.65	1.13
HSS3×3×3/8	0.349	12.17	3.39	5.60	5.60	3.78	2.52	1.06	3.25	–	6.64	4.74	0.900
×5/16	0.291	10.58	2.94	7.31	7.31	3.45	2.30	1.08	2.90	–	5.94	4.18	0.917
×1/4	0.233	8.81	2.44	9.88	9.88	3.02	2.01	1.11	2.48	–	5.08	3.52	0.933
×3/16	0.174	6.87	1.89	14.2	14.2	2.46	1.64	1.14	1.97	2 3/16	4.03	2.76	0.950
×1/8	0.116	4.75	1.30	22.9	22.9	1.78	1.19	1.17	1.40	2 7/16	2.84	1.92	0.967

Note: For width-to-thickness criteria, refer to Table 1-12A.
– Indicates flat depth or width is too small to establish a workable flat.

Table 1-12 (continued)
Square HSS
Dimensions and Properties

HSS2½–HSS2

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	I	S	r	Z	Workable Flat	Torsion J	Torsion C	Surface Area
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}	in.	in.^{4}	in.^{3}	ft^2/ft
HSS2½×2½×5/16	0.291	8.45	2.35	5.59	5.59	1.82	1.46	0.880	1.88	–	3.20	2.74	0.750
×¼	0.233	7.11	1.97	7.73	7.73	1.63	1.30	0.908	1.63	–	2.79	2.35	0.767
×3/16	0.174	5.59	1.54	11.4	11.4	1.35	1.08	0.937	1.32	–	2.25	1.86	0.784
×1/8	0.116	3.90	1.07	18.6	18.6	0.998	0.799	0.965	0.947	–	1.61	1.31	0.800
HSS2¼×2¼×¼	0.233	6.26	1.74	6.66	6.66	1.13	1.01	0.806	1.28	–	1.96	1.85	0.683
×3/16	0.174	4.96	1.37	9.93	9.93	0.953	0.847	0.835	1.04	–	1.60	1.48	0.700
×1/8	0.116	3.48	0.956	16.4	16.4	0.712	0.633	0.863	0.755	–	1.15	1.05	0.717
HSS2×2×¼	0.233	5.41	1.51	5.58	5.58	0.747	0.747	0.704	0.964	–	1.31	1.41	0.600
×3/16	0.174	4.32	1.19	8.49	8.49	0.641	0.641	0.733	0.797	–	1.09	1.14	0.617
×1/8	0.116	3.05	0.840	14.2	14.2	0.486	0.486	0.761	0.584	–	0.796	0.817	0.633

Note: For width-to-thickness criteria, refer to Table 1-12A.
– Indicates flat depth or width is too small to establish a workable flat.

Table 1-12A
Width-to-Thickness Criteria for Rectangular and Square HSS

Nominal Wall Thickness, in.	Width-to-Thickness Criteria for Rectangular and Square HSS			
	Compression	Flexure		Shear
	Nonslender up to	Compact up to	Compact up to	C_{v2} = 1.0 up to
	Flange Width, in.	Flange Width, in.	Web Height, in.	Web Height, in.
7/8	24	22	24	24
3/4	24	20	↓	↓
5/8	20	16	↓	↓
1/2	16	12	↓	↓
3/8	12	10	20	20
5/16	10	8	18	18
1/4	8	6	14	14
3/16	6	5	10	10
1/8	4	3	7	7

Note: Width-to-thickness criteria given for F_y = 50 ksi.

Menu

Table 1-13
Round HSS
Dimensions and Properties

HSS20.000–
HSS10.000

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	D/t	I	S	r	Z	Torsion	
									J	C
	in.	lb/ft	in.^{2}		in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}
HSS20.000×0.500	0.465	104.00	28.5	43.0	1 360	136	6.91	177	2720	272
×0.375[f]	0.349	78.67	21.5	57.3	1 040	104	6.95	135	2080	208
HSS18.000×0.500	0.465	93.54	25.6	38.7	985	109	6.20	143	1970	219
×0.375[f]	0.349	70.66	19.4	51.6	754	83.8	6.24	109	1510	168
HSS16.000×0.625	0.581	103.00	28.1	27.5	838	105	5.46	138	1680	209
×0.500	0.465	82.85	22.7	34.4	685	85.7	5.49	112	1370	171
×0.438	0.407	72.87	19.9	39.3	606	75.8	5.51	99.0	1210	152
×0.375[f]	0.349	62.64	17.2	45.8	526	65.7	5.53	85.5	1050	131
×0.312[f]	0.291	52.32	14.4	55.0	443	55.4	5.55	71.8	886	111
×0.250[f]	0.233	42.09	11.5	68.7	359	44.8	5.58	57.9	717	89.7
HSS14.000×0.625	0.581	89.36	24.5	24.1	552	78.9	4.75	105	1100	158
×0.500	0.465	72.16	19.8	30.1	453	64.8	4.79	85.2	907	130
×0.375	0.349	54.62	15.0	40.1	349	49.8	4.83	65.1	698	100
×0.312[f]	0.291	45.65	12.5	48.1	295	42.1	4.85	54.7	589	84.2
×0.250[f]	0.233	36.75	10.1	60.1	239	34.1	4.87	44.2	478	68.2
HSS12.750×0.500	0.465	65.48	17.9	27.4	339	53.2	4.35	70.2	678	106
×0.375	0.349	49.61	13.6	36.5	262	41.0	4.39	53.7	523	82.1
×0.250[f]	0.233	33.41	9.16	54.7	180	28.2	4.43	36.5	359	56.3
HSS10.750×0.500	0.465	54.79	15.0	23.1	199	37.0	3.64	49.2	398	74.1
×0.375	0.349	41.59	11.4	30.8	154	28.7	3.68	37.8	309	57.4
×0.250[f]	0.233	28.06	7.70	46.1	106	19.8	3.72	25.8	213	39.6
HSS10.000×0.625	0.581	62.64	17.2	17.2	191	38.3	3.34	51.6	383	76.6
×0.500	0.465	50.78	13.9	21.5	159	31.7	3.38	42.3	317	63.5
×0.375	0.349	38.58	10.6	28.7	123	24.7	3.41	32.5	247	49.3
×0.312	0.291	32.31	8.88	34.4	105	20.9	3.43	27.4	209	41.9
×0.250	0.233	26.06	7.15	42.9	85.3	17.1	3.45	22.2	171	34.1
×0.188[f]	0.174	19.72	5.37	57.5	64.8	13.0	3.47	16.8	130	25.9

[f] Shape exceeds compact limit for flexure with $F_y = 46$ ksi.

HSS9.625–
HSS6.875

Table 1-13 (continued)
Round HSS
Dimensions and Properties

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	D/t	I	S	r	Z	Torsion	
									J	C
	in.	lb/ft	in.^{2}		in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}
HSS9.625×0.500	0.465	48.77	13.4	20.7	141	29.2	3.24	39.0	281	58.5
×0.375	0.349	37.08	10.2	27.6	110	22.8	3.28	30.0	219	45.5
×0.312	0.291	31.06	8.53	33.1	93.0	19.3	3.30	25.4	186	38.7
×0.250	0.233	25.06	6.87	41.3	75.9	15.8	3.32	20.6	152	31.5
×0.188[f]	0.174	18.97	5.17	55.3	57.7	12.0	3.34	15.5	115	24.0
HSS8.625×0.625	0.581	53.45	14.7	14.8	119	27.7	2.85	37.7	239	55.4
×0.500	0.465	43.43	11.9	18.5	100	23.1	2.89	31.0	199	46.2
×0.375	0.349	33.07	9.07	24.7	77.8	18.0	2.93	23.9	156	36.1
×0.322	0.300	28.58	7.85	28.8	68.1	15.8	2.95	20.8	136	31.6
×0.250	0.233	22.38	6.14	37.0	54.1	12.5	2.97	16.4	108	25.1
×0.188[f]	0.174	16.96	4.62	49.6	41.3	9.57	2.99	12.4	82.5	19.1
HSS7.625×0.375	0.349	29.06	7.98	21.8	52.9	13.9	2.58	18.5	106	27.8
×0.328	0.305	25.59	7.01	25.0	47.1	12.3	2.59	16.4	94.1	24.7
HSS7.500×0.500	0.465	37.42	10.3	16.1	63.9	17.0	2.49	23.0	128	34.1
×0.375	0.349	28.56	7.84	21.5	50.2	13.4	2.53	17.9	100	26.8
×0.312	0.291	23.97	6.59	25.8	42.9	11.4	2.55	15.1	85.8	22.9
×0.250	0.233	19.38	5.32	32.2	35.2	9.37	2.57	12.3	70.3	18.7
×0.188	0.174	14.70	4.00	43.1	26.9	7.17	2.59	9.34	53.8	14.3
HSS7.000×0.500	0.465	34.74	9.55	15.1	51.2	14.6	2.32	19.9	102	29.3
×0.375	0.349	26.56	7.29	20.1	40.4	11.6	2.35	15.5	80.9	23.1
×0.312	0.291	22.31	6.13	24.1	34.6	9.88	2.37	13.1	69.1	19.8
×0.250	0.233	18.04	4.95	30.0	28.4	8.11	2.39	10.7	56.8	16.2
×0.188	0.174	13.69	3.73	40.2	21.7	6.21	2.41	8.11	43.5	12.4
×0.125[f]	0.116	9.19	2.51	60.3	14.9	4.25	2.43	5.50	29.7	8.49
HSS6.875×0.500	0.465	34.07	9.36	14.8	48.3	14.1	2.27	19.1	96.7	28.1
×0.375	0.349	26.06	7.16	19.7	38.2	11.1	2.31	14.9	76.4	22.2
×0.312	0.291	21.89	6.02	23.6	32.7	9.51	2.33	12.6	65.4	19.0
×0.250	0.233	17.71	4.86	29.5	26.8	7.81	2.35	10.3	53.7	15.6
×0.188	0.174	13.44	3.66	39.5	20.6	5.99	2.37	7.81	41.1	12.0

[f] Shape exceeds compact limit for flexure with $F_y = 46$ ksi.

Table 1-13 (continued)
Round HSS
Dimensions and Properties

HSS6.625–HSS5.000

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	D/t	I	S	r	Z	Torsion	
									J	C
	in.	lb/ft	in.^{2}		in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}
HSS6.625×0.500	0.465	32.74	9.00	14.2	42.9	13.0	2.18	17.7	85.9	25.9
×0.432	0.402	28.60	7.86	16.5	38.2	11.5	2.20	15.6	76.4	23.1
×0.375	0.349	25.06	6.88	19.0	34.0	10.3	2.22	13.8	68.0	20.5
×0.312	0.291	21.06	5.79	22.8	29.1	8.79	2.24	11.7	58.2	17.6
×0.280	0.260	18.99	5.20	25.5	26.4	7.96	2.25	10.5	52.7	15.9
×0.250	0.233	17.04	4.68	28.4	23.9	7.22	2.26	9.52	47.9	14.4
×0.188	0.174	12.94	3.53	38.1	18.4	5.54	2.28	7.24	36.7	11.1
×0.125[f]	0.116	8.69	2.37	57.1	12.6	3.79	2.30	4.92	25.1	7.59
HSS6.000×0.500	0.465	29.40	8.09	12.9	31.2	10.4	1.96	14.3	62.4	20.8
×0.375	0.349	22.55	6.20	17.2	24.8	8.28	2.00	11.2	49.7	16.6
×0.312	0.291	18.97	5.22	20.6	21.3	7.11	2.02	9.49	42.6	14.2
×0.280	0.260	17.12	4.69	23.1	19.3	6.45	2.03	8.57	38.7	12.9
×0.250	0.233	15.37	4.22	25.8	17.6	5.86	2.04	7.75	35.2	11.7
×0.188	0.174	11.68	3.18	34.5	13.5	4.51	2.06	5.91	27.0	9.02
×0.125[f]	0.116	7.85	2.14	51.7	9.28	3.09	2.08	4.02	18.6	6.19
HSS5.563×0.500	0.465	27.06	7.45	12.0	24.4	8.77	1.81	12.1	48.8	17.5
×0.375	0.349	20.80	5.72	15.9	19.5	7.02	1.85	9.50	39.0	14.0
×0.258	0.240	14.63	4.01	23.2	14.2	5.12	1.88	6.80	28.5	10.2
×0.188	0.174	10.80	2.95	32.0	10.7	3.85	1.91	5.05	21.4	7.70
×0.134[f]	0.124	7.78	2.12	44.9	7.84	2.82	1.92	3.67	15.7	5.64
HSS5.500×0.500	0.465	26.73	7.36	11.8	23.5	8.55	1.79	11.8	47.0	17.1
×0.375	0.349	20.55	5.65	15.8	18.8	6.84	1.83	9.27	37.6	13.7
×0.258	0.240	14.46	3.97	22.9	13.7	5.00	1.86	6.64	27.5	10.0
HSS5.000×0.500	0.465	24.05	6.62	10.8	17.2	6.88	1.61	9.60	34.4	13.8
×0.375	0.349	18.54	5.10	14.3	13.9	5.55	1.65	7.56	27.7	11.1
×0.312	0.291	15.64	4.30	17.2	12.0	4.79	1.67	6.46	24.0	9.58
×0.258	0.240	13.08	3.59	20.8	10.2	4.08	1.69	5.44	20.4	8.15
×0.250	0.233	12.69	3.49	21.5	9.94	3.97	1.69	5.30	19.9	7.95
×0.188	0.174	9.67	2.64	28.7	7.69	3.08	1.71	4.05	15.4	6.15
×0.125	0.116	6.51	1.78	43.1	5.31	2.12	1.73	2.77	10.6	4.25

[f] Shape exceeds compact limit for flexure with F_y = 46 ksi.

HSS4.500–
HSS2.500

Table 1-13 (continued)
Round HSS
Dimensions and Properties

Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*D*/*t*	*I*	*S*	*r*	*Z*	Torsion *J*	Torsion *C*
	in.	lb/ft	in.²		in.⁴	in.³	in.	in.³	in.⁴	in.³
HSS4.500×0.375	0.349	16.54	4.55	12.9	9.87	4.39	1.47	6.03	19.7	8.78
×0.337	0.313	15.00	4.12	14.4	9.07	4.03	1.48	5.50	18.1	8.06
×0.237	0.220	10.80	2.96	20.5	6.79	3.02	1.52	4.03	13.6	6.04
×0.188	0.174	8.67	2.36	25.9	5.54	2.46	1.53	3.26	11.1	4.93
×0.125	0.116	5.85	1.60	38.8	3.84	1.71	1.55	2.23	7.68	3.41
HSS4.000×0.313	0.291	12.34	3.39	13.7	5.87	2.93	1.32	4.01	11.7	5.87
×0.250	0.233	10.00	2.76	17.2	4.91	2.45	1.33	3.31	9.82	4.91
×0.237	0.220	9.53	2.61	18.2	4.68	2.34	1.34	3.15	9.36	4.68
×0.226	0.210	9.12	2.50	19.0	4.50	2.25	1.34	3.02	9.01	4.50
×0.220	0.205	8.89	2.44	19.5	4.41	2.21	1.34	2.96	8.83	4.41
×0.188	0.174	7.66	2.09	23.0	3.83	1.92	1.35	2.55	7.67	3.83
×0.125	0.116	5.18	1.42	34.5	2.67	1.34	1.37	1.75	5.34	2.67
HSS3.500×0.313	0.291	10.66	2.93	12.0	3.81	2.18	1.14	3.00	7.61	4.35
×0.300	0.279	10.26	2.82	12.5	3.69	2.11	1.14	2.90	7.38	4.22
×0.250	0.233	8.69	2.39	15.0	3.21	1.83	1.16	2.49	6.41	3.66
×0.216	0.201	7.58	2.08	17.4	2.84	1.63	1.17	2.19	5.69	3.25
×0.203	0.189	7.15	1.97	18.5	2.70	1.54	1.17	2.07	5.41	3.09
×0.188	0.174	6.66	1.82	20.1	2.52	1.44	1.18	1.93	5.04	2.88
×0.125	0.116	4.51	1.23	30.2	1.77	1.01	1.20	1.33	3.53	2.02
HSS3.000×0.250	0.233	7.35	2.03	12.9	1.95	1.30	0.982	1.79	3.90	2.60
×0.216	0.201	6.43	1.77	14.9	1.74	1.16	0.992	1.58	3.48	2.32
×0.203	0.189	6.07	1.67	15.9	1.66	1.10	0.996	1.50	3.31	2.21
×0.188	0.174	5.65	1.54	17.2	1.55	1.03	1.00	1.39	3.10	2.06
×0.152	0.141	4.63	1.27	21.3	1.30	0.865	1.01	1.15	2.59	1.73
×0.134	0.124	4.11	1.12	24.2	1.16	0.774	1.02	1.03	2.32	1.55
×0.125	0.116	3.84	1.05	25.9	1.09	0.730	1.02	0.965	2.19	1.46
HSS2.875×0.250	0.233	7.02	1.93	12.3	1.70	1.18	0.938	1.63	3.40	2.37
×0.203	0.189	5.80	1.59	15.2	1.45	1.01	0.952	1.37	2.89	2.01
×0.188	0.174	5.40	1.48	16.5	1.35	0.941	0.957	1.27	2.70	1.88
×0.125	0.116	3.67	1.01	24.8	0.958	0.667	0.976	0.884	1.92	1.33
HSS2.500×0.250	0.233	6.01	1.66	10.7	1.08	0.862	0.806	1.20	2.15	1.72
×0.188	0.174	4.65	1.27	14.4	0.865	0.692	0.825	0.943	1.73	1.38
×0.125	0.116	3.17	0.869	21.6	0.619	0.495	0.844	0.660	1.24	0.990

Table 1-13 (continued)
Round HSS
Dimensions and Properties

HSS2.375–
HSS1.660

Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	D/t	I	S	r	Z	Torsion	
									J	C
	in.	lb/ft	in.^{2}		in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}
HSS2.375×0.250	0.233	5.68	1.57	10.2	0.910	0.766	0.762	1.07	1.82	1.53
×0.218	0.203	5.03	1.39	11.7	0.824	0.694	0.771	0.960	1.65	1.39
×0.188	0.174	4.40	1.20	13.6	0.733	0.617	0.781	0.845	1.47	1.23
×0.154	0.143	3.66	1.00	16.6	0.627	0.528	0.791	0.713	1.25	1.06
×0.125	0.116	3.01	0.823	20.5	0.527	0.443	0.800	0.592	1.05	0.887
HSS1.900×0.188	0.174	3.44	0.943	10.9	0.355	0.374	0.613	0.520	0.710	0.747
×0.145	0.135	2.72	0.749	14.1	0.293	0.309	0.626	0.421	0.586	0.617
×0.120	0.111	2.28	0.624	17.1	0.251	0.264	0.634	0.356	0.501	0.527
HSS1.660×0.140	0.130	2.27	0.625	12.8	0.184	0.222	0.543	0.305	0.368	0.444

PIPE

Table 1-14
Pipes
Dimensions and Properties

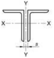
Shape	Nominal Wt.	Dimensions: Outside Diameter	Dimensions: Inside Diameter	Nominal Wall Thickness	Design Wall Thickness	Area	D/t	I	S	r	J	Z
	lb/ft	in.	in.	in.	in.	in.^{2}		in.^{4}	in.^{3}	in.	in.^{4}	in.^{3}
Standard Weight (Std.)												
Pipe 26 Std.	103	26.000	25.3	0.375	0.349	28.2	74.5	2320	178	9.07	4640	230
Pipe 24 Std.	94.7	24.000	23.3	0.375	0.349	26.0	68.8	1820	152	8.36	3640	196
Pipe 20 Std.	78.7	20.000	19.3	0.375	0.349	21.6	57.3	1040	104	6.95	2090	135
Pipe 18 Std.	70.7	18.000	17.3	0.375	0.349	19.4	51.6	756	84.0	6.24	1510	109
Pipe 16 Std.	62.6	16.000	15.3	0.375	0.349	17.2	45.8	527	65.9	5.53	1050	85.7
Pipe 14 Std.	54.6	14.000	13.3	0.375	0.349	15.0	40.1	350	50.0	4.83	700	65.2
Pipe 12 Std.	49.6	12.750	12.0	0.375	0.349	13.7	36.5	262	41.0	4.39	523	53.7
Pipe 10 Std.	40.5	10.750	10.0	0.365	0.340	11.5	31.6	151	28.1	3.68	302	36.9
Pipe 8 Std.	28.6	8.625	7.98	0.322	0.300	7.85	28.8	68.1	15.8	2.95	136	20.8
Pipe 6 Std.	19.0	6.625	6.07	0.280	0.261	5.20	25.4	26.5	7.99	2.25	52.9	10.6
Pipe 5 Std.	14.6	5.563	5.05	0.258	0.241	4.01	23.1	14.3	5.14	1.88	28.6	6.83
Pipe 4 Std.	10.8	4.500	4.03	0.237	0.221	2.96	20.4	6.82	3.03	1.51	13.6	4.05
Pipe 3 1/2 Std.	9.12	4.000	3.55	0.226	0.211	2.50	19.0	4.52	2.26	1.34	9.04	3.03
Pipe 3 Std.	7.58	3.500	3.07	0.216	0.201	2.07	17.4	2.85	1.63	1.17	5.69	2.19
Pipe 2 1/2 Std.	5.80	2.875	2.47	0.203	0.189	1.61	15.2	1.45	1.01	0.952	2.89	1.37
Pipe 2 Std.	3.66	2.375	2.07	0.154	0.143	1.02	16.6	0.627	0.528	0.791	1.25	0.713
Pipe 1 1/2 Std.	2.72	1.900	1.61	0.145	0.135	0.749	14.1	0.293	0.309	0.626	0.586	0.421
Pipe 1 1/4 Std.	2.27	1.660	1.38	0.140	0.130	0.625	12.8	0.184	0.222	0.543	0.368	0.305
Pipe 1 Std.	1.68	1.315	1.05	0.133	0.124	0.469	10.6	0.0830	0.126	0.423	0.166	0.177
Pipe 3/4 Std.	1.13	1.050	0.824	0.113	0.105	0.312	10.0	0.0350	0.0671	0.336	0.0700	0.0942
Pipe 1/2 Std.	0.850	0.840	0.622	0.109	0.101	0.234	8.32	0.0160	0.0388	0.264	0.0320	0.0555
Extra Strong (x-Strong)												
Pipe 26 x-Strong	136	26.000	25.1	0.500	0.465	36.1	55.9	2950	227	9.03	5900	294
Pipe 24 x-Strong	126	24.000	23.1	0.500	0.465	33.3	51.6	2310	192	8.33	4620	250
Pipe 20 x-Strong	104	20.000	19.1	0.500	0.465	27.6	43.0	1320	132	6.91	2640	172
Pipe 18 x-Strong	93.5	18.000	17.1	0.500	0.465	24.8	38.7	956	106	6.21	1910	139
Pipe 16 x-Strong	82.9	16.000	15.1	0.500	0.465	22.0	34.4	665	83.1	5.50	1330	109
Pipe 14 x-Strong	72.2	14.000	13.1	0.500	0.465	19.2	30.1	440	62.9	4.79	880	82.7
Pipe 12 x-Strong	65.5	12.750	11.8	0.500	0.465	17.5	27.4	339	53.2	4.35	678	70.2
Pipe 10 x-Strong	54.8	10.750	9.75	0.500	0.465	15.1	23.1	199	37.0	3.64	398	49.2
Pipe 8 x-Strong	43.4	8.625	7.63	0.500	0.465	11.9	18.5	100	23.1	2.89	199	31.0
Pipe 6 x-Strong	28.6	6.625	5.76	0.432	0.403	7.83	16.4	38.3	11.6	2.20	76.6	15.6
Pipe 5 x-Strong	20.8	5.563	4.81	0.375	0.349	5.73	15.9	19.5	7.02	1.85	39.0	9.50
Pipe 4 x-Strong	15.0	4.500	3.83	0.337	0.315	4.14	14.3	9.12	4.05	1.48	18.2	5.53
Pipe 3 1/2 x-Strong	12.5	4.000	3.36	0.318	0.296	3.43	13.5	5.94	2.97	1.31	11.9	4.07
Pipe 3 x-Strong	10.3	3.500	2.90	0.300	0.280	2.83	12.5	3.70	2.11	1.14	7.40	2.91
Pipe 2 1/2 x-Strong	7.67	2.875	2.32	0.276	0.257	2.10	11.2	1.83	1.27	0.930	3.66	1.77
Pipe 2 x-Strong	5.03	2.375	1.94	0.218	0.204	1.40	11.7	0.827	0.696	0.771	1.65	0.964
Pipe 1 1/2 x-Strong	3.63	1.900	1.50	0.200	0.186	1.00	10.2	0.372	0.392	0.610	0.744	0.549
Pipe 1 1/4 x-Strong	3.00	1.660	1.28	0.191	0.178	0.837	9.33	0.231	0.278	0.528	0.462	0.393
Pipe 1 x-Strong	2.17	1.315	0.957	0.179	0.166	0.602	7.92	0.101	0.154	0.410	0.202	0.221
Pipe 3/4 x-Strong	1.48	1.050	0.742	0.154	0.143	0.407	7.34	0.0430	0.0818	0.325	0.0860	0.119
Pipe 1/2 x-Strong	1.09	0.840	0.546	0.147	0.137	0.303	6.13	0.0190	0.0462	0.253	0.0380	0.0686

Table 1-14 (continued)
Pipes
Dimensions and Properties

PIPE

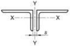
Shape	Nominal Wt.	Dimensions: Outside Diameter	Dimensions: Inside Diameter	Nominal Wall Thickness	Design Wall Thickness	Area	D/t	I	S	r	J	Z
	lb/ft	in.	in.	in.	in.	in.^{2}		in.^{4}	in.^{3}	in.	in.^{4}	in.^{3}
Double-Extra Strong (xx-Strong)												
Pipe 12 xx-Strong	126	12.750	10.9	1.00	0.930	35.4	13.8	625	97.6	4.20	1250	134
Pipe 10 xx-Strong	104	10.750	8.94	1.00	0.930	28.8	11.6	354	65.6	3.51	709	90.9
Pipe 8 xx-Strong	72.5	8.625	6.88	0.875	0.816	20.0	10.6	154	35.8	2.78	308	49.9
Pipe 6 xx-Strong	53.2	6.625	4.90	0.864	0.805	14.7	8.23	63.5	19.2	2.08	127	27.4
Pipe 5 xx-Strong	38.6	5.563	4.06	0.750	0.699	10.7	7.96	32.2	11.6	1.74	64.4	16.7
Pipe 4 xx-Strong	27.6	4.500	3.15	0.674	0.628	7.66	7.17	14.7	6.53	1.39	29.4	9.50
Pipe 3 xx-Strong	18.6	3.500	2.30	0.600	0.559	5.17	6.26	5.79	3.31	1.06	11.6	4.89
Pipe 2 1/2 xx-Strong	13.7	2.875	1.77	0.552	0.514	3.83	5.59	2.78	1.94	0.854	5.56	2.91
Pipe 2 xx-Strong	9.04	2.375	1.50	0.436	0.406	2.51	5.85	1.27	1.07	0.711	2.54	1.60

Menu



LLBB

Table 1-15
Double Angles
Properties



SLBB

Shape	Area, A	Radius of Gyration							
		LLBB				SLBB			
		r_y			r_x	r_y			r_x
		Separation, s, in.				Separation, s, in.			
		0	3/4	1 1/2		0	3/4	1 1/2	
	in.^{2}	in.	in.	in.	in.	in.	in.	in.	in.
2L12×12×1 3/8	62.2	5.06	5.32	5.60	3.64	5.06	5.32	5.60	3.64
×1 1/4	56.8	5.04	5.29	5.57	3.66	5.04	5.29	5.57	3.66
×1 1/8	51.6	5.02	5.28	5.55	3.68	5.02	5.28	5.55	3.68
×1	46.0	5.00	5.25	5.54	3.70	5.00	5.25	5.54	3.70
2L10×10×1 3/8	51.2	4.25	4.53	4.80	3.00	4.25	4.53	4.80	3.00
×1 1/4	46.8	4.22	4.49	4.78	3.02	4.22	4.49	4.78	3.02
×1 1/8	42.6	4.20	4.46	4.75	3.03	4.20	4.46	4.75	3.03
×1	38.0	4.18	4.45	4.73	3.05	4.18	4.45	4.73	3.05
×7/8	33.6	4.15	4.42	4.69	3.07	4.15	4.42	4.69	3.07
×3/4	29.0	4.15	4.41	4.68	3.10	4.15	4.41	4.68	3.10

Menu

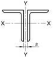
Note: For width-to-thickness criteria, refer to Table 1-7B.

Table 1-15 (continued)
Double Angles
Properties

2L12–2L10

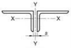
Shape	Flexural-Torsional Properties												Single Angle Properties	
	LLBB						SLBB							
	Separation, *s*, in.						Separation, *s*, in.						Area, *A*	r_z
	0		3/4		1 1/2		0		3/4		1 1/2			
	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*		
	in.		in.		in.		in.		in.		in.		in.²	in.
2L12×12×1 3/8	6.84	0.831	7.03	0.840	7.25	0.850	6.84	0.831	7.03	0.840	7.25	0.850	31.1	2.30
×1 1/4	6.84	0.829	7.03	0.839	7.24	0.848	6.84	0.829	7.03	0.839	7.24	0.848	28.4	2.31
×1 1/8	6.85	0.827	7.04	0.837	7.24	0.846	6.85	0.827	7.04	0.837	7.24	0.846	25.8	2.33
×1	6.85	0.826	7.03	0.834	7.25	0.844	6.85	0.826	7.03	0.840	7.25	0.844	23.0	2.34
2L10×10×1 3/8	5.69	0.835	5.90	0.847	6.12	0.858	5.69	0.835	5.90	0.847	6.12	0.858	25.6	1.91
×1 1/4	5.68	0.832	5.89	0.844	6.11	0.855	5.68	0.832	5.89	0.844	6.11	0.855	23.4	1.91
×1 1/8	5.68	0.831	5.88	0.842	6.10	0.853	5.68	0.831	5.88	0.842	6.10	0.853	21.3	1.92
×1	5.69	0.828	5.89	0.839	6.10	0.850	5.69	0.828	5.89	0.839	6.10	0.850	19.0	1.92
×7/8	5.68	0.827	5.87	0.838	6.08	0.849	5.68	0.827	5.87	0.838	6.08	0.849	16.8	1.93
×3/4	5.70	0.825	5.89	0.836	6.10	0.847	5.70	0.825	5.89	0.836	6.10	0.847	14.5	1.96

Note: For width-to-thickness criteria, refer to Table 1-7B.



LLBB

Table 1-15 (continued)
Double Angles
Properties



SLBB

Shape	Area, A	Radius of Gyration							
		LLBB				SLBB			
		r_y			r_x	r_y			r_x
		Separation, s, in.				Separation, s, in.			
		0	3/8	3/4		0	3/8	3/4	
	in.²	in.	in.	in.	in.	in.	in.	in.	in.
2L8×8×1 1/8	33.6	3.41	3.54	3.68	2.41	3.41	3.54	3.68	2.41
×1	30.2	3.39	3.52	3.66	2.43	3.39	3.52	3.66	2.43
×7/8	26.6	3.36	3.50	3.63	2.45	3.36	3.50	3.63	2.45
×3/4	23.0	3.34	3.47	3.61	2.46	3.34	3.47	3.61	2.46
×5/8	19.4	3.32	3.45	3.58	2.48	3.32	3.45	3.58	2.48
×9/16	17.5	3.31	3.44	3.57	2.49	3.31	3.44	3.57	2.49
×1/2	15.7	3.30	3.43	3.56	2.49	3.30	3.43	3.56	2.49
2L8×6×1	26.2	2.39	2.52	2.66	2.49	3.63	3.77	3.91	1.72
×7/8	23.0	2.37	2.50	2.63	2.50	3.61	3.75	3.89	1.74
×3/4	20.0	2.35	2.47	2.61	2.52	3.59	3.72	3.86	1.75
×5/8	16.8	2.33	2.45	2.59	2.54	3.57	3.70	3.84	1.77
×9/16	15.2	2.32	2.44	2.58	2.55	3.55	3.69	3.83	1.78
×1/2	13.6	2.31	2.43	2.56	2.55	3.54	3.68	3.81	1.79
×7/16	12.0	2.30	2.42	2.55	2.56	3.53	3.66	3.80	1.80
2L8×4×1	22.2	1.46	1.60	1.75	2.51	3.94	4.08	4.23	1.03
×7/8	19.6	1.44	1.57	1.72	2.53	3.91	4.06	4.21	1.04
×3/4	17.0	1.42	1.55	1.69	2.55	3.89	4.03	4.18	1.05
×5/8	14.3	1.39	1.52	1.66	2.56	3.86	4.00	4.15	1.06
×9/16	13.0	1.38	1.51	1.65	2.57	3.85	3.99	4.13	1.07
×1/2	11.6	1.38	1.50	1.63	2.58	3.83	3.97	4.12	1.08
×7/16	10.2	1.37	1.49	1.62	2.59	3.82	3.96	4.10	1.09
2L7×4×3/4	15.5	1.48	1.61	1.75	2.21	3.34	3.48	3.63	1.08
×5/8	13.0	1.45	1.58	1.73	2.23	3.31	3.46	3.60	1.10
×1/2	10.5	1.44	1.56	1.70	2.25	3.29	3.43	3.57	1.11
×7/16	9.26	1.43	1.55	1.68	2.26	3.28	3.42	3.56	1.12
×3/8	8.00	1.42	1.54	1.67	2.27	3.26	3.40	3.54	1.12
2L6×6×1	22.0	2.58	2.72	2.86	1.79	2.58	2.72	2.86	1.79
×7/8	19.5	2.56	2.70	2.84	1.81	2.56	2.70	2.84	1.81
×3/4	16.9	2.54	2.67	2.81	1.82	2.54	2.67	2.81	1.82
×5/8	14.3	2.52	2.65	2.79	1.84	2.52	2.65	2.79	1.84
×9/16	12.9	2.51	2.64	2.78	1.85	2.51	2.64	2.78	1.85
×1/2	11.5	2.50	2.63	2.76	1.86	2.50	2.63	2.76	1.86
×7/16	10.2	2.49	2.62	2.75	1.86	2.49	2.62	2.75	1.86
×3/8	8.76	2.48	2.60	2.74	1.87	2.48	2.60	2.74	1.87
×5/16	7.34	2.47	2.59	2.72	1.88	2.47	2.59	2.72	1.88

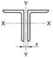
Note: For width-to-thickness criteria, refer to Table 1-7B.

Table 1-15 (continued)
Double Angles
Properties

2L8–2L6

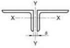
Shape	Flexural-Torsional Properties												Single Angle Properties	
	LLBB						SLBB							
	Separation, s, in.						Separation, s, in.							
	0		3/8		3/4		0		3/8		3/4		Area, A	r_z
	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H		
	in.		in.		in.		in.		in.		in.		in.^{2}	in.
2L8×8×1 1/8	4.56	0.837	4.66	0.844	4.77	0.851	4.56	0.837	4.66	0.844	4.77	0.851	16.8	1.56
×1	4.56	0.834	4.66	0.841	4.77	0.848	4.56	0.834	4.66	0.841	4.77	0.848	15.1	1.56
×7/8	4.56	0.831	4.66	0.838	4.76	0.845	4.56	0.831	4.66	0.838	4.76	0.845	13.3	1.57
×3/4	4.56	0.829	4.66	0.836	4.76	0.843	4.56	0.829	4.66	0.836	4.76	0.843	11.5	1.57
×5/8	4.56	0.826	4.66	0.833	4.76	0.840	4.56	0.826	4.66	0.833	4.76	0.840	9.69	1.58
×9/16	4.56	0.825	4.65	0.832	4.75	0.839	4.56	0.825	4.65	0.832	4.75	0.839	8.77	1.58
×1/2	4.56	0.824	4.65	0.831	4.75	0.837	4.56	0.824	4.65	0.831	4.75	0.837	7.84	1.59
2L8×6×1	4.06	0.721	4.14	0.732	4.23	0.742	4.18	0.924	4.30	0.929	4.43	0.933	13.1	1.28
×7/8	4.07	0.718	4.14	0.728	4.23	0.739	4.17	0.922	4.29	0.926	4.42	0.930	11.5	1.28
×3/4	4.07	0.714	4.15	0.725	4.23	0.735	4.17	0.919	4.28	0.924	4.40	0.928	9.99	1.29
×5/8	4.08	0.712	4.16	0.722	4.24	0.732	4.16	0.917	4.27	0.921	4.39	0.926	8.41	1.29
×9/16	4.09	0.710	4.16	0.720	4.24	0.731	4.15	0.916	4.27	0.920	4.39	0.924	7.61	1.30
×1/2	4.09	0.709	4.16	0.719	4.24	0.729	4.15	0.915	4.26	0.919	4.38	0.923	6.80	1.30
×7/16	4.09	0.708	4.16	0.718	4.24	0.728	4.15	0.913	4.26	0.918	4.38	0.922	5.99	1.31
2L8×4×1	3.86	0.568	3.91	0.580	3.97	0.594	4.11	0.983	4.25	0.984	4.39	0.985	11.1	0.844
×7/8	3.87	0.566	3.92	0.577	3.98	0.590	4.09	0.981	4.22	0.982	4.37	0.984	9.79	0.846
×3/4	3.88	0.564	3.93	0.575	3.99	0.587	4.07	0.980	4.20	0.981	4.35	0.983	8.49	0.850
×5/8	3.89	0.562	3.94	0.573	3.99	0.585	4.05	0.979	4.18	0.980	4.32	0.981	7.16	0.856
×9/16	3.90	0.562	3.94	0.572	4.00	0.584	4.04	0.978	4.17	0.980	4.31	0.981	6.49	0.859
×1/2	3.90	0.561	3.95	0.571	4.00	0.583	4.03	0.978	4.16	0.979	4.30	0.980	5.80	0.863
×7/16	3.91	0.561	3.95	0.571	4.00	0.582	4.02	0.977	4.15	0.978	4.29	0.980	5.11	0.867
2L7×4×3/4	3.41	0.611	3.47	0.624	3.53	0.639	3.57	0.969	3.70	0.971	3.84	0.973	7.74	0.855
×5/8	3.42	0.608	3.47	0.621	3.54	0.635	3.55	0.967	3.68	0.969	3.82	0.971	6.50	0.860
×1/2	3.43	0.606	3.48	0.618	3.55	0.632	3.53	0.965	3.66	0.968	3.80	0.970	5.26	0.866
×7/16	3.43	0.605	3.49	0.617	3.55	0.630	3.53	0.964	3.66	0.967	3.79	0.969	4.63	0.869
×3/8	3.44	0.605	3.49	0.616	3.55	0.629	3.52	0.963	3.65	0.966	3.78	0.968	4.00	0.873
2L6×6×1	3.42	0.843	3.53	0.852	3.64	0.861	3.42	0.843	3.53	0.852	3.64	0.861	11.0	1.17
×7/8	3.42	0.839	3.53	0.848	3.63	0.857	3.42	0.839	3.53	0.848	3.63	0.857	9.75	1.17
×3/4	3.42	0.835	3.52	0.844	3.63	0.853	3.42	0.835	3.52	0.844	3.63	0.853	8.46	1.17
×5/8	3.42	0.831	3.52	0.840	3.62	0.849	3.42	0.831	3.52	0.840	3.62	0.849	7.13	1.17
×9/16	3.42	0.829	3.52	0.838	3.62	0.847	3.42	0.829	3.52	0.838	3.62	0.847	6.45	1.18
×1/2	3.42	0.827	3.52	0.836	3.62	0.846	3.42	0.827	3.52	0.836	3.62	0.846	5.77	1.18
×7/16	3.42	0.826	3.52	0.835	3.62	0.844	3.42	0.826	3.52	0.835	3.62	0.844	5.08	1.18
×3/8	3.42	0.824	3.51	0.833	3.61	0.842	3.42	0.824	3.51	0.833	3.61	0.842	4.38	1.19
×5/16	3.42	0.823	3.51	0.832	3.61	0.841	3.42	0.823	3.51	0.832	3.61	0.841	3.67	1.19

Note: For width-to-thickness criteria, refer to Table 1-7B.



LLBB

Table 1-15 (continued)
Double Angles
Properties



SLBB

Shape	Area, A	Radius of Gyration							
		LLBB				SLBB			
		r_y			r_x	r_y			r_x
		Separation, s, in.				Separation, s, in.			
		0	3/8	3/4		0	3/8	3/4	
	in.^{2}	in.	in.	in.	in.	in.	in.	in.	in.
2L6×4×7/8	16.0	1.57	1.71	1.86	1.86	2.82	2.96	3.11	1.10
×3/4	13.9	1.55	1.68	1.83	1.88	2.80	2.94	3.08	1.12
×5/8	11.7	1.53	1.66	1.80	1.89	2.77	2.91	3.06	1.13
×9/16	10.6	1.52	1.65	1.79	1.90	2.76	2.90	3.04	1.14
×1/2	9.50	1.51	1.64	1.77	1.91	2.75	2.89	3.03	1.14
×7/16	8.36	1.50	1.62	1.76	1.92	2.74	2.88	3.02	1.15
×3/8	7.22	1.49	1.61	1.75	1.93	2.73	2.86	3.00	1.16
×5/16	6.06	1.48	1.60	1.74	1.94	2.72	2.85	2.99	1.17
2L6×3½×½	9.00	1.27	1.40	1.54	1.92	2.82	2.96	3.11	0.968
×3/8	6.88	1.26	1.38	1.52	1.93	2.80	2.94	3.08	0.984
×5/16	5.78	1.25	1.37	1.50	1.94	2.78	2.92	3.06	0.991
2L5×5×7/8	16.0	2.16	2.30	2.44	1.49	2.16	2.30	2.44	1.49
×3/4	14.0	2.13	2.27	2.41	1.50	2.13	2.27	2.41	1.50
×5/8	11.8	2.11	2.25	2.39	1.52	2.11	2.25	2.39	1.52
×1/2	9.58	2.09	2.22	2.36	1.53	2.09	2.22	2.36	1.53
×7/16	8.44	2.08	2.21	2.35	1.54	2.08	2.21	2.35	1.54
×3/8	7.30	2.07	2.20	2.34	1.55	2.07	2.20	2.34	1.55
×5/16	6.14	2.06	2.19	2.32	1.56	2.06	2.19	2.32	1.56
2L5×3½×3/4	11.7	1.39	1.53	1.68	1.55	2.33	2.47	2.62	0.974
×5/8	9.86	1.37	1.50	1.65	1.56	2.30	2.45	2.59	0.987
×1/2	8.00	1.35	1.48	1.62	1.58	2.28	2.42	2.57	1.00
×3/8	6.10	1.33	1.46	1.59	1.59	2.26	2.39	2.54	1.02
×5/16	5.12	1.32	1.44	1.58	1.60	2.25	2.38	2.52	1.02
×1/4	4.14	1.31	1.43	1.57	1.61	2.23	2.37	2.51	1.03
2L5×3×½	7.50	1.11	1.24	1.39	1.58	2.35	2.50	2.64	0.824
×7/16	6.62	1.10	1.23	1.38	1.59	2.34	2.48	2.63	0.831
×3/8	5.72	1.09	1.22	1.36	1.60	2.33	2.47	2.62	0.838
×5/16	4.82	1.08	1.21	1.35	1.61	2.32	2.46	2.60	0.846
×1/4	3.88	1.07	1.19	1.33	1.62	2.30	2.44	2.58	0.853

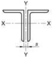
Note: For width-to-thickness criteria, refer to Table 1-7B.

Table 1-15 (continued)
Double Angles
Properties

2L6–2L5

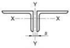
Shape	Flexural-Torsional Properties												Single Angle Properties	
	LLBB						SLBB							
	Separation, *s*, in.						Separation, *s*, in.							
	0		3/8		3/4		0		3/8		3/4		Area, A	r_z
	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H		
	in.		in.		in.		in.		in.		in.		in.^{2}	in.
2L6×4×7/8	2.96	0.678	3.04	0.694	3.12	0.710	3.10	0.952	3.23	0.956	3.37	0.959	8.00	0.854
×3/4	2.97	0.673	3.04	0.688	3.12	0.705	3.09	0.949	3.22	0.953	3.35	0.957	6.94	0.856
×5/8	2.98	0.669	3.05	0.684	3.13	0.700	3.08	0.946	3.21	0.950	3.34	0.954	5.86	0.859
×9/16	2.98	0.667	3.05	0.682	3.13	0.697	3.07	0.945	3.20	0.949	3.33	0.953	5.31	0.861
×1/2	2.99	0.665	3.05	0.679	3.13	0.695	3.07	0.943	3.19	0.948	3.32	0.952	4.75	0.864
×7/16	2.99	0.663	3.06	0.678	3.13	0.693	3.06	0.942	3.19	0.946	3.31	0.950	4.18	0.867
×3/8	2.99	0.662	3.06	0.676	3.13	0.691	3.06	0.940	3.18	0.945	3.31	0.949	3.61	0.870
×5/16	3.00	0.661	3.06	0.674	3.13	0.689	3.05	0.939	3.17	0.944	3.30	0.948	3.03	0.874
2L6x3½×½	2.94	0.615	2.99	0.630	3.06	0.646	3.04	0.964	3.17	0.967	3.31	0.969	4.50	0.756
×3/8	2.95	0.613	3.00	0.627	3.07	0.642	3.02	0.962	3.15	0.965	3.29	0.967	3.44	0.763
×5/16	2.95	0.612	3.00	0.625	3.07	0.641	3.02	0.960	3.14	0.964	3.28	0.966	2.89	0.767
2L5×5×7/8	2.85	0.845	2.96	0.856	3.07	0.866	2.85	0.845	2.96	0.856	3.07	0.866	8.00	0.971
×3/4	2.85	0.840	2.95	0.851	3.06	0.861	2.85	0.840	2.95	0.851	3.06	0.861	6.98	0.972
×5/8	2.85	0.835	2.95	0.846	3.06	0.857	2.85	0.835	2.95	0.846	3.06	0.857	5.90	0.975
×1/2	2.85	0.830	2.94	0.842	3.05	0.852	2.85	0.830	2.94	0.842	3.05	0.852	4.79	0.980
×7/16	2.85	0.828	2.94	0.839	3.05	0.850	2.85	0.828	2.94	0.839	3.05	0.850	4.22	0.983
×3/8	2.84	0.826	2.94	0.838	3.04	0.848	2.84	0.826	2.94	0.838	3.04	0.848	3.65	0.986
×5/16	2.84	0.825	2.94	0.836	3.04	0.847	2.84	0.825	2.94	0.836	3.04	0.847	3.07	0.990
2L5x3½×3/4	2.49	0.699	2.57	0.717	2.66	0.736	2.60	0.943	2.73	0.949	2.86	0.953	5.85	0.744
×5/8	2.49	0.693	2.57	0.711	2.66	0.730	2.59	0.940	2.71	0.945	2.85	0.950	4.93	0.746
×1/2	2.50	0.688	2.58	0.705	2.66	0.724	2.58	0.936	2.70	0.942	2.83	0.947	4.00	0.750
×3/8	2.51	0.683	2.58	0.700	2.66	0.718	2.56	0.933	2.69	0.938	2.81	0.944	3.05	0.755
×5/16	2.51	0.682	2.58	0.698	2.66	0.716	2.56	0.931	2.68	0.937	2.81	0.942	2.56	0.758
×1/4	2.52	0.680	2.58	0.696	2.66	0.714	2.55	0.929	2.67	0.935	2.80	0.941	2.07	0.761
2L5×3×½	2.44	0.628	2.51	0.646	2.58	0.667	2.54	0.962	2.68	0.966	2.81	0.969	3.75	0.642
×7/16	2.45	0.626	2.51	0.644	2.58	0.664	2.54	0.961	2.67	0.964	2.80	0.968	3.31	0.644
×3/8	2.45	0.624	2.51	0.642	2.59	0.661	2.53	0.959	2.66	0.963	2.79	0.967	2.86	0.646
×5/16	2.46	0.623	2.52	0.640	2.59	0.659	2.52	0.958	2.65	0.962	2.78	0.965	2.41	0.649
×1/4	2.46	0.622	2.52	0.638	2.59	0.657	2.51	0.957	2.64	0.961	2.77	0.964	1.94	0.652

Note: For width-to-thickness criteria, refer to Table 1-7B.



LLBB

Table 1-15 (continued)
Double Angles
Properties



SLBB

Shape	Area, *A*	Radius of Gyration							
		LLBB				SLBB			
		r_y			r_x	r_y			r_x
		Separation, *s*, in.				Separation, *s*, in.			
		0	3/8	3/4		0	3/8	3/4	
	in.^{2}	in.	in.	in.	in.	in.	in.	in.	in.
2L4×4×3/4	10.9	1.73	1.88	2.03	1.18	1.73	1.88	2.03	1.18
×5/8	9.22	1.71	1.85	2.00	1.20	1.71	1.85	2.00	1.20
×1/2	7.50	1.69	1.83	1.97	1.21	1.69	1.83	1.97	1.21
×7/16	6.60	1.68	1.81	1.96	1.22	1.68	1.81	1.96	1.22
×3/8	5.72	1.67	1.80	1.94	1.23	1.67	1.80	1.94	1.23
×5/16	4.80	1.66	1.79	1.93	1.24	1.66	1.79	1.93	1.24
×1/4	3.86	1.65	1.78	1.91	1.25	1.65	1.78	1.91	1.25
2L4×3½×1/2	7.00	1.44	1.57	1.72	1.23	1.75	1.89	2.03	1.04
×3/8	5.36	1.42	1.55	1.69	1.25	1.73	1.86	2.00	1.05
×5/16	4.50	1.40	1.53	1.68	1.25	1.72	1.85	1.99	1.06
×1/4	3.64	1.39	1.52	1.66	1.26	1.70	1.83	1.97	1.07
2L4×3×5/8	7.98	1.21	1.35	1.50	1.23	1.84	1.98	2.13	0.845
×1/2	6.50	1.19	1.32	1.47	1.24	1.81	1.95	2.10	0.858
×3/8	4.98	1.17	1.30	1.44	1.26	1.79	1.93	2.07	0.873
×5/16	4.18	1.16	1.29	1.43	1.27	1.78	1.91	2.06	0.880
×1/4	3.38	1.15	1.27	1.41	1.27	1.76	1.90	2.04	0.887
2L3½×3½×1/2	6.50	1.49	1.63	1.77	1.05	1.49	1.63	1.77	1.05
×7/16	5.78	1.48	1.61	1.76	1.06	1.48	1.61	1.76	1.06
×3/8	5.00	1.47	1.60	1.74	1.07	1.47	1.60	1.74	1.07
×5/16	4.20	1.46	1.59	1.73	1.08	1.46	1.59	1.73	1.08
×1/4	3.40	1.44	1.57	1.72	1.09	1.44	1.57	1.72	1.09
2L3½×3×1/2	6.04	1.23	1.37	1.52	1.07	1.55	1.69	1.84	0.877
×7/16	5.34	1.22	1.36	1.51	1.08	1.54	1.67	1.82	0.885
×3/8	4.64	1.21	1.35	1.49	1.09	1.52	1.66	1.81	0.892
×5/16	3.90	1.20	1.33	1.48	1.09	1.51	1.65	1.79	0.900
×1/4	3.16	1.19	1.32	1.46	1.10	1.50	1.63	1.78	0.908
2L3½×2½×1/2	5.54	0.992	1.13	1.28	1.08	1.62	1.76	1.91	0.701
×3/8	4.24	0.970	1.11	1.25	1.10	1.59	1.73	1.88	0.716
×5/16	3.58	0.960	1.09	1.24	1.11	1.58	1.72	1.87	0.723
×1/4	2.90	0.950	1.08	1.22	1.12	1.57	1.70	1.85	0.731

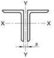
Note: For width-to-thickness criteria, refer to Table 1-7B.

Table 1-15 (continued)
Double Angles
Properties

2L4–2L3½

Shape	Flexural-Torsional Properties												Single Angle Properties	
	LLBB						SLBB							
	Separation, *s*, in.						Separation, *s*, in.							
	0		3/8		3/4		0		3/8		3/4		Area, *A*	r_z
	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*	$\bar{r}_o$	*H*		
	in.		in.		in.		in.		in.		in.		in.²	in.
2L4×4×3/4	2.28	0.847	2.39	0.861	2.51	0.874	2.28	0.847	2.39	0.861	2.51	0.874	5.44	0.774
×5/8	2.28	0.841	2.39	0.854	2.50	0.868	2.28	0.841	2.39	0.854	2.50	0.868	4.61	0.774
×1/2	2.28	0.834	2.38	0.848	2.49	0.862	2.28	0.834	2.38	0.848	2.49	0.862	3.75	0.776
×7/16	2.28	0.832	2.38	0.846	2.49	0.859	2.28	0.832	2.38	0.846	2.49	0.859	3.30	0.777
×3/8	2.28	0.829	2.38	0.843	2.49	0.856	2.28	0.829	2.38	0.843	2.49	0.856	2.86	0.779
×5/16	2.28	0.826	2.37	0.840	2.48	0.854	2.28	0.826	2.37	0.840	2.48	0.854	2.40	0.781
×1/4	2.28	0.824	2.37	0.838	2.48	0.851	2.28	0.824	2.37	0.838	2.48	0.851	1.93	0.783
2L4×3½×1/2	2.14	0.784	2.23	0.802	2.33	0.819	2.16	0.882	2.28	0.893	2.40	0.904	3.50	0.716
×3/8	2.14	0.778	2.23	0.795	2.33	0.813	2.16	0.876	2.27	0.888	2.39	0.899	2.68	0.719
×5/16	2.14	0.775	2.23	0.792	2.33	0.810	2.16	0.874	2.26	0.885	2.38	0.896	2.25	0.721
×1/4	2.14	0.773	2.22	0.790	2.32	0.807	2.15	0.871	2.26	0.883	2.37	0.894	1.82	0.723
2L4×3×5/8	2.02	0.728	2.11	0.750	2.21	0.773	2.10	0.930	2.22	0.938	2.36	0.945	3.99	0.631
×1/2	2.02	0.721	2.11	0.743	2.20	0.765	2.09	0.925	2.21	0.933	2.34	0.940	3.25	0.633
×3/8	2.03	0.715	2.11	0.736	2.20	0.757	2.08	0.920	2.20	0.928	2.32	0.936	2.49	0.636
×5/16	2.03	0.712	2.11	0.733	2.20	0.754	2.07	0.918	2.19	0.926	2.32	0.934	2.09	0.638
×1/4	2.03	0.710	2.11	0.730	2.20	0.751	2.06	0.915	2.18	0.924	2.31	0.932	1.69	0.639
2L3½×3½×1/2	1.99	0.838	2.10	0.854	2.21	0.869	1.99	0.838	2.10	0.854	2.21	0.869	3.25	0.679
×7/16	1.99	0.835	2.09	0.851	2.21	0.866	1.99	0.835	2.09	0.851	2.21	0.866	2.89	0.681
×3/8	1.99	0.832	2.09	0.848	2.20	0.863	1.99	0.832	2.09	0.848	2.20	0.863	2.50	0.683
×5/16	1.99	0.829	2.09	0.845	2.20	0.860	1.99	0.829	2.09	0.845	2.20	0.860	2.10	0.685
×1/4	1.99	0.826	2.08	0.842	2.19	0.857	1.99	0.826	2.08	0.842	2.19	0.857	1.70	0.688
2L3½×3×1/2	1.85	0.780	1.94	0.801	2.05	0.822	1.88	0.892	2.00	0.904	2.13	0.915	3.02	0.618
×7/16	1.85	0.776	1.94	0.797	2.05	0.818	1.88	0.889	1.99	0.901	2.12	0.912	2.67	0.620
×3/8	1.85	0.773	1.94	0.794	2.05	0.814	1.88	0.885	1.99	0.898	2.11	0.910	2.32	0.622
×5/16	1.85	0.770	1.94	0.790	2.04	0.811	1.87	0.883	1.98	0.895	2.11	0.907	1.95	0.624
×1/4	1.85	0.767	1.94	0.787	2.04	0.807	1.87	0.880	1.98	0.893	2.10	0.905	1.58	0.628
2L3½×2½×1/2	1.75	0.706	1.83	0.732	1.93	0.759	1.82	0.938	1.95	0.946	2.08	0.953	2.77	0.532
×3/8	1.75	0.698	1.83	0.724	1.93	0.750	1.81	0.933	1.93	0.941	2.07	0.949	2.12	0.535
×5/16	1.76	0.695	1.83	0.720	1.92	0.746	1.80	0.930	1.92	0.939	2.06	0.947	1.79	0.538
×1/4	1.76	0.693	1.83	0.717	1.92	0.742	1.80	0.928	1.92	0.937	2.05	0.944	1.45	0.541

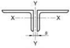
Note: For width-to-thickness criteria, refer to Table 1-7B.



LLBB

Table 1-15 (continued) Double Angles

Properties



SLBB

Shape	Area, *A*	Radius of Gyration							
		LLBB				SLBB			
		r_y			r_x	r_y			r_x
		Separation, *s*, in.				Separation, *s*, in.			
		0	3/8	3/4		0	3/8	3/4	
	in.^{2}	in.	in.	in.	in.	in.	in.	in.	in.
2L3×3×1/2	5.52	1.29	1.43	1.58	0.895	1.29	1.43	1.58	0.895
×7/16	4.86	1.28	1.42	1.57	0.903	1.28	1.42	1.57	0.903
×3/8	4.22	1.27	1.41	1.55	0.910	1.27	1.41	1.55	0.910
×5/16	3.56	1.26	1.39	1.54	0.918	1.26	1.39	1.54	0.918
×1/4	2.88	1.25	1.38	1.52	0.926	1.25	1.38	1.52	0.926
×3/16	2.18	1.24	1.37	1.51	0.933	1.24	1.37	1.51	0.933
2L3×2 1/2×1/2	5.00	1.04	1.18	1.33	0.910	1.35	1.49	1.64	0.718
×7/16	4.44	1.02	1.16	1.32	0.917	1.34	1.48	1.63	0.724
×3/8	3.86	1.01	1.15	1.30	0.924	1.32	1.46	1.61	0.731
×5/16	3.26	1.00	1.14	1.29	0.932	1.31	1.45	1.60	0.739
×1/4	2.64	0.991	1.12	1.27	0.940	1.30	1.44	1.58	0.746
×3/16	2.00	0.980	1.11	1.25	0.947	1.29	1.42	1.57	0.753
2L3×2×1/2	4.52	0.795	0.940	1.10	0.922	1.42	1.56	1.72	0.543
×3/8	3.50	0.771	0.911	1.07	0.937	1.39	1.54	1.69	0.555
×5/16	2.96	0.760	0.897	1.05	0.945	1.38	1.52	1.67	0.562
×1/4	2.40	0.749	0.883	1.03	0.953	1.37	1.51	1.66	0.569
×3/16	1.83	0.739	0.869	1.02	0.961	1.35	1.49	1.64	0.577
2L2 1/2×2 1/2×1/2	4.52	1.09	1.23	1.39	0.735	1.09	1.23	1.39	0.735
×3/8	3.46	1.07	1.21	1.36	0.749	1.07	1.21	1.36	0.749
×5/16	2.92	1.05	1.19	1.34	0.756	1.05	1.19	1.34	0.756
×1/4	2.38	1.04	1.18	1.33	0.764	1.04	1.18	1.33	0.764
×3/16	1.80	1.03	1.17	1.31	0.771	1.03	1.17	1.31	0.771
2L2 1/2×2×3/8	3.10	0.815	0.957	1.11	0.766	1.13	1.27	1.42	0.574
×5/16	2.64	0.804	0.943	1.10	0.774	1.12	1.26	1.41	0.581
×1/4	2.14	0.794	0.930	1.08	0.782	1.10	1.24	1.39	0.589
×3/16	1.64	0.784	0.916	1.07	0.790	1.09	1.23	1.38	0.597
2L2 1/2×1 1/2×1/4	1.89	0.551	0.691	0.850	0.790	1.17	1.32	1.47	0.409
×3/16	1.45	0.541	0.677	0.833	0.800	1.16	1.30	1.46	0.416
2L2×2×3/8	2.74	0.865	1.01	1.17	0.591	0.865	1.01	1.17	0.591
×5/16	2.32	0.853	0.996	1.15	0.598	0.853	0.996	1.15	0.598
×1/4	1.89	0.842	0.982	1.14	0.605	0.842	0.982	1.14	0.605
×3/16	1.44	0.831	0.967	1.12	0.612	0.831	0.967	1.12	0.612
×1/8	0.982	0.818	0.951	1.10	0.620	0.818	0.951	1.10	0.620

Note: For width-to-thickness criteria, refer to Table 1-7B.

Menu

Table 1-15 (continued)
Double Angles
Properties

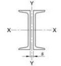
2L3–2L2

Shape	Flexural-Torsional Properties												Single Angle Properties	
	LLBB						SLBB							
	Separation, s, in.						Separation, s, in.						Area, A	r_z
	0		3/8		3/4		0		3/8		3/4			
	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H	$\bar{r}_o$	H		
	in.		in.		in.		in.		in.		in.		in.^{2}	in.
2L3×3×1/2	1.71	0.842	1.82	0.861	1.94	0.878	1.71	0.842	1.82	0.861	1.94	0.878	2.76	0.580
×7/16	1.71	0.838	1.82	0.857	1.94	0.874	1.71	0.838	1.82	0.857	1.94	0.874	2.43	0.580
×3/8	1.71	0.834	1.81	0.853	1.93	0.870	1.71	0.834	1.81	0.853	1.93	0.870	2.11	0.581
×5/16	1.71	0.830	1.81	0.849	1.93	0.866	1.71	0.830	1.81	0.849	1.93	0.866	1.78	0.583
×1/4	1.71	0.827	1.81	0.845	1.92	0.863	1.71	0.827	1.81	0.845	1.92	0.863	1.44	0.585
×3/16	1.71	0.823	1.80	0.842	1.91	0.859	1.71	0.823	1.80	0.842	1.91	0.859	1.09	0.586
2L3×2 1/2×1/2	1.57	0.774	1.66	0.800	1.78	0.824	1.61	0.905	1.73	0.918	1.86	0.929	2.50	0.516
×7/16	1.57	0.769	1.66	0.795	1.77	0.819	1.60	0.901	1.72	0.914	1.85	0.926	2.22	0.516
×3/8	1.57	0.764	1.66	0.790	1.77	0.815	1.60	0.897	1.72	0.911	1.85	0.923	1.93	0.517
×5/16	1.57	0.760	1.66	0.785	1.76	0.810	1.59	0.893	1.71	0.907	1.84	0.920	1.63	0.518
×1/4	1.57	0.756	1.66	0.781	1.76	0.806	1.59	0.890	1.70	0.904	1.83	0.917	1.32	0.520
×3/16	1.57	0.753	1.65	0.778	1.75	0.802	1.58	0.887	1.70	0.901	1.82	0.914	1.00	0.521
2L3×2×1/2	1.47	0.684	1.55	0.717	1.66	0.751	1.55	0.955	1.69	0.962	1.83	0.968	2.26	0.425
×3/8	1.48	0.675	1.55	0.707	1.65	0.739	1.54	0.949	1.67	0.957	1.81	0.963	1.75	0.426
×5/16	1.48	0.671	1.56	0.702	1.65	0.734	1.53	0.946	1.66	0.954	1.80	0.961	1.48	0.428
×1/4	1.48	0.668	1.56	0.698	1.65	0.730	1.52	0.944	1.65	0.952	1.79	0.959	1.20	0.431
×3/16	1.49	0.666	1.55	0.695	1.64	0.726	1.52	0.941	1.64	0.950	1.78	0.957	0.917	0.435
2L2 1/2×2 1/2×1/2	1.43	0.850	1.54	0.871	1.67	0.890	1.43	0.850	1.54	0.871	1.67	0.890	2.26	0.481
×3/8	1.42	0.839	1.53	0.861	1.65	0.881	1.42	0.839	1.53	0.861	1.65	0.881	1.73	0.481
×5/16	1.42	0.834	1.53	0.856	1.65	0.876	1.42	0.834	1.53	0.856	1.65	0.876	1.46	0.481
×1/4	1.42	0.829	1.52	0.852	1.64	0.872	1.42	0.829	1.52	0.852	1.64	0.872	1.19	0.482
×3/16	1.42	0.825	1.52	0.847	1.63	0.868	1.42	0.825	1.52	0.847	1.63	0.868	0.901	0.482
2L2 1/2×2×3/8	1.29	0.754	1.38	0.786	1.49	0.817	1.32	0.913	1.45	0.927	1.59	0.939	1.55	0.419
×5/16	1.29	0.748	1.38	0.781	1.49	0.812	1.32	0.909	1.44	0.923	1.58	0.936	1.32	0.420
×1/4	1.29	0.744	1.38	0.775	1.49	0.806	1.32	0.904	1.43	0.920	1.57	0.933	1.07	0.423
×3/16	1.29	0.740	1.38	0.771	1.48	0.801	1.31	0.901	1.43	0.916	1.56	0.929	0.818	0.426
2L2 1/2×1 1/2×1/4	1.21	0.629	1.28	0.668	1.38	0.711	1.26	0.962	1.40	0.969	1.55	0.975	0.947	0.321
×3/16	1.22	0.625	1.29	0.662	1.38	0.704	1.26	0.959	1.39	0.967	1.53	0.973	0.724	0.324
2L2×2×3/8	1.14	0.847	1.25	0.874	1.38	0.897	1.14	0.847	1.25	0.874	1.38	0.897	1.37	0.386
×5/16	1.14	0.841	1.25	0.868	1.37	0.891	1.14	0.841	1.25	0.868	1.37	0.891	1.16	0.386
×1/4	1.13	0.835	1.24	0.862	1.37	0.886	1.13	0.835	1.24	0.862	1.37	0.886	0.944	0.387
×3/16	1.13	0.830	1.24	0.857	1.36	0.882	1.13	0.830	1.24	0.857	1.36	0.882	0.722	0.389
×1/8	1.13	0.826	1.23	0.853	1.35	0.877	1.13	0.826	1.23	0.853	1.35	0.877	0.491	0.391

Note: For width-to-thickness criteria, refer to Table 1-7B.

2C-SHAPES

Table 1-16
2C-Shapes
Properties



Shape	Area, A	Axis Y-Y, Separation, s, in.												Axis X-X
		0				3/8				3/4				
		I	S	r	Z	I	S	r	Z	I	S	r	Z	r_x
	in.²	in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.
2C15×50	29.4	40.7	11.0	1.18	23.5	50.5	12.9	1.31	29.0	62.4	15.3	1.46	34.5	5.24
×40	23.6	32.6	9.25	1.18	18.4	40.2	10.9	1.31	22.8	49.6	12.7	1.45	27.2	5.43
×33.9	20.0	28.5	8.38	1.20	15.8	35.1	9.78	1.33	19.5	43.1	11.4	1.47	23.3	5.61
2C12×30	17.6	18.2	5.75	1.02	11.9	23.3	6.94	1.15	15.2	29.6	8.36	1.30	18.5	4.29
×25	14.7	15.6	5.11	1.03	9.89	19.8	6.12	1.16	12.6	25.0	7.32	1.31	15.4	4.43
×20.7	12.2	13.6	4.64	1.06	8.49	17.2	5.51	1.19	10.8	21.7	6.55	1.34	13.0	4.61
2C10×30	17.6	15.3	5.04	0.931	11.4	20.2	6.27	1.07	14.7	26.3	7.73	1.22	18.0	3.43
×25	14.7	12.3	4.25	0.914	9.06	16.2	5.27	1.05	11.8	21.1	6.48	1.20	14.6	3.52
×20	11.7	9.91	3.62	0.918	7.11	13.0	4.44	1.05	9.32	16.9	5.43	1.20	11.5	3.67
×15.3	8.96	8.14	3.13	0.953	5.68	10.6	3.80	1.09	7.36	13.7	4.59	1.23	9.04	3.88
2C9×20	11.7	8.80	3.32	0.866	6.84	11.8	4.15	1.00	9.05	15.6	5.15	1.15	11.2	3.22
×15	8.80	6.86	2.76	0.882	5.17	9.10	3.41	1.02	6.82	12.0	4.19	1.17	8.48	3.40
×13.4	7.88	6.34	2.61	0.897	4.74	8.39	3.20	1.03	6.21	11.0	3.92	1.18	7.69	3.48
2C8×18.75	11.0	7.46	2.95	0.823	6.23	10.2	3.75	0.962	8.29	13.7	4.71	1.11	10.4	2.82
×13.75	8.06	5.51	2.35	0.826	4.48	7.47	2.95	0.962	5.99	10.0	3.68	1.11	7.51	2.99
×11.5	6.74	4.82	2.13	0.846	3.86	6.50	2.66	0.982	5.12	8.66	3.29	1.13	6.38	3.11
2C7×14.75	8.66	5.18	2.25	0.773	4.61	7.21	2.90	0.912	6.23	9.85	3.68	1.07	7.85	2.51
×12.25	7.18	4.30	1.96	0.773	3.78	5.97	2.51	0.911	5.13	8.14	3.17	1.06	6.48	2.59
×9.8	5.74	3.59	1.72	0.791	3.11	4.95	2.17	0.929	4.18	6.72	2.73	1.08	5.26	2.72
2C6×13	7.64	4.11	1.91	0.734	3.92	5.85	2.50	0.876	5.35	8.13	3.21	1.03	6.77	2.13
×10.5	6.14	3.26	1.60	0.728	3.08	4.63	2.08	0.867	4.24	6.43	2.67	1.02	5.39	2.22
×8.2	4.78	2.63	1.37	0.741	2.45	3.72	1.76	0.881	3.34	5.14	2.24	1.04	4.24	2.34
2C5×9	5.28	2.45	1.30	0.682	2.52	3.59	1.73	0.824	3.51	5.09	2.25	0.982	4.50	1.84
×6.7	3.94	1.86	1.06	0.688	1.91	2.71	1.40	0.831	2.65	3.84	1.81	0.989	3.83	1.95
2C4×7.25	4.26	1.75	1.02	0.641	1.96	2.63	1.38	0.786	2.75	3.81	1.82	0.946	3.55	1.47
×6.25	3.54	1.36	0.824	0.620	1.54	2.06	1.12	0.763	2.20	3.01	1.49	0.922	2.87	1.50
×5.4	3.16	1.29	0.812	0.637	1.44	1.94	1.10	0.783	2.04	2.82	1.44	0.943	2.63	1.56
×4.5	2.76	1.25	0.789	0.673	1.36	1.86	1.05	0.820	1.88	2.66	1.36	0.981	2.40	1.63
2C3×6	3.52	1.33	0.833	0.614	1.60	2.06	1.15	0.764	2.26	3.03	1.54	0.927	2.92	1.09
×5	2.94	1.05	0.699	0.597	1.29	1.63	0.969	0.746	1.84	2.43	1.30	0.909	2.39	1.12
×4.1	2.40	0.842	0.597	0.591	1.05	1.32	0.827	0.741	1.50	1.97	1.10	0.905	1.95	1.18
×3.5	2.18	0.766	0.558	0.593	0.966	1.20	0.772	0.743	1.37	1.80	1.03	0.908	1.78	1.20

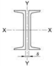


Table 1-17
2MC-Shapes
Properties

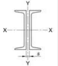
2MC18–2MC7

Shape	Area, A	Axis Y-Y, Separation, s, in. = 0: I	S	r	Z	3/8: I	S	r	Z	3/4: I	S	r	Z	Axis X-X: r_x
	in.²	in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.
2MC18×58	34.2	60.6	14.4	1.33	29.5	72.8	16.6	1.46	35.9	87.5	19.1	1.60	42.3	6.29
×51.9	30.6	55.0	13.4	1.34	26.3	65.9	15.4	1.47	32.0	79.0	17.6	1.61	37.7	6.41
×45.8	27.0	50.1	12.5	1.36	23.4	59.8	14.3	1.49	28.4	71.4	16.3	1.63	33.5	6.55
×42.7	25.2	47.8	12.1	1.38	22.1	57.0	13.8	1.51	26.8	67.9	15.7	1.64	31.6	6.64
2MC13×50	29.4	60.7	13.8	1.44	28.6	72.5	15.8	1.57	34.1	86.3	18.0	1.71	39.7	4.62
×40	23.4	49.1	11.7	1.45	22.7	58.4	13.4	1.58	27.2	69.4	15.2	1.72	31.6	4.82
×35	20.6	44.3	10.9	1.47	20.2	52.6	12.3	1.60	24.1	62.3	14.0	1.74	27.9	4.95
×31.8	18.7	41.5	10.4	1.49	18.7	49.2	11.7	1.62	22.2	58.2	13.3	1.76	25.7	5.05
2MC12×50	29.4	67.2	16.2	1.51	30.9	79.8	18.5	1.65	36.4	94.5	20.9	1.79	41.9	4.28
×45	26.4	59.9	14.9	1.51	27.5	71.1	16.9	1.64	32.4	84.1	19.2	1.79	37.4	4.36
×40	23.6	53.7	13.8	1.51	24.5	63.7	15.6	1.65	29.0	75.3	17.7	1.79	33.4	4.46
×35	20.6	48.0	12.7	1.53	21.6	56.8	14.4	1.66	25.5	67.1	16.2	1.81	29.4	4.59
×31	18.2	44.0	12.0	1.55	19.7	52.1	13.5	1.69	23.1	61.4	15.2	1.83	26.5	4.71
2MC12×14.3	8.36	3.19	1.50	0.618	3.15	4.66	2.02	0.747	4.72	6.73	2.70	0.897	6.29	4.27
2MC12×10.6[c]	6.20	1.21	0.804	0.441	1.67	2.05	1.21	0.575	2.83	3.33	1.78	0.733	3.99	4.22
2MC10×41.1	24.2	60.0	13.9	1.58	26.4	70.7	15.7	1.71	30.9	83.1	17.7	1.85	35.5	3.61
×33.6	19.7	49.5	12.1	1.58	21.5	58.2	13.6	1.72	25.2	68.3	15.3	1.86	28.9	3.75
×28.5	16.7	43.5	11.0	1.61	18.7	51.1	12.3	1.75	21.9	59.8	13.8	1.89	25.0	3.89
2MC10×25	14.7	27.8	8.18	1.38	14.0	33.6	9.36	1.51	16.8	40.4	10.7	1.66	19.5	3.87
×22	12.9	25.4	7.67	1.40	12.8	30.7	8.76	1.54	15.2	36.8	10.0	1.69	17.6	3.99
2MC10×8.4[c]	4.92	1.05	0.700	0.462	1.40	1.75	1.03	0.596	2.32	2.79	1.49	0.753	3.24	3.61
×6.5[c]	3.90	0.414	0.354	0.326	0.757	0.835	0.615	0.463	1.49	1.53	0.990	0.626	2.22	3.43
2MC9×25.4	14.9	29.2	8.34	1.40	14.5	35.2	9.53	1.53	17.3	42.2	10.9	1.68	20.1	3.43
×23.9	14.0	27.8	8.05	1.41	13.8	33.4	9.19	1.54	16.4	40.1	10.5	1.69	19.0	3.48
2MC8×22.8	13.4	27.7	7.91	1.44	13.5	33.2	9.01	1.58	16.0	39.7	10.2	1.72	18.6	3.09
×21.4	12.6	26.3	7.63	1.45	12.8	31.6	8.68	1.59	15.2	37.7	9.86	1.73	17.5	3.13
2MC8×20	11.7	17.1	5.66	1.21	9.88	21.2	6.61	1.34	12.1	26.2	7.70	1.49	14.3	3.04
×18.7	11.0	16.2	5.45	1.21	9.34	20.1	6.35	1.35	11.4	24.8	7.39	1.50	13.5	3.09
2MC8×8.5	5.00	2.16	1.15	0.658	2.14	3.14	1.52	0.793	3.08	4.47	1.99	0.946	4.02	3.05
2MC7×22.7	13.3	29.0	8.06	1.47	13.9	34.7	9.16	1.61	16.4	41.3	10.4	1.76	18.9	2.67
×19.1	11.2	25.1	7.27	1.50	12.1	30.0	8.25	1.64	14.2	35.7	9.34	1.78	16.3	2.77

[c] Shape is slender for compression with F_y = 36 ksi.

2MC6–2MC3

Table 1-17 (continued)
2MC-Shapes
Properties



Shape	Area, A	Axis Y-Y												Axis X-X
		Separation, s, in.												
		0				3/8				3/4				r_x
		I	S	r	Z	I	S	r	Z	I	S	r	Z	
	in.^{2}	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.
2MC6×18	10.6	25.0	7.13	1.54	11.8	29.8	8.07	1.68	13.8	35.3	9.11	1.83	15.8	2.37
×15.3	8.98	19.7	5.63	1.48	9.43	23.6	6.39	1.62	11.1	28.1	7.24	1.77	12.8	2.38
2MC6×16.3	9.58	15.8	5.26	1.28	8.88	19.4	6.10	1.42	10.7	23.8	7.05	1.58	12.5	2.33
×15.1	8.88	14.8	5.02	1.29	8.35	18.2	5.82	1.43	10.0	22.3	6.71	1.58	11.7	2.37
2MC6×12	7.06	7.21	2.89	1.01	4.97	9.32	3.47	1.15	6.29	11.9	4.15	1.30	7.62	2.30
2MC6×7	4.18	2.25	1.20	0.734	2.09	3.19	1.55	0.873	2.88	4.41	1.96	1.03	3.66	2.34
×6.5	3.90	2.15	1.16	0.744	2.00	3.04	1.49	0.883	2.73	4.20	1.89	1.04	3.46	2.38
2MC4×13.8	8.06	10.1	4.03	1.12	6.84	12.9	4.81	1.27	8.35	16.3	5.68	1.42	9.87	1.48
2MC3×7.1	4.22	3.13	1.62	0.862	2.76	4.31	2.03	1.01	3.55	5.79	2.50	1.17	4.34	1.14

Table 4-14
Available Critical Stress for Compression Members

L_c/r	F_y = 35 ksi		F_y = 36 ksi		F_y = 46 ksi		F_y = 50 ksi		F_y = 65 ksi		F_y = 70 ksi	
	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$
	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
1	21.0	31.5	21.6	32.4	27.5	41.4	29.9	45.0	38.9	58.5	41.9	63.0
2	21.0	31.5	21.6	32.4	27.5	41.4	29.9	45.0	38.9	58.5	41.9	63.0
3	20.9	31.5	21.5	32.4	27.5	41.4	29.9	45.0	38.9	58.4	41.9	62.9
4	20.9	31.5	21.5	32.4	27.5	41.4	29.9	44.9	38.9	58.4	41.8	62.9
5	20.9	31.5	21.5	32.4	27.5	41.3	29.9	44.9	38.8	58.4	41.8	62.8
6	20.9	31.4	21.5	32.3	27.5	41.3	29.9	44.9	38.8	58.3	41.8	62.8
7	20.9	31.4	21.5	32.3	27.5	41.3	29.8	44.8	38.7	58.2	41.7	62.7
8	20.9	31.4	21.5	32.3	27.4	41.2	29.8	44.8	38.7	58.1	41.6	62.6
9	20.9	31.4	21.5	32.3	27.4	41.2	29.8	44.7	38.6	58.1	41.6	62.5
10	20.9	31.3	21.4	32.2	27.4	41.1	29.7	44.7	38.6	57.9	41.5	62.4
11	20.8	31.3	21.4	32.2	27.3	41.1	29.7	44.6	38.5	57.8	41.4	62.2
12	20.8	31.3	21.4	32.2	27.3	41.0	29.6	44.5	38.4	57.7	41.3	62.1
13	20.8	31.2	21.4	32.1	27.2	40.9	29.6	44.4	38.3	57.6	41.2	61.9
14	20.7	31.2	21.3	32.1	27.2	40.9	29.5	44.4	38.2	57.4	41.1	61.7
15	20.7	31.1	21.3	32.0	27.1	40.8	29.5	44.3	38.1	57.3	41.0	61.6
16	20.7	31.1	21.3	32.0	27.1	40.7	29.4	44.2	38.0	57.1	40.8	61.4
17	20.7	31.0	21.2	31.9	27.0	40.6	29.3	44.1	37.9	56.9	40.7	61.2
18	20.6	31.0	21.2	31.9	27.0	40.5	29.2	43.9	37.7	56.7	40.5	60.9
19	20.6	30.9	21.2	31.8	26.9	40.4	29.2	43.8	37.6	56.5	40.4	60.7
20	20.5	30.9	21.1	31.7	26.8	40.3	29.1	43.7	37.5	56.3	40.2	60.5
21	20.5	30.8	21.1	31.7	26.7	40.2	29.0	43.6	37.3	56.1	40.1	60.2
22	20.4	30.7	21.0	31.6	26.7	40.1	28.9	43.4	37.2	55.9	39.9	60.0
23	20.4	30.7	21.0	31.5	26.6	40.0	28.8	43.3	37.0	55.6	39.7	59.7
24	20.3	30.6	20.9	31.4	26.5	39.8	28.7	43.1	36.8	55.4	39.5	59.4
25	20.3	30.5	20.9	31.4	26.4	39.7	28.6	43.0	36.7	55.1	39.3	59.1
26	20.2	30.4	20.8	31.3	26.3	39.6	28.5	42.8	36.5	54.9	39.1	58.8
27	20.2	30.3	20.7	31.2	26.2	39.4	28.4	42.7	36.3	54.6	38.9	58.5
28	20.1	30.3	20.7	31.1	26.1	39.3	28.3	42.5	36.1	54.3	38.7	58.1
29	20.1	30.2	20.6	31.0	26.0	39.1	28.2	42.3	35.9	54.0	38.5	57.8
30	20.0	30.1	20.6	30.9	25.9	39.0	28.0	42.1	35.7	53.7	38.2	57.5
31	20.0	30.0	20.5	30.8	25.8	38.8	27.9	41.9	35.5	53.4	38.0	57.1
32	19.9	29.9	20.4	30.7	25.7	38.6	27.8	41.8	35.3	53.1	37.7	56.7
33	19.8	29.8	20.4	30.6	25.6	38.5	27.7	41.6	35.1	52.7	37.5	56.4
34	19.8	29.7	20.3	30.5	25.5	38.3	27.5	41.4	34.9	52.4	37.2	56.0
35	19.7	29.6	20.2	30.4	25.4	38.1	27.4	41.2	34.6	52.1	37.0	55.6
36	19.6	29.5	20.1	30.3	25.2	37.9	27.2	40.9	34.4	51.7	36.7	55.2
37	19.5	29.4	20.1	30.1	25.1	37.8	27.1	40.7	34.2	51.4	36.4	54.8
38	19.5	29.3	20.0	30.0	25.0	37.6	26.9	40.5	33.9	51.0	36.2	54.3
39	19.4	29.1	19.9	29.9	24.9	37.4	26.8	40.3	33.7	50.6	35.9	53.9
40	19.3	29.0	19.8	29.8	24.7	37.2	26.6	40.0	33.4	50.2	35.6	53.5

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Table 4-14 (continued)
Available Critical Stress for Compression Members

$\frac{L_c}{r}$	F_y = 35 ksi		F_y = 36 ksi		F_y = 46 ksi		F_y = 50 ksi		F_y = 65 ksi		F_y = 70 ksi	
	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$
	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
41	19.2	28.9	19.7	29.7	24.6	37.0	26.5	39.8	33.2	49.9	35.3	53.0
42	19.2	28.8	19.6	29.5	24.5	36.8	26.3	39.5	32.9	49.5	35.0	52.6
43	19.1	28.7	19.6	29.4	24.3	36.6	26.2	39.3	32.6	49.1	34.7	52.1
44	19.0	28.5	19.5	29.3	24.2	36.3	26.0	39.1	32.4	48.7	34.4	51.7
45	18.9	28.4	19.4	29.1	24.0	36.1	25.8	38.8	32.1	48.3	34.1	51.2
46	18.8	28.3	19.3	29.0	23.9	35.9	25.6	38.5	31.8	47.8	33.8	50.7
47	18.7	28.1	19.2	28.9	23.8	35.7	25.5	38.3	31.6	47.4	33.4	50.3
48	18.6	28.0	19.1	28.7	23.6	35.4	25.3	38.0	31.3	47.0	33.1	49.8
49	18.5	27.9	19.0	28.5	23.4	35.2	25.1	37.7	31.0	46.6	32.8	49.3
50	18.4	27.7	18.9	28.4	23.3	35.0	24.9	37.5	30.7	46.1	32.5	48.8
51	18.3	27.6	18.8	28.3	23.1	34.8	24.8	37.2	30.4	45.7	32.1	48.3
52	18.3	27.4	18.7	28.1	23.0	34.5	24.6	36.9	30.1	45.2	31.8	47.8
53	18.2	27.3	18.6	28.0	22.8	34.3	24.4	36.7	29.8	44.8	31.4	47.3
54	18.1	27.1	18.5	27.8	22.6	34.0	24.2	36.4	29.5	44.3	31.1	46.7
55	18.0	27.0	18.4	27.6	22.5	33.8	24.0	36.1	29.2	43.9	30.8	46.2
56	17.9	26.8	18.3	27.5	22.3	33.5	23.8	35.8	28.9	43.4	30.4	45.7
57	17.7	26.7	18.2	27.3	22.1	33.3	23.6	35.5	28.6	43.0	30.1	45.2
58	17.6	26.5	18.1	27.1	22.0	33.0	23.4	35.2	28.3	42.5	29.7	44.6
59	17.5	26.4	17.9	27.0	21.8	32.8	23.2	34.9	28.0	42.0	29.4	44.1
60	17.4	26.2	17.8	26.8	21.6	32.5	23.0	34.6	27.6	41.5	29.0	43.6
61	17.3	26.0	17.7	26.6	21.4	32.2	22.8	34.3	27.3	41.1	28.6	43.0
62	17.2	25.9	17.6	26.5	21.3	32.0	22.6	34.0	27.0	40.6	28.3	42.5
63	17.1	25.7	17.5	26.3	21.1	31.7	22.4	33.7	26.7	40.1	27.9	42.0
64	17.0	25.5	17.4	26.1	20.9	31.4	22.2	33.4	26.4	39.6	27.6	41.4
65	16.9	25.4	17.3	25.9	20.7	31.2	22.0	33.0	26.0	39.2	27.2	40.9
66	16.8	25.2	17.1	25.8	20.5	30.9	21.8	32.7	25.7	38.7	26.8	40.3
67	16.7	25.0	17.0	25.6	20.4	30.6	21.6	32.4	25.4	38.2	26.5	39.8
68	16.5	24.9	16.9	25.4	20.2	30.3	21.4	32.1	25.1	37.7	26.1	39.2
69	16.4	24.7	16.8	25.2	20.0	30.1	21.1	31.8	24.8	37.2	25.7	38.7
70	16.3	24.5	16.7	25.0	19.8	29.8	20.9	31.4	24.4	36.7	25.4	38.2
71	16.2	24.3	16.5	24.8	19.6	29.5	20.7	31.1	24.1	36.2	25.0	37.6
72	16.1	24.2	16.4	24.7	19.4	29.2	20.5	30.8	23.8	35.7	24.7	37.1
73	16.0	24.0	16.3	24.5	19.2	28.9	20.3	30.5	23.5	35.3	24.3	36.5
74	15.8	23.8	16.2	24.3	19.1	28.6	20.1	30.2	23.1	34.8	23.9	36.0
75	15.7	23.6	16.0	24.1	18.9	28.4	19.8	29.8	22.8	34.3	23.6	35.4
76	15.6	23.4	15.9	23.9	18.7	28.1	19.6	29.5	22.5	33.8	23.2	34.9
77	15.5	23.3	15.8	23.7	18.5	27.8	19.4	29.2	22.2	33.3	22.8	34.3
78	15.4	23.1	15.6	23.5	18.3	27.5	19.2	28.8	21.8	32.8	22.5	33.8
79	15.2	22.9	15.5	23.3	18.1	27.2	19.0	28.5	21.5	32.3	22.1	33.3
80	15.1	22.7	15.4	23.1	17.9	26.9	18.8	28.2	21.2	31.8	21.8	32.7

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Table 4-14 (continued)
Available Critical Stress for Compression Members

$\frac{L_c}{r}$	F_y = 35 ksi		F_y = 36 ksi		F_y = 46 ksi		F_y = 50 ksi		F_y = 65 ksi		F_y = 70 ksi	
	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$
	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
81	15.0	22.5	15.3	22.9	17.7	26.6	18.5	27.9	20.9	31.4	21.4	32.2
82	14.9	22.3	15.1	22.7	17.5	26.3	18.3	27.5	20.5	30.9	21.1	31.7
83	14.7	22.1	15.0	22.5	17.3	26.0	18.1	27.2	20.2	30.4	20.7	31.1
84	14.6	22.0	14.9	22.3	17.1	25.8	17.9	26.9	19.9	29.9	20.4	30.6
85	14.5	21.8	14.7	22.1	16.9	25.5	17.7	26.5	19.6	29.4	20.0	30.1
86	14.4	21.6	14.6	22.0	16.7	25.2	17.4	26.2	19.3	29.0	19.7	29.5
87	14.2	21.4	14.5	21.8	16.6	24.9	17.2	25.9	19.0	28.5	19.3	29.0
88	14.1	21.2	14.3	21.6	16.4	24.6	17.0	25.5	18.6	28.0	19.0	28.5
89	14.0	21.0	14.2	21.4	16.2	24.3	16.8	25.2	18.3	27.6	18.6	28.0
90	13.8	20.8	14.1	21.2	16.0	24.0	16.6	24.9	18.0	27.1	18.3	27.5
91	13.7	20.6	13.9	21.0	15.8	23.7	16.3	24.6	17.7	26.6	18.0	27.0
92	13.6	20.4	13.8	20.8	15.6	23.4	16.1	24.2	17.4	26.2	17.6	26.5
93	13.5	20.2	13.7	20.5	15.4	23.1	15.9	23.9	17.1	25.7	17.3	26.0
94	13.3	20.0	13.5	20.3	15.2	22.8	15.7	23.6	16.8	25.3	17.0	25.5
95	13.2	19.9	13.4	20.1	15.0	22.6	15.5	23.3	16.5	24.8	16.6	25.0
96	13.1	19.7	13.3	19.9	14.8	22.3	15.3	22.9	16.2	24.4	16.3	24.5
97	13.0	19.5	13.1	19.7	14.6	22.0	15.0	22.6	15.9	23.9	16.0	24.0
98	12.8	19.3	13.0	19.5	14.4	21.7	14.8	22.3	15.6	23.5	15.7	23.5
99	12.7	19.1	12.9	19.3	14.2	21.4	14.6	22.0	15.3	23.0	15.3	23.0
100	12.6	18.9	12.7	19.1	14.1	21.1	14.4	21.7	15.0	22.6	15.0	22.6
101	12.4	18.7	12.6	18.9	13.9	20.8	14.2	21.3	14.7	22.1	14.7	22.1
102	12.3	18.5	12.5	18.7	13.7	20.6	14.0	21.0	14.4	21.7	14.4	21.7
103	12.2	18.3	12.3	18.5	13.5	20.3	13.8	20.7	14.2	21.3	14.2	21.3
104	12.1	18.1	12.2	18.3	13.3	20.0	13.6	20.4	13.9	20.9	13.9	20.9
105	11.9	17.9	12.1	18.1	13.1	19.7	13.4	20.1	13.6	20.5	13.6	20.5
106	11.8	17.7	11.9	17.9	12.9	19.4	13.2	19.8	13.4	20.1	13.4	20.1
107	11.7	17.5	11.8	17.7	12.8	19.2	13.0	19.5	13.1	19.7	13.1	19.7
108	11.5	17.3	11.7	17.5	12.6	18.9	12.8	19.2	12.9	19.4	12.9	19.4
109	11.4	17.2	11.5	17.3	12.4	18.6	12.6	18.9	12.7	19.0	12.7	19.0
110	11.3	17.0	11.4	17.1	12.2	18.3	12.4	18.6	12.4	18.7	12.4	18.7
111	11.2	16.8	11.3	16.9	12.0	18.1	12.2	18.3	12.2	18.3	12.2	18.3
112	11.0	16.6	11.1	16.7	11.8	17.8	12.0	18.0	12.0	18.0	12.0	18.0
113	10.9	16.4	11.0	16.5	11.7	17.5	11.8	17.7	11.8	17.7	11.8	17.7
114	10.8	16.2	10.9	16.3	11.5	17.3	11.6	17.4	11.6	17.4	11.6	17.4
115	10.7	16.0	10.7	16.2	11.3	17.0	11.4	17.1	11.4	17.1	11.4	17.1
116	10.5	15.8	10.6	16.0	11.1	16.7	11.2	16.8	11.2	16.8	11.2	16.8
117	10.4	15.6	10.5	15.8	11.0	16.5	11.0	16.5	11.0	16.5	11.0	16.5
118	10.3	15.5	10.4	15.6	10.8	16.2	10.8	16.2	10.8	16.2	10.8	16.2
119	10.2	15.3	10.2	15.4	10.6	16.0	10.6	16.0	10.6	16.0	10.6	16.0
120	10.0	15.1	10.1	15.2	10.4	15.7	10.4	15.7	10.4	15.7	10.4	15.7

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

Table 4-14 (continued)
Available Critical Stress for Compression Members

$\frac{L_c}{r}$	F_y = 35 ksi		F_y = 36 ksi		F_y = 46 ksi		F_y = 50 ksi		F_y = 65 ksi		F_y = 70 ksi	
	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$
	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
121	9.91	14.9	10.0	15.0	10.3	15.4	10.3	15.4	10.3	15.4	10.3	15.4
122	9.79	14.7	9.85	14.8	10.1	15.2	10.1	15.2	10.1	15.2	10.1	15.2
123	9.67	14.5	9.72	14.6	9.94	14.9	9.94	14.9	9.94	14.9	9.94	14.9
124	9.55	14.3	9.59	14.4	9.78	14.7	9.78	14.7	9.78	14.7	9.78	14.7
125	9.43	14.2	9.47	14.2	9.62	14.5	9.62	14.5	9.62	14.5	9.62	14.5
126	9.31	14.0	9.35	14.0	9.47	14.2	9.47	14.2	9.47	14.2	9.47	14.2
127	9.19	13.8	9.22	13.9	9.32	14.0	9.32	14.0	9.32	14.0	9.32	14.0
128	9.07	13.6	9.10	13.7	9.17	13.8	9.17	13.8	9.17	13.8	9.17	13.8
129	8.95	13.4	8.98	13.5	9.03	13.6	9.03	13.6	9.03	13.6	9.03	13.6
130	8.83	13.3	8.86	13.3	8.89	13.4	8.89	13.4	8.89	13.4	8.89	13.4
131	8.71	13.1	8.73	13.1	8.76	13.2	8.76	13.2	8.76	13.2	8.76	13.2
132	8.60	12.9	8.61	12.9	8.63	13.0	8.63	13.0	8.63	13.0	8.63	13.0
133	8.48	12.7	8.49	12.8	8.50	12.8	8.50	12.8	8.50	12.8	8.50	12.8
134	8.37	12.6	8.37	12.6	8.37	12.6	8.37	12.6	8.37	12.6	8.37	12.6
135	8.25	12.4	8.25	12.4	8.25	12.4	8.25	12.4	8.25	12.4	8.25	12.4
136	8.13	12.2	8.13	12.2	8.13	12.2	8.13	12.2	8.13	12.2	8.13	12.2
137	8.01	12.0	8.01	12.0	8.01	12.0	8.01	12.0	8.01	12.0	8.01	12.0
138	7.89	11.9	7.89	11.9	7.89	11.9	7.89	11.9	7.89	11.9	7.89	11.9
139	7.78	11.7	7.78	11.7	7.78	11.7	7.78	11.7	7.78	11.7	7.78	11.7
140	7.67	11.5	7.67	11.5	7.67	11.5	7.67	11.5	7.67	11.5	7.67	11.5
141	7.56	11.4	7.56	11.4	7.56	11.4	7.56	11.4	7.56	11.4	7.56	11.4
142	7.45	11.2	7.45	11.2	7.45	11.2	7.45	11.2	7.45	11.2	7.45	11.2
143	7.35	11.0	7.35	11.0	7.35	11.0	7.35	11.0	7.35	11.0	7.35	11.0
144	7.25	10.9	7.25	10.9	7.25	10.9	7.25	10.9	7.25	10.9	7.25	10.9
145	7.15	10.7	7.15	10.7	7.15	10.7	7.15	10.7	7.15	10.7	7.15	10.7
146	7.05	10.6	7.05	10.6	7.05	10.6	7.05	10.6	7.05	10.6	7.05	10.6
147	6.96	10.5	6.96	10.5	6.96	10.5	6.96	10.5	6.96	10.5	6.96	10.5
148	6.86	10.3	6.86	10.3	6.86	10.3	6.86	10.3	6.86	10.3	6.86	10.3
149	6.77	10.2	6.77	10.2	6.77	10.2	6.77	10.2	6.77	10.2	6.77	10.2
150	6.68	10.0	6.68	10.0	6.68	10.0	6.68	10.0	6.68	10.0	6.68	10.0
151	6.59	9.91	6.59	9.91	6.59	9.91	6.59	9.91	6.59	9.91	6.59	9.91
152	6.51	9.78	6.51	9.78	6.51	9.78	6.51	9.78	6.51	9.78	6.51	9.78
153	6.42	9.65	6.42	9.65	6.42	9.65	6.42	9.65	6.42	9.65	6.42	9.65
154	6.34	9.53	6.34	9.53	6.34	9.53	6.34	9.53	6.34	9.53	6.34	9.53
155	6.26	9.40	6.26	9.40	6.26	9.40	6.26	9.40	6.26	9.40	6.26	9.40
156	6.18	9.28	6.18	9.28	6.18	9.28	6.18	9.28	6.18	9.28	6.18	9.28
157	6.10	9.17	6.10	9.17	6.10	9.17	6.10	9.17	6.10	9.17	6.10	9.17
158	6.02	9.05	6.02	9.05	6.02	9.05	6.02	9.05	6.02	9.05	6.02	9.05
159	5.95	8.94	5.95	8.94	5.95	8.94	5.95	8.94	5.95	8.94	5.95	8.94
160	5.87	8.82	5.87	8.82	5.87	8.82	5.87	8.82	5.87	8.82	5.87	8.82

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

Table 4-14 (continued)
Available Critical Stress for Compression Members

$\frac{L_c}{r}$	$F_y = 35$ ksi		$F_y = 36$ ksi		$F_y = 46$ ksi		$F_y = 50$ ksi		$F_y = 65$ ksi		$F_y = 70$ ksi	
	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$	F_{cr}/Ω_c	$\phi_c F_{cr}$
	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi	ksi
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
161	5.80	8.72	5.80	8.72	5.80	8.72	5.80	8.72	5.80	8.72	5.80	8.72
162	5.73	8.61	5.73	8.61	5.73	8.61	5.73	8.61	5.73	8.61	5.73	8.61
163	5.66	8.50	5.66	8.50	5.66	8.50	5.66	8.50	5.66	8.50	5.66	8.50
164	5.59	8.40	5.59	8.40	5.59	8.40	5.59	8.40	5.59	8.40	5.59	8.40
165	5.52	8.30	5.52	8.30	5.52	8.30	5.52	8.30	5.52	8.30	5.52	8.30
166	5.45	8.20	5.45	8.20	5.45	8.20	5.45	8.20	5.45	8.20	5.45	8.20
167	5.39	8.10	5.39	8.10	5.39	8.10	5.39	8.10	5.39	8.10	5.39	8.10
168	5.33	8.00	5.33	8.00	5.33	8.00	5.33	8.00	5.33	8.00	5.33	8.00
169	5.25	7.89	5.25	7.89	5.25	7.89	5.25	7.89	5.25	7.89	5.25	7.89
170	5.20	7.82	5.20	7.82	5.20	7.82	5.20	7.82	5.20	7.82	5.20	7.82
171	5.14	7.73	5.14	7.73	5.14	7.73	5.14	7.73	5.14	7.73	5.14	7.73
172	5.08	7.64	5.08	7.64	5.08	7.64	5.08	7.64	5.08	7.64	5.08	7.64
173	5.02	7.55	5.02	7.55	5.02	7.55	5.02	7.55	5.02	7.55	5.02	7.55
174	4.96	7.46	4.96	7.46	4.96	7.46	4.96	7.46	4.96	7.46	4.96	7.46
175	4.91	7.38	4.91	7.38	4.91	7.38	4.91	7.38	4.91	7.38	4.91	7.38
176	4.85	7.29	4.85	7.29	4.85	7.29	4.85	7.29	4.85	7.29	4.85	7.29
177	4.80	7.21	4.80	7.21	4.80	7.21	4.80	7.21	4.80	7.21	4.80	7.21
178	4.74	7.13	4.74	7.13	4.74	7.13	4.74	7.13	4.74	7.13	4.74	7.13
179	4.69	7.05	4.69	7.05	4.69	7.05	4.69	7.05	4.69	7.05	4.69	7.05
180	4.64	6.97	4.64	6.97	4.64	6.97	4.64	6.97	4.64	6.97	4.64	6.97
181	4.59	6.90	4.59	6.90	4.59	6.90	4.59	6.90	4.59	6.90	4.59	6.90
182	4.54	6.82	4.54	6.82	4.54	6.82	4.54	6.82	4.54	6.82	4.54	6.82
183	4.49	6.75	4.49	6.75	4.49	6.75	4.49	6.75	4.49	6.75	4.49	6.75
184	4.44	6.67	4.44	6.67	4.44	6.67	4.44	6.67	4.44	6.67	4.44	6.67
185	4.39	6.60	4.39	6.60	4.39	6.60	4.39	6.60	4.39	6.60	4.39	6.60
186	4.34	6.53	4.34	6.53	4.34	6.53	4.34	6.53	4.34	6.53	4.34	6.53
187	4.30	6.46	4.30	6.46	4.30	6.46	4.30	6.46	4.30	6.46	4.30	6.46
188	4.25	6.39	4.25	6.39	4.25	6.39	4.25	6.39	4.25	6.39	4.25	6.39
189	4.21	6.32	4.21	6.32	4.21	6.32	4.21	6.32	4.21	6.32	4.21	6.32
190	4.16	6.26	4.16	6.26	4.16	6.26	4.16	6.26	4.16	6.26	4.16	6.26
191	4.12	6.19	4.12	6.19	4.12	6.19	4.12	6.19	4.12	6.19	4.12	6.19
192	4.08	6.13	4.08	6.13	4.08	6.13	4.08	6.13	4.08	6.13	4.08	6.13
193	4.04	6.06	4.04	6.06	4.04	6.06	4.04	6.06	4.04	6.06	4.04	6.06
194	3.99	6.00	3.99	6.00	3.99	6.00	3.99	6.00	3.99	6.00	3.99	6.00
195	3.95	5.94	3.95	5.94	3.95	5.94	3.95	5.94	3.95	5.94	3.95	5.94
196	3.91	5.88	3.91	5.88	3.91	5.88	3.91	5.88	3.91	5.88	3.91	5.88
197	3.87	5.82	3.87	5.82	3.87	5.82	3.87	5.82	3.87	5.82	3.87	5.82
198	3.83	5.76	3.83	5.76	3.83	5.76	3.83	5.76	3.83	5.76	3.83	5.76
199	3.80	5.70	3.80	5.70	3.80	5.70	3.80	5.70	3.80	5.70	3.80	5.70
200	3.76	5.65	3.76	5.65	3.76	5.65	3.76	5.65	3.76	5.65	3.76	5.65

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Menu

Table 4-1a
Available Strength in Axial Compression, kips
W-Shapes

W14

F_y = 50 ksi

Shape		W14×							
lb/ft		873[h]		808[h]		730[h]		665[h]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	7690	11600	7130	10700	6440	9670	5870	8820
	11	7300	11000	6750	10100	6070	9130	5530	8310
	12	7220	10900	6680	10000	6010	9030	5470	8220
	13	7140	10700	6600	9920	5940	8920	5400	8110
	14	7060	10600	6520	9800	5860	8810	5330	8010
	15	6970	10500	6440	9680	5780	8690	5250	7890
	16	6880	10300	6350	9540	5690	8560	5170	7770
	17	6780	10200	6250	9400	5610	8430	5090	7650
	18	6680	10000	6160	9250	5510	8290	5000	7520
	19	6570	9870	6050	9100	5420	8140	4910	7380
	20	6460	9700	5950	8940	5320	7990	4820	7240
	22	6220	9350	5730	8610	5110	7670	4620	6950
	24	5980	8980	5490	8260	4890	7340	4420	6640
	26	5720	8600	5250	7890	4660	7000	4200	6320
	28	5460	8200	5000	7520	4420	6650	3990	5990
	30	5190	7790	4750	7130	4180	6290	3760	5660
	32	4910	7380	4490	6750	3940	5930	3540	5320
	34	4630	6970	4230	6360	3700	5560	3320	4990
	36	4360	6550	3970	5970	3460	5200	3100	4650
	38	4080	6140	3710	5580	3220	4850	2880	4330
	40	3810	5730	3460	5200	2990	4500	2670	4010
	42	3550	5340	3210	4830	2770	4160	2460	3690
	44	3290	4950	2970	4470	2550	3830	2260	3390
	46	3040	4570	2740	4120	2330	3510	2060	3100
	48	2800	4200	2520	3780	2140	3220	1900	2850
	50	2580	3870	2320	3480	1970	2970	1750	2630
Properties									
P_{wo}, kips		4010	6010	3560	5340	2820	4230	2410	3620
P_{wi}, kip/in.		131	197	125	187	102	154	94.3	142
P_{wb}, kips		93000	140000	79600	120000	44000	66100	34400	51700
P_{fb}, kips		5680	8540	4910	7370	4510	6780	3820	5750
L_p, ft		17.3		17.1		16.6		16.3	
L_r, ft		329		309		275		253	
A_g, in.^{2}		257		238		215		196	
I_x, in.^{4}		18100		15900		14300		12400	
I_y, in.^{4}		6170		5550		4720		4170	
r_y, in.		4.90		4.83		4.69		4.62	
r_x/r_y		1.71		1.69		1.74		1.73	
$P_{ex}L_c^2/10^4$, k-in.^{2}		518000		455000		409000		355000	
$P_{ey}L_c^2/10^4$, k-in.^{2}		177000		159000		135000		119000	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

$F_y = 50$ ksi

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

W14

Shape	W14×							
lb/ft	605[h]		550[h]		500[h]		455[h]	
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	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y: 0	5330	8010	4850	7290	4400	6610	4010	6030
11	5010	7530	4550	6840	4120	6200	3750	5640
12	4950	7440	4500	6760	4070	6120	3710	5570
13	4890	7350	4440	6670	4020	6040	3660	5500
14	4820	7250	4380	6580	3960	5950	3600	5420
15	4750	7140	4310	6480	3900	5860	3550	5330
16	4680	7030	4240	6380	3840	5770	3490	5240
17	4600	6920	4170	6270	3770	5660	3420	5150
18	4520	6790	4100	6160	3700	5560	3360	5050
19	4440	6670	4020	6040	3630	5450	3290	4950
20	4350	6540	3940	5920	3550	5340	3220	4840
22	4170	6260	3770	5660	3390	5100	3080	4620
24	3980	5980	3590	5400	3230	4860	2920	4400
26	3780	5680	3410	5120	3060	4600	2770	4160
28	3580	5380	3220	4840	2890	4340	2610	3920
30	3370	5070	3030	4560	2720	4080	2450	3680
32	3170	4760	2840	4270	2540	3820	2290	3440
34	2960	4450	2650	3990	2370	3560	2130	3200
36	2760	4140	2460	3700	2200	3300	1970	2960
38	2560	3840	2280	3430	2030	3050	1820	2730
40	2360	3550	2100	3160	1870	2800	1670	2510
42	2170	3270	1930	2900	1710	2570	1520	2290
44	1990	2990	1760	2650	1560	2340	1390	2080
46	1820	2730	1610	2420	1420	2140	1270	1910
48	1670	2510	1480	2220	1310	1960	1160	1750
50	1540	2310	1360	2050	1200	1810	1070	1610
Properties								
P_{wo}, kips	2060	3090	1750	2630	1500	2240	1280	1920
P_{wi}, kip/in.	86.7	130	79.3	119	73.0	110	67.3	101
P_{wb}, kips	26600	40100	20500	30800	15900	23900	12500	18800
P_{fb}, kips	3240	4870	2730	4100	2290	3450	1930	2900
L_p, ft	16.1		15.9		15.6		15.5	
L_r, ft	232		213		196		179	
A_g, in.^{2}	178		162		147		134	
I_x, in.^{4}	10800		9430		8210		7190	
I_y, in.^{4}	3680		3250		2880		2560	
r_y, in.	4.55		4.49		4.43		4.38	
r_x/r_y	1.71		1.70		1.69		1.67	
$P_{ex}L_c^2/10^4$, k-in.^{2}	309000		270000		235000		206000	
$P_{ey}L_c^2/10^4$, k-in.^{2}	105000		93000		82400		73300	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

W14

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

$F_y = 50$ ksi

Shape		W14×											
lb/ft		426[h]		398[h]		370[h]		342[h]		311[h]		283[h]	
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, L_c (ft), with respect to least radius of gyration, r_y	0	3740	5620	3500	5260	3260	4900	3020	4540	2740	4110	2490	3750
	11	3500	5260	3270	4920	3040	4570	2820	4230	2550	3830	2320	3480
	12	3450	5190	3230	4850	3000	4510	2780	4180	2510	3770	2290	3440
	13	3410	5120	3180	4780	2960	4450	2740	4120	2470	3720	2250	3380
	14	3350	5040	3130	4710	2910	4380	2700	4050	2430	3660	2210	3330
	15	3300	4960	3080	4630	2870	4310	2650	3980	2390	3600	2180	3270
	16	3240	4870	3030	4550	2810	4230	2600	3910	2350	3530	2140	3210
	17	3180	4790	2970	4470	2760	4150	2550	3840	2300	3460	2090	3150
	18	3120	4690	2920	4380	2710	4070	2500	3760	2260	3390	2050	3080
	19	3060	4600	2850	4290	2650	3980	2450	3680	2210	3320	2000	3010
	20	2990	4500	2790	4200	2590	3890	2390	3600	2160	3240	1960	2940
	22	2860	4290	2660	4000	2470	3710	2280	3420	2050	3080	1860	2800
	24	2710	4080	2530	3800	2340	3520	2160	3240	1940	2920	1760	2640
	26	2560	3850	2390	3590	2210	3320	2040	3060	1830	2750	1660	2490
	28	2410	3630	2250	3380	2080	3120	1910	2870	1710	2580	1550	2330
	30	2260	3400	2100	3160	1940	2920	1790	2680	1600	2400	1450	2170
	32	2110	3170	1960	2950	1810	2720	1660	2500	1490	2230	1340	2020
	34	1960	2950	1820	2730	1670	2520	1540	2310	1370	2060	1240	1860
	36	1810	2730	1680	2530	1540	2320	1420	2130	1260	1900	1140	1710
	38	1670	2510	1550	2320	1420	2130	1300	1950	1160	1740	1040	1560
	40	1530	2300	1410	2130	1300	1950	1180	1780	1050	1580	945	1420
	42	1390	2090	1290	1930	1180	1770	1070	1610	954	1430	857	1290
	44	1270	1910	1170	1760	1070	1610	979	1470	869	1310	781	1170
	46	1160	1750	1070	1610	980	1470	896	1350	795	1200	715	1070
	48	1070	1600	985	1480	900	1350	823	1240	730	1100	656	986
	50	983	1480	907	1360	830	1250	758	1140	673	1010	605	909
Properties													
P_{wo}, kips		1140	1710	1010	1520	902	1350	788	1180	672	1010	574	861
P_{wi}, kip/in.		62.7	94.0	59.0	88.5	55.3	83.0	51.3	77.0	47.0	70.5	43.0	64.5
P_{wb}, kips		10100	15100	8420	12700	6920	10400	5540	8320	4250	6390	3260	4900
P_{fb}, kips		1730	2600	1520	2280	1320	1990	1140	1720	956	1440	802	1210
L_p, ft		15.3		15.2		15.1		15.0		14.8		14.7	
L_r, ft		168		158		148		138		125		114	
A_g, in.^{2}		125		117		109		101		91.4		83.3	
I_x, in.^{4}		6600		6000		5440		4900		4330		3840	
I_y, in.^{4}		2360		2170		1990		1810		1610		1440	
r_y, in.		4.34		4.31		4.27		4.24		4.20		4.17	
r_x/r_y		1.67		1.66		1.66		1.65		1.64		1.63	
$P_{ex}L_c^2/10^4$, k-in.^{2}		189000		172000		156000		140000		124000		110000	
$P_{ey}L_c^2/10^4$, k-in.^{2}		67500		62100		57000		51800		46100		41200	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

F_y = 50 ksi

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

W14

Shape		W14×											
lb/ft		257		233		211		193		176		159	
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, L_c (ft), with respect to least radius of gyration, r_y	0	2260	3400	2050	3080	1860	2790	1700	2560	1550	2330	1400	2100
	6	2210	3330	2010	3010	1810	2730	1660	2500	1510	2280	1370	2050
	7	2200	3300	1990	2990	1800	2700	1650	2480	1500	2260	1350	2030
	8	2180	3270	1970	2960	1780	2680	1630	2450	1490	2240	1340	2010
	9	2150	3240	1950	2930	1760	2650	1610	2430	1470	2210	1330	1990
	10	2130	3200	1930	2900	1740	2620	1590	2400	1450	2180	1310	1970
	11	2100	3160	1900	2860	1720	2580	1570	2360	1430	2150	1290	1940
	12	2070	3110	1870	2820	1690	2550	1550	2330	1410	2120	1270	1910
	13	2040	3060	1840	2770	1670	2510	1530	2290	1390	2090	1250	1880
	14	2010	3010	1810	2730	1640	2460	1500	2250	1360	2050	1230	1850
	15	1970	2960	1780	2680	1610	2420	1470	2210	1340	2010	1210	1810
	16	1930	2900	1750	2630	1580	2370	1440	2170	1310	1970	1180	1780
	17	1890	2850	1710	2570	1540	2320	1410	2120	1280	1930	1160	1740
	18	1850	2790	1670	2520	1510	2270	1380	2080	1260	1890	1130	1700
	19	1810	2720	1640	2460	1480	2220	1350	2030	1230	1840	1100	1660
	20	1770	2660	1600	2400	1440	2160	1320	1980	1200	1800	1070	1620
	22	1680	2520	1510	2280	1360	2050	1250	1870	1130	1700	1020	1530
	24	1590	2380	1430	2150	1290	1930	1170	1770	1070	1600	957	1440
	26	1490	2240	1340	2020	1210	1820	1100	1660	998	1500	896	1350
	28	1400	2100	1260	1890	1130	1700	1030	1550	931	1400	835	1250
	30	1300	1950	1170	1750	1050	1570	954	1430	863	1300	773	1160
	32	1200	1810	1080	1620	968	1460	881	1320	796	1200	713	1070
	34	1110	1670	994	1490	890	1340	810	1220	730	1100	653	982
	36	1020	1530	911	1370	815	1220	740	1110	667	1000	596	896
	38	928	1400	830	1250	741	1110	673	1010	605	909	540	812
	40	841	1260	751	1130	670	1010	608	914	546	821	487	733
Properties													
P_{wo}, kips		490	735	414	621	353	529	303	454	264	396	222	333
P_{wi}, kip/in.		39.3	59.0	35.7	53.5	32.7	49.0	29.7	44.5	27.7	41.5	24.8	37.3
P_{wb}, kips		2480	3730	1850	2780	1430	2150	1070	1610	870	1310	628	944
P_{fb}, kips		668	1000	554	832	455	684	388	583	321	483	265	398
L_p, ft		14.6		14.5		14.4		14.3		14.2		14.1	
L_r, ft		104		95.0		86.6		79.4		73.2		66.7	
A_g, in.^{2}		75.6		68.5		62.0		56.8		51.8		46.7	
I_x, in.^{4}		3400		3010		2660		2400		2140		1900	
I_y, in.^{4}		1290		1150		1030		931		838		748	
r_y, in.		4.13		4.10		4.07		4.05		4.02		4.00	
r_x/r_y		1.62		1.62		1.61		1.60		1.60		1.60	
$P_{ex}L_c^2/10^4$, k-in.^{2}		97300		86200		76100		68700		61300		54400	
$P_{ey}L_c^2/10^4$, k-in.^{2}		36900		32900		29500		26600		24000		21400	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

W14

$F_y = 50$ ksi

Shape	W14×													
lb/ft	145		132		120		109		99		90	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	1280	1920	1160	1750	1060	1590	958	1440	871	1310	793	1190
6	1250	1880	1130	1700	1030	1550	932	1400	848	1270	772	1160
7	1240	1860	1120	1680	1020	1530	923	1390	839	1260	764	1150
8	1230	1840	1110	1660	1010	1510	913	1370	830	1250	755	1140
9	1210	1820	1090	1640	994	1490	901	1350	819	1230	745	1120
10	1200	1800	1080	1620	980	1470	888	1340	807	1210	735	1100
11	1180	1770	1060	1600	965	1450	874	1310	794	1190	723	1090
12	1160	1750	1040	1570	948	1430	859	1290	780	1170	710	1070
13	1140	1720	1020	1540	931	1400	843	1270	766	1150	697	1050
14	1120	1690	1000	1510	912	1370	826	1240	750	1130	682	1030
15	1100	1650	982	1480	892	1340	808	1210	733	1100	667	1000
16	1080	1620	960	1440	872	1310	789	1190	716	1080	652	979
17	1060	1590	937	1410	850	1280	770	1160	698	1050	635	955
18	1030	1550	913	1370	828	1240	750	1130	680	1020	618	929
19	1010	1510	888	1330	805	1210	729	1100	661	994	601	903
20	980	1470	862	1300	782	1180	708	1060	642	964	583	877
22	927	1390	810	1220	734	1100	664	998	602	904	547	822
24	872	1310	756	1140	685	1030	620	931	561	843	509	766
26	816	1230	702	1060	635	955	574	863	519	781	472	709
28	759	1140	648	974	586	880	529	796	478	719	434	653
30	703	1060	594	893	537	807	485	729	438	658	397	597
32	647	973	542	814	489	735	441	663	398	598	361	543
34	593	891	491	738	443	665	399	600	360	541	326	490
36	540	812	442	664	398	598	359	539	323	485	292	439
38	489	735	397	596	357	536	322	484	290	435	262	394
40	441	663	358	538	322	484	290	437	261	393	237	356
Properties												
P_{wo}, kips	192	287	175	263	151	227	128	192	112	167	96.1	144
P_{wi}, kip/in.	22.7	34.0	21.5	32.3	19.7	29.5	17.5	26.3	16.2	24.3	14.7	22.0
P_{wb}, kips	476	716	407	611	312	469	220	330	173	260	129	194
P_{fb}, kips	222	334	199	298	165	249	138	208	114	171	94.3	142
L_p, ft	14.1		13.3		13.2		13.2		13.5		15.1	
L_r, ft	61.7		55.8		51.9		48.5		45.3		42.5	
A_g, in.^{2}	42.7		38.8		35.3		32.0		29.1		26.5	
I_x, in.^{4}	1710		1530		1380		1240		1110		999	
I_y, in.^{4}	677		548		495		447		402		362	
r_y, in.	3.98		3.76		3.74		3.73		3.71		3.70	
r_x/r_y	1.59		1.67		1.67		1.67		1.66		1.66	
$P_{ex}L_c^2/10^4$, k-in.^{2}	48900		43800		39500		35500		31800		28600	
$P_{ey}L_c^2/10^4$, k-in.^{2}	19400		15700		14200		12800		11500		10400	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

F_y = 50 ksi

W14

Shape	W14×													
lb/ft	82		74		68		61		53		48		43[c]	
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	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y														
0	719	1080	653	981	599	900	536	805	467	702	422	634	374	562
6	676	1020	614	922	562	845	503	756	421	633	380	572	339	510
7	661	993	600	902	550	826	492	739	406	610	366	551	327	491
8	644	968	585	879	536	805	479	720	389	585	351	527	312	470
9	626	940	568	854	520	782	465	699	371	557	334	502	297	447
10	606	910	550	827	503	756	450	676	351	528	316	475	281	422
11	584	878	531	797	485	729	433	651	331	497	298	447	264	397
12	562	844	510	767	466	701	416	626	310	465	279	419	247	371
13	538	809	489	735	446	671	398	599	288	433	259	390	229	345
14	514	772	467	701	426	640	380	571	267	401	240	360	212	318
15	489	735	444	667	405	608	361	543	246	369	221	331	194	292
16	464	697	421	633	384	577	342	514	225	338	202	303	177	267
17	438	659	398	598	362	544	323	485	205	308	183	276	161	242
18	413	620	375	563	341	512	304	456	185	278	166	249	145	218
19	387	582	352	529	320	480	285	428	166	250	149	224	130	196
20	362	545	329	495	299	449	266	399	150	226	134	202	117	177
22	314	472	285	428	258	388	229	345	124	186	111	167	97.1	146
24	267	402	243	365	219	330	195	293	104	157	93.2	140	81.6	123
26	228	343	207	311	187	281	166	249	88.8	133	79.4	119	69.5	104
28	197	295	179	268	161	242	143	215	76.6	115	68.5	103	59.9	90.1
30	171	257	156	234	140	211	125	187	66.7	100	59.7	89.7	52.2	78.5
32	150	226	137	205	123	185	110	165	58.6	88.1				
34	133	200	121	182	109	164	97.0	146						
36	119	179	108	162	97.5	147	86.5	130						
38	107	160	96.9	146	87.5	131	77.7	117						
40	96.3	145	87.5	131	79.0	119	70.1	105						
Properties														
P_{wo}, kips	123	185	104	155	90.6	136	77.5	116	77.1	116	67.4	101	56.9	85.4
P_{wi}, kip/in.	17.0	25.5	15.0	22.5	13.8	20.8	12.5	18.8	12.3	18.5	11.3	17.0	10.2	15.3
P_{wb}, kips	201	302	138	207	108	163	80.1	120	76.7	115	59.5	89.5	43.0	64.7
P_{fb}, kips	137	206	115	173	97.0	146	77.8	117	81.5	123	66.2	99.6	52.6	79.0
L_p, ft	8.76		8.76		8.69		8.65		6.78		6.75		6.68	
L_r, ft	33.2		31.0		29.3		27.5		22.3		21.1		20.0	
A_g, in.^{2}	24.0		21.8		20.0		17.9		15.6		14.1		12.6	
I_x, in.^{4}	881		795		722		640		541		484		428	
I_y, in.^{4}	148		134		121		107		57.7		51.4		45.2	
r_y, in.	2.48		2.48		2.46		2.45		1.92		1.91		1.89	
r_x/r_y	2.44		2.44		2.44		2.44		3.07		3.06		3.08	
$P_{ex}L_c^2/10^4$, k-in.^{2}	25200		22800		20700		18300		15500		13900		12300	
$P_{ey}L_c^2/10^4$, k-in.^{2}	4240		3840		3460		3060		1650		1470		1290	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Table 4-1a (continued)
Available Strength in Axial Compression, kips

F_y = 50 ksi

W12

W-Shapes

Shape	W12×											
lb/ft	336[h]		305[h]		279[h]		252[h]		230[h]		210	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	2960	4450	2680	4030	2450	3690	2220	3330	2030	3050	1850	2780
6	2870	4310	2590	3900	2370	3570	2140	3220	1960	2940	1790	2680
7	2840	4260	2560	3850	2340	3520	2120	3180	1930	2910	1760	2650
8	2800	4210	2530	3800	2310	3470	2090	3140	1910	2860	1740	2610
9	2760	4150	2490	3740	2280	3420	2060	3090	1880	2820	1710	2570
10	2710	4080	2450	3680	2240	3360	2020	3030	1840	2770	1680	2520
11	2660	4000	2400	3610	2190	3300	1980	2970	1800	2710	1640	2470
12	2610	3920	2350	3540	2150	3230	1940	2910	1760	2650	1610	2420
13	2550	3840	2300	3460	2100	3150	1890	2840	1720	2590	1570	2360
14	2490	3750	2250	3380	2050	3080	1840	2770	1680	2520	1530	2300
15	2430	3660	2190	3290	1990	3000	1790	2700	1630	2450	1480	2230
16	2370	3560	2130	3200	1940	2910	1740	2620	1580	2380	1440	2160
17	2300	3460	2070	3100	1880	2820	1690	2540	1540	2310	1390	2100
18	2230	3350	2000	3010	1820	2730	1630	2460	1480	2230	1350	2030
19	2160	3250	1940	2910	1760	2640	1580	2370	1430	2150	1300	1950
20	2090	3140	1870	2810	1700	2550	1520	2290	1380	2070	1250	1880
22	1940	2910	1730	2610	1570	2360	1410	2110	1270	1910	1150	1730
24	1790	2690	1600	2400	1440	2170	1290	1940	1170	1750	1050	1580
26	1640	2460	1460	2190	1320	1980	1170	1760	1060	1590	955	1440
28	1490	2240	1320	1990	1190	1790	1060	1590	954	1430	859	1290
30	1350	2030	1190	1790	1070	1610	949	1430	854	1280	767	1150
32	1210	1820	1070	1600	954	1430	843	1270	756	1140	678	1020
34	1080	1620	945	1420	845	1270	746	1120	670	1010	600	902
36	959	1440	843	1270	754	1130	666	1000	597	898	535	805
38	861	1290	757	1140	676	1020	598	898	536	806	481	722
40	777	1170	683	1030	610	917	539	811	484	727	434	652
Properties												
P_{wo}, kips	1050	1580	897	1340	783	1170	665	998	574	861	492	738
P_{wi}, kip/in.	59.3	89.0	54.3	81.5	51.0	76.5	46.7	70.0	43.0	64.5	39.3	59.0
P_{wb}, kips	10000	15100	7690	11600	6380	9590	4870	7320	3810	5730	2930	4400
P_{fb}, kips	1640	2460	1370	2070	1140	1720	947	1420	802	1210	676	1020
L_p, ft	12.3		12.1		11.9		11.8		11.7		11.6	
L_r, ft	150		137		126		114		105		95.8	
A_g, in.^{2}	98.9		89.5		81.9		74.1		67.7		61.8	
I_x, in.^{4}	4060		3550		3110		2720		2420		2140	
I_y, in.^{4}	1190		1050		937		828		742		664	
r_y, in.	3.47		3.42		3.38		3.34		3.31		3.28	
r_x/r_y	1.85		1.84		1.82		1.81		1.80		1.80	
$P_{ex}L_c^2/10^4$, k-in.^{2}	116000		102000		89000		77900		69300		61300	
$P_{ey}L_c^2/10^4$, k-in.^{2}	34100		30100		26800		23700		21200		19000	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

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

$F_y = 50$ ksi

W12

Shape		W12×											
lb/ft		190		170		152		136		120		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, L_c (ft), with respect to least radius of gyration, r_y	0	1680	2520	1500	2250	1340	2010	1190	1800	1050	1580	934	1400
	6	1620	2430	1440	2170	1290	1940	1150	1730	1010	1520	898	1350
	7	1600	2400	1420	2140	1270	1910	1130	1710	1000	1500	886	1330
	8	1570	2360	1400	2110	1250	1880	1120	1680	984	1480	871	1310
	9	1550	2320	1380	2070	1230	1850	1100	1650	966	1450	855	1290
	10	1520	2280	1350	2030	1210	1810	1080	1620	947	1420	838	1260
	11	1490	2230	1320	1990	1180	1770	1050	1580	925	1390	819	1230
	12	1450	2180	1290	1940	1150	1730	1030	1540	903	1360	799	1200
	13	1420	2130	1260	1900	1120	1690	1000	1500	879	1320	777	1170
	14	1380	2070	1230	1840	1090	1640	972	1460	854	1280	755	1130
	15	1340	2010	1190	1790	1060	1590	942	1420	828	1240	731	1100
	16	1300	1950	1150	1730	1030	1540	912	1370	800	1200	707	1060
	17	1260	1890	1120	1680	992	1490	881	1320	773	1160	682	1030
	18	1210	1820	1080	1620	957	1440	849	1280	744	1120	656	987
	19	1170	1760	1040	1560	921	1380	816	1230	715	1070	631	948
	20	1130	1690	997	1500	885	1330	784	1180	686	1030	604	908
	22	1030	1560	916	1380	811	1220	717	1080	626	942	552	829
	24	944	1420	834	1250	737	1110	651	978	567	853	499	750
	26	855	1280	754	1130	665	999	586	880	510	766	448	673
	28	767	1150	675	1010	595	894	523	786	454	682	398	598
	30	684	1030	600	902	527	793	462	695	400	601	350	526
	32	603	906	528	794	464	697	406	610	352	528	308	462
	34	534	803	468	704	411	617	360	541	311	468	272	410
	36	476	716	418	628	366	551	321	482	278	417	243	365
	38	428	643	375	563	329	494	288	433	249	375	218	328
	40	386	580	338	508	297	446	260	391	225	338	197	296
Properties													
P_{wo}, kips		412	617	346	518	290	435	244	365	201	302	162	242
P_{wi}, kip/in.		35.3	53.0	32.0	48.0	29.0	43.5	26.3	39.5	23.7	35.5	20.3	30.5
P_{wb}, kips		2120	3190	1580	2370	1170	1760	878	1320	637	957	405	609
P_{fb}, kips		567	852	455	684	367	551	292	439	231	347	183	276
L_p, ft		11.5		11.4		11.3		11.2		11.1		11.0	
L_r, ft		87.3		78.5		70.6		63.2		56.5		50.7	
A_g, in.^{2}		56.0		50.0		44.7		39.9		35.2		31.2	
I_x, in.^{4}		1890		1650		1430		1240		1070		933	
I_y, in.^{4}		589		517		454		398		345		301	
r_y, in.		3.25		3.22		3.19		3.16		3.13		3.11	
r_x/r_y		1.79		1.78		1.77		1.77		1.76		1.76	
$P_{ex}L_c^2/10^4$, k-in.^{2}		54100		47200		40900		35500		30600		26700	
$P_{ey}L_c^2/10^4$, k-in.^{2}		16900		14800		13000		11400		9870		8620	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

W12

F_y = 50 ksi

Shape		W12×									
lb/ft		96		87		79		72		65	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	844	1270	766	1150	695	1040	632	949	572	859
	6	811	1220	736	1110	667	1000	606	911	549	825
	7	800	1200	726	1090	657	988	597	898	540	812
	8	787	1180	714	1070	646	971	587	883	531	798
	9	772	1160	700	1050	634	953	576	866	521	783
	10	756	1140	685	1030	620	932	564	847	510	766
	11	739	1110	670	1010	606	910	550	827	497	747
	12	720	1080	653	981	590	887	536	806	484	728
	13	701	1050	635	954	574	862	521	783	470	707
	14	680	1020	616	925	556	836	505	759	456	685
	15	659	990	596	896	538	809	489	735	441	663
	16	637	957	576	865	520	781	472	709	426	640
	17	614	923	555	834	501	753	455	683	410	616
	18	591	888	534	802	481	723	437	656	393	591
	19	567	852	512	770	462	694	419	629	377	567
	20	543	816	490	737	442	664	401	602	360	542
	22	495	744	446	671	402	604	364	547	327	492
	24	447	672	403	605	362	544	328	493	294	442
	26	401	602	360	541	323	486	292	440	262	394
	28	356	535	319	480	286	430	259	389	231	348
	30	312	469	280	421	250	376	226	340	202	304
	32	274	413	246	370	220	331	199	299	178	267
	34	243	365	218	327	195	293	176	265	157	236
	36	217	326	194	292	174	261	157	236	140	211
	38	195	293	174	262	156	234	141	212	126	189
	40	176	264	157	237	141	212	127	191	114	171
Properties											
P_{wo}, kips		138	206	121	182	104	156	91.0	137	78.0	117
P_{wi}, kip/in.		18.3	27.5	17.2	25.8	15.7	23.5	14.3	21.5	13.0	19.5
P_{wb}, kips		296	445	243	365	185	278	142	213	106	159
P_{fb}, kips		152	228	123	185	101	152	84.0	126	68.5	103
L_p, ft		10.9		10.8		10.8		10.7		11.9	
L_r, ft		46.7		43.1		39.9		37.5		35.1	
A_g, in.^{2}		28.2		25.6		23.2		21.1		19.1	
I_x, in.^{4}		833		740		662		597		533	
I_y, in.^{4}		270		241		216		195		174	
r_y, in.		3.09		3.07		3.05		3.04		3.02	
r_x/r_y		1.76		1.75		1.75		1.75		1.75	
$P_{ex}L_c^2/10^4$, k-in.^{2}		23800		21200		18900		17100		15300	
$P_{ey}L_c^2/10^4$, k-in.^{2}		7730		6900		6180		5580		4980	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

F_y = 50 ksi

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

W12

Shape		W12×									
lb/ft		58		53		50		45		40	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	509	765	467	702	437	657	392	589	350	526
	6	479	720	439	660	396	595	355	534	317	476
	7	469	705	429	646	382	574	342	515	305	459
	8	457	687	419	629	367	551	329	494	293	440
	9	445	668	407	611	350	526	313	471	279	420
	10	431	647	394	592	332	500	297	447	265	398
	11	416	625	380	571	314	472	281	422	250	375
	12	400	601	365	549	295	443	263	396	234	352
	13	384	577	350	526	275	413	246	369	218	328
	14	367	551	334	502	255	384	228	343	202	304
	15	349	525	318	478	236	355	210	316	187	281
	16	332	499	301	453	217	326	193	290	171	257
	17	314	472	285	428	198	298	176	265	156	235
	18	296	445	268	403	180	270	160	240	142	213
	19	278	418	252	378	162	244	144	216	127	191
	20	261	392	235	354	146	220	130	195	115	173
	22	227	341	204	307	121	182	107	161	95.0	143
	24	194	292	174	261	102	153	90.3	136	79.8	120
	26	165	249	148	223	86.6	130	76.9	116	68.0	102
	28	143	214	128	192	74.7	112	66.3	99.7	58.6	88.1
	30	124	187	111	167	65.0	97.8	57.8	86.8	51.1	76.8
	32	109	164	97.8	147	57.2	85.9	50.8	76.3	44.9	67.5
	34	96.7	145	86.6	130						
	36	86.3	130	77.3	116						
	38	77.4	116	69.4	104						
	40	69.9	105	62.6	94.1						
Properties											
P_{wo}, kips		74.4	112	67.9	102	70.3	105	60.3	90.5	50.2	75.2
P_{wi}, kip/in.		12.0	18.0	11.5	17.3	12.3	18.5	11.2	16.8	9.83	14.8
P_{wb}, kips		83.1	125	73.3	110	88.4	133	65.6	98.6	44.8	67.4
P_{fb}, kips		76.6	115	61.9	93.0	76.6	115	61.9	93.0	49.6	74.6
L_p, ft		8.87		8.76		6.92		6.89		6.85	
L_r, ft		29.8		28.2		23.8		22.4		21.1	
A_g, in.^{2}		17.0		15.6		14.6		13.1		11.7	
I_x, in.^{4}		475		425		391		348		307	
I_y, in.^{4}		107		95.8		56.3		50.0		44.1	
r_y, in.		2.51		2.48		1.96		1.95		1.94	
r_x/r_y		2.10		2.11		2.64		2.64		2.64	
$P_{ex}L_c^2/10^4$, k-in.^{2}		13600		12200		11200		9960		8790	
$P_{ey}L_c^2/10^4$, k-in.^{2}		3060		2740		1610		1430		1260	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

Table 4-1a (continued)
Available Strength in Axial Compression, kips

W-Shapes

W10

$F_y = 50$ ksi

Shape		W10×											
lb/ft		112		100		88		77		68		60	
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, L_c (ft), with respect to least radius of gyration, r_y	0	985	1480	877	1320	778	1170	680	1020	596	895	530	796
	6	934	1400	831	1250	737	1110	643	966	563	846	500	752
	7	917	1380	815	1230	722	1090	630	946	552	829	490	737
	8	897	1350	797	1200	706	1060	615	925	539	810	479	719
	9	875	1310	777	1170	688	1030	599	900	525	789	466	700
	10	851	1280	755	1130	669	1000	582	874	509	765	452	679
	11	825	1240	732	1100	647	973	563	846	493	741	437	657
	12	798	1200	707	1060	625	940	543	816	475	714	421	633
	13	769	1160	681	1020	602	905	522	785	457	687	405	608
	14	739	1110	654	983	578	868	501	753	438	658	388	583
	15	708	1060	626	941	553	831	479	720	419	629	370	556
	16	677	1020	598	898	527	792	456	686	399	599	352	530
	17	645	969	569	855	501	754	433	651	379	569	334	502
	18	613	921	540	811	475	714	410	617	358	539	316	475
	19	580	872	511	767	449	675	387	582	338	508	298	448
	20	548	824	482	724	423	636	365	548	318	478	280	421
	22	485	728	425	638	373	560	320	481	279	419	245	368
	24	423	636	370	556	324	487	277	417	241	363	212	318
	26	365	548	318	478	278	417	237	356	206	310	181	271
	28	315	473	274	412	239	360	204	307	178	267	156	234
	30	274	412	239	359	209	313	178	267	155	233	136	204
	32	241	362	210	315	183	276	156	235	136	205	119	179
	34	213	321	186	279	162	244	139	208	121	181	106	159
	36	190	286	166	249	145	218	124	186	108	162	94.2	142
	38	171	257	149	224	130	195	111	167	96.5	145	84.5	127
	40	154	232	134	202	117	176	100	150	87.1	131	76.3	115
Properties													
P_{wo}, kips		220	330	184	275	150	225	121	182	99.5	149	82.6	124
P_{wi}, kip/in.		25.2	37.8	22.7	34.0	20.2	30.3	17.7	26.5	15.7	23.5	14.0	21.0
P_{wb}, kips		949	1430	690	1040	487	732	328	494	229	344	163	245
P_{fb}, kips		292	439	235	353	183	276	142	213	111	167	86.5	130
L_p, ft		9.47		9.36		9.29		9.18		9.15		9.08	
L_r, ft		64.1		57.9		51.2		45.3		40.6		36.6	
A_g, in.^{2}		32.9		29.3		26.0		22.7		19.9		17.7	
I_x, in.^{4}		716		623		534		455		394		341	
I_y, in.^{4}		236		207		179		154		134		116	
r_y, in.		2.68		2.65		2.63		2.60		2.59		2.57	
r_x/r_y		1.74		1.74		1.73		1.73		1.71		1.71	
$P_{ex}L_c^2/10^4$, k-in.^{2}		20500		17800		15300		13000		11300		9760	
$P_{ey}L_c^2/10^4$, k-in.^{2}		6750		5920		5120		4410		3840		3320	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

F_y = 50 ksi

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

W10

Shape		W10×									
lb/ft		54		49		45		39		33	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	473	711	431	648	398	598	344	517	291	437
	6	446	671	407	611	363	545	313	470	263	395
	7	437	657	398	598	350	527	302	454	253	381
	8	427	642	388	584	337	507	290	436	243	365
	9	415	624	378	568	322	485	277	416	232	348
	10	403	605	366	550	307	461	263	396	220	330
	11	389	585	354	532	291	437	249	374	207	311
	12	375	564	341	512	274	411	234	352	194	292
	13	361	542	327	492	256	385	219	329	181	272
	14	345	519	313	471	239	359	203	306	168	253
	15	330	495	299	449	222	333	188	283	155	233
	16	314	471	284	427	204	307	173	260	142	214
	17	297	447	269	404	188	282	158	238	130	195
	18	281	422	254	382	171	257	144	217	117	177
	19	265	398	239	360	155	234	130	196	106	159
	20	249	374	224	337	140	211	118	177	95.4	143
	22	217	327	196	294	116	174	97.2	146	78.8	118
	24	188	282	168	253	97.4	146	81.7	123	66.2	99.5
	26	160	240	143	216	83.0	125	69.6	105	56.4	84.8
	28	138	207	124	186	71.5	108	60.0	90.2	48.7	73.1
	30	120	180	108	162	62.3	93.7	52.3	78.6	42.4	63.7
	32	106	159	94.7	142	54.8	82.3	46.0	69.1	37.3	56.0
	34	93.5	141	83.9	126						
	36	83.4	125	74.8	112						
	38	74.8	112	67.2	101						
	40	67.6	102	60.6	91.1						
Properties											
P_{wo}, kips		69.1	104	60.1	90.1	65.3	98.0	54.1	81.1	45.2	67.8
P_{wi}, kip/in.		12.3	18.5	11.3	17.0	11.7	17.5	10.5	15.8	9.67	14.5
P_{wb}, kips		112	168	86.6	130	94.2	142	68.7	103	53.7	80.7
P_{fb}, kips		70.8	106	58.7	88.2	71.9	108	52.6	79.0	35.4	53.2
L_p, ft		9.04		8.97		7.10		6.99		6.85	
L_r, ft		33.6		31.6		26.9		24.2		21.8	
A_g, in.^{2}		15.8		14.4		13.3		11.5		9.71	
I_x, in.^{4}		303		272		248		209		171	
I_y, in.^{4}		103		93.4		53.4		45.0		36.6	
r_y, in.		2.56		2.54		2.01		1.98		1.94	
r_x/r_y		1.71		1.71		2.15		2.16		2.16	
$P_{ex}L_c^2/10^4$, k-in.^{2}		8670		7790		7100		5980		4890	
$P_{ey}L_c^2/10^4$, k-in.^{2}		2950		2670		1530		1290		1050	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

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

W8

F_y = 50 ksi

Shape	W8×											
lb/ft	67		58		48		40		35		31	
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, L_c (ft), with respect to least radius of gyration, r_y: 0	590	886	512	769	422	634	350	526	308	463	273	411
6	542	815	470	706	387	581	320	481	281	423	249	374
7	526	790	455	685	375	563	309	465	272	409	241	362
8	508	763	439	660	361	543	298	448	262	394	232	348
9	488	733	422	634	347	521	285	429	251	377	222	333
10	467	701	403	606	331	497	272	409	239	359	211	317
11	444	668	384	576	314	473	258	388	226	340	200	301
12	421	633	363	546	297	447	243	366	213	321	189	283
13	397	597	342	514	280	421	228	343	200	301	177	266
14	373	560	321	482	262	394	213	321	187	281	165	248
15	348	523	299	450	244	367	198	298	174	261	153	230
16	324	487	278	418	226	340	183	275	160	241	141	212
17	300	450	257	386	209	314	169	253	147	221	130	195
18	276	415	236	355	192	288	154	232	135	203	118	178
19	253	381	216	325	175	264	141	211	123	184	108	162
20	231	347	197	296	159	239	127	191	111	166	97.2	146
22	191	287	163	244	132	198	105	158	91.5	138	80.3	121
24	160	241	137	205	111	166	88.2	133	76.9	116	67.5	101
26	137	205	116	175	94.2	142	75.2	113	65.5	98.5	57.5	86.5
28	118	177	100	151	81.2	122	64.8	97.4	56.5	84.9	49.6	74.5
30	103	154	87.5	131	70.7	106	56.5	84.9	49.2	74.0	43.2	64.9
32	90.3	136	76.9	116	62.2	93.5	49.6	74.6	43.3	65.0	38.0	57.1
34	79.9	120	68.1	102	55.1	82.8	44.0	66.1				
Properties												
P_{wo}, kips	126	190	102	153	72.0	108	57.2	85.9	45.9	68.9	39.4	59.1
P_{wi}, kip/in.	19.0	28.5	17.0	25.5	13.3	20.0	12.0	18.0	10.3	15.5	9.50	14.3
P_{wb}, kips	507	761	363	546	174	262	127	192	81.1	122	63.0	94.7
P_{fb}, kips	164	246	123	185	87.8	132	58.7	88.2	45.9	68.9	35.4	53.2
L_p, ft	7.49		7.42		7.35		7.21		7.17		7.18	
L_r, ft	47.6		41.6		35.2		29.9		27.0		24.8	
A_g, in.^{2}	19.7		17.1		14.1		11.7		10.3		9.13	
I_x, in.^{4}	272		228		184		146		127		110	
I_y, in.^{4}	88.6		75.1		60.9		49.1		42.6		37.1	
r_y, in.	2.12		2.10		2.08		2.04		2.03		2.02	
r_x/r_y	1.75		1.74		1.74		1.73		1.73		1.72	
$P_{ex}L_c^2/10^4$, k-in.^{2}	7790		6530		5270		4180		3630		3150	
$P_{ey}L_c^2/10^4$, k-in.^{2}	2540		2150		1740		1410		1220		1060	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

F_y = 65 ksi

Table 4-1b
Available Strength in Axial Compression, kips
W-Shapes

W14

Shape		W14×							
lb/ft		873[h]		808[h]		730[h]		665[h]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	10000	15000	9260	13900	8370	12600	7630	11500
	11	9340	14000	8630	13000	7760	11700	7060	10600
	12	9210	13800	8510	12800	7650	11500	6960	10500
	13	9080	13700	8390	12600	7530	11300	6850	10300
	14	8950	13400	8260	12400	7410	11100	6730	10100
	15	8800	13200	8120	12200	7270	10900	6600	9930
	16	8640	13000	7970	12000	7140	10700	6470	9730
	17	8480	12800	7820	11800	6990	10500	6340	9530
	18	8320	12500	7660	11500	6840	10300	6200	9310
	19	8140	12200	7500	11300	6680	10000	6050	9100
	20	7960	12000	7330	11000	6520	9810	5900	8870
	22	7590	11400	6970	10500	6190	9310	5590	8410
	24	7200	10800	6610	9930	5850	8790	5270	7920
	26	6800	10200	6230	9360	5490	8260	4950	7430
	28	6400	9620	5850	8790	5140	7720	4610	6940
	30	5990	9000	5460	8210	4780	7180	4280	6440
	32	5580	8390	5080	7630	4420	6650	3960	5950
	34	5180	7780	4700	7070	4080	6130	3640	5460
	36	4780	7180	4330	6510	3740	5620	3320	4990
	38	4390	6600	3970	5970	3410	5120	3020	4540
	40	4020	6040	3620	5450	3090	4640	2730	4100
	42	3650	5490	3290	4940	2800	4210	2480	3720
	44	3330	5000	2990	4500	2550	3830	2260	3390
	46	3040	4570	2740	4120	2330	3510	2060	3100
	48	2800	4200	2520	3780	2140	3220	1900	2850
	50	2580	3870	2320	3480	1970	2970	1750	2630
Properties									
P_{wo}, kips		5210	7810	4630	6940	3670	5500	3140	4710
P_{wi}, kip/in.		171	256	162	243	133	200	123	184
P_{wb}, kips		106000	159000	90800	136000	50100	75300	39200	58900
P_{fb}, kips		7390	11100	6380	9580	5860	8810	4970	7470
L_p, ft		15.2		15.0		14.5		14.3	
L_r, ft		253		238		212		195	
A_g, in.^{2}		257		238		215		196	
I_x, in.^{4}		18100		15900		14300		12400	
I_y, in.^{4}		6170		5550		4720		4170	
r_y, in.		4.90		4.83		4.69		4.62	
r_x/r_y		1.71		1.69		1.74		1.73	
$P_{ex}L_c^2/10^4$, k-in.^{2}		518000		455000		409000		355000	
$P_{ey}L_c^2/10^4$, k-in.^{2}		177000		159000		135000		119000	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

Table 4-1b (continued) Available Strength in Axial Compression, kips

F_y = 65 ksi

W14

W-Shapes

Shape		W14×							
lb/ft		605[h]		550[h]		500[h]		455[h]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	6930	10400	6310	9480	5720	8600	5220	7840
	11	6400	9610	5810	8730	5260	7900	4780	7190
	12	6300	9470	5720	8590	5170	7780	4710	7070
	13	6200	9310	5620	8450	5090	7640	4620	6950
	14	6090	9150	5520	8300	4990	7500	4530	6820
	15	5970	8970	5410	8130	4890	7350	4440	6680
	16	5850	8790	5300	7970	4790	7190	4340	6530
	17	5720	8600	5180	7790	4680	7030	4240	6380
	18	5590	8410	5060	7610	4560	6860	4140	6220
	19	5460	8200	4930	7420	4450	6690	4030	6060
	20	5320	7990	4810	7220	4330	6510	3920	5890
	22	5030	7560	4540	6820	4080	6140	3690	5550
	24	4730	7120	4260	6410	3830	5750	3460	5200
	26	4430	6660	3980	5990	3570	5370	3220	4840
	28	4130	6200	3700	5570	3310	4980	2980	4480
	30	3820	5740	3420	5140	3050	4590	2740	4120
	32	3520	5290	3150	4730	2800	4210	2510	3780
	34	3230	4850	2880	4320	2550	3840	2290	3440
	36	2940	4420	2620	3930	2320	3480	2070	3110
	38	2660	4000	2360	3550	2090	3130	1860	2790
	40	2400	3610	2130	3200	1880	2830	1680	2520
	42	2180	3280	1930	2900	1710	2570	1520	2290
	44	1990	2990	1760	2650	1560	2340	1390	2080
	46	1820	2730	1610	2420	1420	2140	1270	1910
	48	1670	2510	1480	2220	1310	1960	1160	1750
	50	1540	2310	1360	2050	1200	1810	1070	1610
Properties									
P_{wo}, kips		2680	4020	2280	3420	1950	2920	1670	2500
P_{wi}, kip/in.		113	169	103	155	94.9	142	87.5	131
P_{wb}, kips		30400	45700	23300	35100	18200	27300	14200	21400
P_{fb}, kips		4210	6330	3550	5340	2980	4480	2510	3770
L_p, ft		14.1		13.9		13.7		13.6	
L_r, ft		178		164		151		138	
A_g, in.^{2}		178		162		147		134	
I_x, in.^{4}		10800		9430		8210		7190	
I_y, in.^{4}		3680		3250		2880		2560	
r_y, in.		4.55		4.49		4.43		4.38	
r_x/r_y		1.71		1.70		1.69		1.67	
$P_{ex}L_c^2/10^4$, k-in.^{2}		309000		270000		235000		206000	
$P_{ey}L_c^2/10^4$, k-in.^{2}		105000		93000		82400		73300	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

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

F_y = 65 ksi

W14

Shape	W14×											
lb/ft	426[h]		398[h]		370[h]		342[h]		311[h]		283[h]	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	4870	7310	4550	6840	4240	6380	3930	5910	3560	5350	3240	4870
11	4460	6700	4170	6260	3870	5820	3590	5390	3240	4870	2950	4430
12	4380	6590	4100	6160	3810	5720	3520	5290	3180	4780	2890	4350
13	4300	6470	4020	6040	3740	5620	3460	5200	3120	4690	2840	4270
14	4220	6340	3940	5920	3660	5500	3390	5090	3060	4590	2780	4180
15	4130	6210	3860	5800	3580	5390	3310	4980	2990	4490	2720	4080
16	4040	6070	3770	5670	3500	5260	3230	4860	2920	4380	2650	3980
17	3940	5930	3680	5530	3420	5130	3150	4740	2840	4270	2580	3880
18	3840	5780	3590	5390	3330	5000	3070	4620	2770	4160	2510	3780
19	3740	5630	3490	5250	3240	4860	2990	4490	2690	4040	2440	3670
20	3640	5470	3390	5100	3140	4720	2900	4360	2610	3920	2370	3560
22	3420	5140	3190	4790	2950	4430	2720	4090	2440	3670	2220	3330
24	3200	4810	2980	4480	2750	4140	2540	3810	2280	3420	2060	3100
26	2980	4470	2770	4160	2550	3840	2350	3530	2110	3160	1900	2860
28	2750	4140	2560	3840	2360	3540	2160	3250	1940	2910	1750	2630
30	2530	3800	2350	3530	2160	3240	1980	2980	1770	2660	1600	2400
32	2310	3470	2140	3220	1970	2960	1800	2710	1610	2420	1450	2180
34	2100	3160	1940	2920	1780	2680	1630	2450	1450	2180	1310	1960
36	1900	2850	1750	2630	1600	2410	1460	2200	1300	1950	1170	1750
38	1700	2560	1570	2360	1440	2160	1310	1970	1170	1750	1050	1570
40	1540	2310	1420	2130	1300	1950	1180	1780	1050	1580	945	1420
42	1390	2090	1290	1930	1180	1770	1070	1610	954	1430	857	1290
44	1270	1910	1170	1760	1070	1610	979	1470	869	1310	781	1170
46	1160	1750	1070	1610	980	1470	896	1350	795	1200	715	1070
48	1070	1600	985	1480	900	1350	823	1240	730	1100	656	986
50	983	1480	907	1360	830	1250	758	1140	673	1010	605	909
Properties												
P_{wo}, kips	1480	2220	1320	1980	1170	1760	1020	1540	874	1310	746	1120
P_{wi}, kip/in.	81.5	122	76.7	115	71.9	108	66.7	100	61.1	91.7	55.9	83.9
P_{wb}, kips	11500	17200	9600	14400	7890	11900	6320	9490	4850	7290	3710	5580
P_{fb}, kips	2250	3380	1980	2970	1720	2590	1480	2230	1240	1870	1040	1570
L_p, ft	13.4		13.4		13.2		13.1		13.0		12.9	
L_r, ft	130		122		114		106		96.7		88.3	
A_g, in.^{2}	125		117		109		101		91.4		83.3	
I_x, in.^{4}	6600		6000		5440		4900		4330		3840	
I_y, in.^{4}	2360		2170		1990		1810		1610		1440	
r_y, in.	4.34		4.31		4.27		4.24		4.20		4.17	
r_x/r_y	1.67		1.66		1.66		1.65		1.64		1.63	
$P_{ex}L_c^2/10^4$, k-in.^{2}	189000		172000		156000		140000		124000		110000	
$P_{ey}L_c^2/10^4$, k-in.^{2}	67500		62100		57000		51800		46100		41200	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

W14

Table 4-1b (continued)
Available Strength in Axial Compression, kips

F_y = 65 ksi

W-Shapes

Shape		W14×											
lb/ft		257		233		211		193		176		159	
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, L_c (ft), with respect to least radius of gyration, r_y	0	2940	4420	2670	4010	2410	3630	2210	3320	2020	3030	1820	2730
	6	2860	4300	2590	3890	2340	3520	2150	3220	1960	2940	1760	2650
	7	2830	4250	2560	3850	2320	3480	2120	3190	1930	2910	1740	2620
	8	2800	4200	2530	3800	2290	3440	2100	3150	1910	2870	1720	2590
	9	2760	4140	2500	3750	2260	3390	2070	3110	1880	2830	1700	2550
	10	2720	4080	2460	3690	2220	3340	2030	3060	1850	2780	1670	2510
	11	2670	4010	2420	3630	2180	3280	2000	3000	1820	2740	1640	2460
	12	2620	3940	2370	3560	2140	3220	1960	2950	1780	2680	1610	2420
	13	2570	3860	2320	3490	2100	3150	1920	2890	1750	2630	1570	2360
	14	2510	3780	2270	3420	2050	3080	1880	2820	1710	2570	1540	2310
	15	2460	3690	2220	3340	2000	3010	1830	2750	1670	2500	1500	2250
	16	2400	3600	2160	3250	1950	2940	1790	2680	1620	2440	1460	2190
	17	2330	3510	2110	3170	1900	2860	1740	2610	1580	2370	1420	2130
	18	2270	3410	2050	3080	1850	2780	1690	2540	1530	2300	1380	2070
	19	2200	3310	1990	2990	1790	2690	1640	2460	1490	2230	1330	2010
	20	2130	3210	1930	2890	1730	2610	1580	2380	1440	2160	1290	1940
	22	2000	3000	1800	2700	1620	2430	1480	2220	1340	2010	1200	1810
	24	1850	2790	1670	2510	1500	2250	1370	2050	1240	1860	1110	1670
	26	1710	2570	1540	2310	1380	2070	1260	1890	1140	1710	1020	1530
	28	1570	2360	1410	2120	1260	1900	1150	1730	1040	1560	929	1400
	30	1430	2150	1280	1930	1150	1720	1040	1570	941	1410	842	1270
	32	1290	1940	1160	1740	1040	1560	941	1410	847	1270	757	1140
	34	1160	1750	1040	1560	927	1390	841	1260	756	1140	675	1010
	36	1040	1560	927	1390	827	1240	750	1130	674	1010	602	905
	38	932	1400	832	1250	742	1120	673	1010	605	909	540	812
	40	841	1260	751	1130	670	1010	608	914	546	821	487	733
Properties													
P_{wo}, kips		637	955	538	807	459	688	393	590	343	515	289	433
P_{wi}, kip/in.		51.1	76.7	46.4	69.6	42.5	63.7	38.6	57.9	36.0	54.0	32.3	48.4
P_{wb}, kips		2830	4250	2110	3170	1630	2460	1220	1840	992	1490	716	1080
P_{fb}, kips		869	1310	720	1080	592	890	504	758	417	627	344	518
L_p, ft		12.8		12.7		12.6		12.5		12.5		12.4	
L_r, ft		80.7		73.5		67.2		61.8		57.1		52.4	
A_g, in.^{2}		75.6		68.5		62.0		56.8		51.8		46.7	
I_x, in.^{4}		3400		3010		2660		2400		2140		1900	
I_y, in.^{4}		1290		1150		1030		931		838		748	
r_y, in.		4.13		4.10		4.07		4.05		4.02		4.00	
r_x/r_y		1.62		1.62		1.61		1.60		1.60		1.60	
$P_{ex}L_c^2/10^4$, k-in.^{2}		97300		86200		76100		68700		61300		54400	
$P_{ey}L_c^2/10^4$, k-in.^{2}		36900		32900		29500		26600		24000		21400	

ASD	LRFD	Note: Confirm ASTM A9 13 material availability before specifying, as discussed in Part 2.
$\Omega_c = 1.67$	$\phi_c = 0.90$	

F_y = 65 ksi

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

W14

Shape		W14×											
lb/ft		145		132		120		109		99		90	
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, L_c (ft), with respect to least radius of gyration, r_y	0	1660	2500	1510	2270	1370	2070	1250	1870	1130	1700	1030	1550
	6	1610	2420	1460	2190	1330	1990	1200	1810	1090	1640	995	1500
	7	1590	2390	1440	2160	1310	1970	1190	1780	1080	1620	982	1480
	8	1570	2360	1420	2130	1290	1940	1170	1760	1060	1600	968	1450
	9	1550	2330	1400	2100	1270	1910	1150	1730	1040	1570	951	1430
	10	1520	2290	1370	2060	1250	1870	1130	1700	1030	1540	933	1400
	11	1500	2250	1340	2020	1220	1830	1110	1660	1000	1510	914	1370
	12	1470	2210	1310	1970	1190	1790	1080	1620	982	1480	893	1340
	13	1440	2160	1280	1930	1160	1750	1050	1590	957	1440	871	1310
	14	1400	2110	1250	1880	1130	1700	1030	1540	932	1400	848	1270
	15	1370	2060	1210	1830	1100	1660	998	1500	906	1360	824	1240
	16	1330	2000	1180	1770	1070	1610	968	1460	878	1320	799	1200
	17	1290	1950	1140	1720	1040	1560	937	1410	850	1280	773	1160
	18	1260	1890	1100	1660	1000	1500	906	1360	821	1230	746	1120
	19	1220	1830	1060	1600	965	1450	873	1310	791	1190	719	1080
	20	1180	1770	1030	1540	929	1400	840	1260	761	1140	691	1040
	22	1090	1640	945	1420	856	1290	774	1160	700	1050	636	956
	24	1010	1520	865	1300	782	1180	707	1060	639	960	580	872
	26	927	1390	785	1180	709	1070	640	963	578	869	525	789
	28	844	1270	707	1060	638	959	576	866	519	781	471	708
	30	764	1150	632	950	569	856	514	772	463	696	419	630
	32	686	1030	559	840	503	756	454	682	408	614	370	556
	34	611	918	495	744	446	670	402	604	362	544	328	492
	36	545	819	442	664	398	598	359	539	323	485	292	439
	38	489	735	397	596	357	536	322	484	290	435	262	394
	40	441	663	358	538	322	484	290	437	261	393	237	356
Properties													
P_{wo}, kips		249	373	228	342	197	295	166	249	145	218	125	187
P_{wi}, kip/in.		29.5	44.2	28.0	41.9	25.6	38.4	22.8	34.1	21.0	31.5	19.1	28.6
P_{wb}, kips		543	816	464	697	356	535	251	377	197	297	147	222
P_{fb}, kips		289	434	258	388	215	323	180	270	148	222	123	184
L_p, ft		12.3		11.6		11.6		12.5		14.0		15.3	
L_r, ft		48.7		44.3		41.5		39.1		36.8		34.9	
A_g, in.^{2}		42.7		38.8		35.3		32.0		29.1		26.5	
I_x, in.^{4}		1710		1530		1380		1240		1110		999	
I_y, in.^{4}		677		548		495		447		402		362	
r_y, in.		3.98		3.76		3.74		3.73		3.71		3.70	
r_x/r_y		1.59		1.67		1.67		1.67		1.66		1.66	
$P_{ex}L_c^2/10^4$, k-in.^{2}		48900		43800		39500		35500		31800		28600	
$P_{ey}L_c^2/10^4$, k-in.^{2}		19400		15700		14200		12800		11500		10400	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

Table 4-1b (continued)
Available Strength in Axial Compression, kips

W12

$F_y = 65$ ksi

W-Shapes

Shape		W12×							
lb/ft		230[h]		210		190		170	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	2640	3960	2410	3620	2180	3280	1950	2920
	6	2520	3790	2300	3450	2080	3130	1860	2790
	7	2480	3730	2260	3400	2050	3070	1820	2740
	8	2430	3660	2220	3330	2010	3020	1790	2690
	9	2380	3580	2170	3260	1960	2950	1750	2630
	10	2330	3500	2120	3180	1910	2880	1710	2560
	11	2270	3400	2060	3100	1860	2800	1660	2490
	12	2200	3310	2000	3010	1810	2720	1610	2420
	13	2130	3210	1940	2920	1750	2630	1560	2340
	14	2060	3100	1870	2820	1690	2540	1500	2260
	15	1990	2990	1810	2720	1630	2450	1450	2170
	16	1910	2880	1740	2610	1560	2350	1390	2090
	17	1840	2760	1670	2500	1500	2250	1330	2000
	18	1760	2640	1590	2390	1430	2150	1270	1910
	18	1680	2520	1520	2280	1370	2050	1210	1820
	20	1600	2400	1450	2170	1300	1950	1150	1730
	22	1440	2160	1300	1950	1160	1750	1030	1540
	24	1280	1930	1160	1740	1030	1550	910	1370
	26	1130	1700	1020	1530	908	1360	797	1200
	28	988	1480	885	1330	788	1180	690	1040
	30	860	1290	771	1160	686	1030	601	904
	32	756	1140	678	1020	603	906	528	794
	34	670	1010	600	902	534	803	468	704
	36	597	898	535	805	476	716	418	628
	38	536	806	481	722	428	643	375	563
	40	484	727	434	652	386	580	338	508
Properties									
P_{wo}, kips		746	1120	639	959	535	803	449	674
P_{wi}, kip/in.		55.9	83.9	51.1	76.7	45.9	68.9	41.6	62.4
P_{wb}, kips		4340	6530	3340	5020	2420	3640	1800	2710
P_{fb}, kips		1040	1570	878	1320	737	1110	592	890
L_p, ft		10.3		10.2		10.1		9.98	
L_r, ft		80.7		73.9		67.4		60.7	
A_g, in.^{2}		67.7		61.8		56.0		50.0	
I_x, in.^{4}		2420		2140		1890		1650	
I_y, in.^{4}		742		664		589		517	
r_y, in.		3.31		3.28		3.25		3.22	
r_x/r_y		1.80		1.80		1.79		1.78	
$P_{ex}L_c^2/10^4$, k-in.^{2}		69300		61300		54100		47200	
$P_{ey}L_c^2/10^4$, k-in.^{2}		21200		19000		16900		14800	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

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

F_y = 65 ksi

W12

Shape		W12×							
lb/ft		152		136		120		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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	1740	2610	1550	2330	1370	2060	1210	1830
	6	1660	2490	1480	2220	1300	1960	1150	1730
	7	1630	2450	1450	2180	1280	1920	1130	1700
	8	1600	2400	1420	2140	1250	1880	1110	1670
	9	1560	2350	1390	2090	1220	1840	1080	1630
	10	1520	2290	1350	2040	1190	1790	1050	1580
	11	1480	2220	1320	1980	1160	1740	1020	1540
	12	1430	2150	1270	1920	1120	1680	990	1490
	13	1390	2080	1230	1850	1080	1630	956	1440
	14	1340	2010	1190	1780	1040	1570	920	1380
	15	1290	1930	1140	1710	1000	1500	883	1330
	16	1230	1850	1090	1640	958	1440	845	1270
	17	1180	1770	1050	1570	915	1380	807	1210
	18	1130	1690	996	1500	871	1310	768	1150
	19	1070	1610	947	1420	827	1240	729	1100
	20	1020	1530	898	1350	783	1180	689	1040
	22	907	1360	800	1200	697	1050	612	920
	24	802	1210	705	1060	613	921	537	808
	26	701	1050	615	924	532	800	466	700
	28	606	910	530	797	459	690	402	604
	30	528	793	462	695	400	601	350	526
	32	464	697	406	610	352	528	308	462
	34	411	617	360	541	311	468	272	410
	36	366	551	321	482	278	417	243	365
	38	329	494	288	433	249	375	218	328
	40	297	446	260	391	225	338	197	296
Properties									
P_{wo}, kips		377	566	317	475	262	392	210	315
P_{wi}, kip/in.		37.7	56.6	34.2	51.4	30.8	46.2	26.4	39.7
P_{wb}, kips		1330	2000	1000	1500	726	1090	462	694
P_{fb}, kips		477	717	380	571	300	450	238	358
L_p, ft		9.88		9.79		9.70		9.63	
L_r, ft		54.8		49.1		44.2		39.9	
A_g, in.^{2}		44.7		39.9		35.2		31.2	
I_x, in.^{4}		1430		1240		1070		933	
I_y, in.^{4}		454		398		345		301	
r_y, in.		3.19		3.16		3.13		3.11	
r_x/r_y		1.77		1.77		1.76		1.76	
$P_{ex}L_c^2/10^4$, k-in.^{2}		40900		35500		30600		26700	
$P_{ey}L_c^2/10^4$, k-in.^{2}		13000		11400		9870		8620	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

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

W12

F_y = 65 ksi

Shape		W12×									
lb/ft		96		87		79		72		65	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	1100	1650	996	1500	903	1360	821	1230	743	1120
	6	1040	1570	946	1420	856	1290	779	1170	704	1060
	7	1020	1540	928	1390	840	1260	764	1150	691	1040
	8	1000	1510	908	1360	822	1240	747	1120	675	1020
	9	977	1470	886	1330	802	1200	728	1090	658	989
	10	951	1430	862	1300	779	1170	708	1060	640	962
	11	923	1390	836	1260	756	1140	687	1030	620	932
	12	893	1340	808	1210	731	1100	664	997	599	900
	13	861	1290	780	1170	704	1060	639	961	577	867
	14	829	1250	750	1130	677	1020	614	923	554	833
	15	795	1190	719	1080	648	975	589	885	530	797
	16	760	1140	687	1030	620	931	562	845	506	761
	17	725	1090	655	984	590	887	535	805	482	724
	18	690	1040	622	936	561	843	508	764	457	687
	19	654	983	590	887	531	798	481	723	432	650
	20	619	930	557	838	501	753	454	683	408	613
	22	548	824	493	742	443	666	401	603	360	540
	24	481	722	432	649	387	582	350	526	313	471
	26	416	625	373	560	333	501	301	453	269	404
	28	358	539	321	483	287	432	260	390	232	349
	30	312	469	280	421	250	376	226	340	202	304
	32	274	413	246	370	220	331	199	299	178	267
	34	243	365	218	327	195	293	176	265	157	236
	36	217	326	194	292	174	261	157	236	140	211
	38	195	293	174	262	156	234	141	212	126	189
	40	176	264	157	237	141	212	127	191	114	171
Properties											
P_{wo}, kips		179	268	157	236	135	203	118	177	101	152
P_{wi}, kip/in.		23.8	35.8	22.3	33.5	20.4	30.6	18.6	28.0	16.9	25.4
P_{wb}, kips		337	507	277	416	211	316	161	243	121	181
P_{fb}, kips		197	296	160	240	131	198	109	164	89.0	134
L_p, ft		9.57		9.51		9.78		11.0		12.2	
L_r, ft		37.0		34.4		32.1		30.4		28.8	
A_g, in.^{2}		28.2		25.6		23.2		21.1		19.1	
I_x, in.^{4}		833		740		662		597		533	
I_y, in.^{4}		270		241		216		195		174	
r_y, in.		3.09		3.07		3.05		3.04		3.02	
r_x/r_y		1.76		1.75		1.75		1.75		1.75	
$P_{ex}L_c^2/10^4$, k-in.^{2}		23800		21200		18900		17100		15300	
$P_{ey}L_c^2/10^4$, k-in.^{2}		7730		6900		6180		5580		4980	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Note: Confirm ASTMI A913 material availability before specifying, as discussed in Part 2.

F_y = 70 ksi

Table 4-1c
Available Strength in Axial Compression, kips
W-Shapes

W14

Shape		W14×							
lb/ft		873[h]		808[h]		730[h]		665[h]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	10800	16200	9980	15000	9010	13500	8220	12300
	11	10000	15000	9240	13900	8310	12500	7560	11400
	12	9860	14800	9110	13700	8180	12300	7440	11200
	13	9710	14600	8970	13500	8050	12100	7310	11000
	14	9550	14400	8810	13200	7900	11900	7180	10800
	15	9380	14100	8650	13000	7750	11600	7030	10600
	16	9210	13800	8490	12800	7590	11400	6880	10300
	17	9020	13600	8310	12500	7430	11200	6730	10100
	18	8830	13300	8130	12200	7250	10900	6570	9870
	19	8630	13000	7940	11900	7080	10600	6400	9620
	20	8430	12700	7750	11600	6890	10400	6230	9370
	22	8000	12000	7350	11000	6520	9790	5880	8840
	24	7560	11400	6930	10400	6130	9210	5520	8300
	26	7110	10700	6510	9780	5730	8610	5150	7740
	28	6660	10000	6080	9140	5330	8010	4780	7190
	30	6200	9320	5650	8490	4930	7410	4410	6630
	32	5740	8630	5220	7850	4540	6820	4050	6090
	34	5300	7960	4810	7220	4150	6240	3700	5560
	36	4860	7310	4400	6610	3780	5680	3360	5050
	38	4440	6670	4010	6020	3420	5140	3020	4550
	40	4030	6050	3620	5440	3090	4640	2730	4100
	42	3650	5490	3290	4940	2800	4210	2480	3720
	44	3330	5000	2990	4500	2550	3830	2260	3390
	46	3040	4570	2740	4120	2330	3510	2060	3100
	48	2800	4200	2520	3780	2140	3220	1900	2850
	50	2580	3870	2320	3480	1970	2970	1750	2630
Properties									
P_{wo}, kips		5610	8410	4980	7470	3950	5920	3380	5070
P_{wi}, kip/in.		184	276	175	262	143	215	132	198
P_{wb}, kips		110000	165000	94200	142000	52000	78200	40700	61200
P_{fb}, kips		7950	12000	6870	10300	6320	9490	5350	8040
L_p, ft		14.6		14.4		14.0		13.8	
L_r, ft		235		221		197		181	
A_g, in.^{2}		257		238		215		196	
I_x, in.^{4}		18100		15900		14300		12400	
I_y, in.^{4}		6170		5550		4720		4170	
r_y, in.		4.90		4.83		4.69		4.62	
r_x/r_y		1.71		1.69		1.74		1.73	
$P_{ex}L_c^2/10^4$, k-in.^{2}		518000		455000		409000		355000	
$P_{ey}L_c^2/10^4$, k-in.^{2}		177000		159000		135000		119000	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

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

W14

F_y = 70 ksi

Effective length, L_c (ft), with respect to least radius of gyration, r_y

Shape	W14×							
lb/ft	605[h]		550[h]		500[h]		455[h]	
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	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
0	7460	11200	6790	10200	6160	9260	5620	8440
11	6850	10300	6220	9340	5630	8460	5120	7690
12	6730	10100	6110	9190	5530	8310	5030	7560
13	6620	9940	6000	9020	5430	8160	4930	7410
14	6490	9750	5880	8840	5320	7990	4830	7260
15	6360	9550	5760	8660	5200	7820	4730	7100
16	6220	9350	5630	8460	5080	7640	4610	6930
17	6070	9130	5500	8260	4960	7450	4500	6760
18	5920	8900	5360	8050	4830	7260	4380	6580
19	5770	8670	5220	7840	4700	7060	4260	6400
20	5610	8430	5070	7620	4560	6860	4130	6210
22	5290	7950	4770	7160	4280	6440	3870	5820
24	4950	7440	4460	6700	4000	6010	3610	5420
26	4610	6930	4140	6230	3710	5570	3340	5020
28	4270	6420	3830	5750	3420	5140	3080	4620
30	3930	5910	3520	5290	3130	4710	2810	4230
32	3600	5410	3210	4830	2860	4290	2560	3840
34	3280	4920	2920	4380	2590	3890	2310	3470
36	2970	4460	2630	3950	2320	3490	2070	3110
38	2660	4000	2360	3550	2090	3130	1860	2790
40	2400	3610	2130	3200	1880	2830	1680	2520
42	2180	3280	1930	2900	1710	2570	1520	2290
44	1990	2990	1760	2650	1560	2340	1390	2080
46	1820	2730	1610	2420	1420	2140	1270	1910
48	1670	2510	1480	2220	1310	1960	1160	1750
50	1540	2310	1360	2050	1200	1810	1070	1610
Properties								
P_{wo}, kips	2890	4330	2450	3680	2100	3140	1800	2690
P_{wi}, kip/in.	121	182	111	167	102	153	94.3	141
P_{wb}, kips	31500	47400	24200	36400	18800	28300	14800	22200
P_{fb}, kips	4530	6810	3820	5750	3210	4820	2700	4060
L_p, ft	13.6		13.4		13.2		13.1	
L_r, ft	166		153		140		128	
A_g, in.^{2}	178		162		147		134	
I_x, in.^{4}	10800		9430		8210		7190	
I_y, in.^{4}	3680		3250		2880		2560	
r_y, in.	4.55		4.49		4.43		4.38	
r_x/r_y	1.71		1.70		1.69		1.67	
$P_{ex}L_c^2/10^4$, k-in.^{2}	309000		270000		235000		206000	
$P_{ey}L_c^2/10^4$, k-in.^{2}	105000		93000		82400		73300	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

F_y = 70 ksi

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

W14

Shape		W14×											
lb/ft		426[h]		398[h]		370[h]		342[h]		311[h]		283[h]	
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, L_c (ft), with respect to least radius of gyration, r_y	0	5240	7870	4900	7370	4570	6870	4230	6360	3830	5760	3490	5250
	11	4770	7160	4460	6700	4140	6230	3830	5760	3460	5200	3150	4740
	12	4680	7040	4370	6580	4070	6110	3760	5650	3400	5110	3090	4640
	13	4590	6900	4290	6450	3990	5990	3690	5540	3330	5000	3030	4550
	14	4490	6760	4200	6310	3900	5860	3610	5420	3250	4890	2960	4440
	15	4390	6600	4100	6170	3810	5720	3520	5290	3170	4770	2890	4340
	16	4290	6450	4000	6020	3710	5580	3430	5160	3090	4650	2810	4220
	17	4180	6280	3900	5860	3620	5440	3340	5020	3010	4520	2730	4110
	18	4070	6110	3790	5700	3520	5280	3250	4880	2920	4390	2650	3990
	19	3950	5940	3680	5540	3410	5130	3150	4730	2830	4260	2570	3860
	20	3830	5760	3570	5370	3310	4970	3050	4580	2740	4120	2490	3740
	22	3590	5390	3340	5020	3090	4640	2850	4280	2560	3840	2320	3480
	24	3340	5020	3110	4670	2870	4310	2640	3970	2370	3560	2140	3220
	26	3090	4640	2870	4310	2650	3980	2430	3660	2180	3270	1970	2960
	28	2840	4260	2630	3960	2420	3640	2230	3350	1990	2990	1800	2700
	30	2590	3890	2400	3610	2210	3320	2020	3040	1810	2710	1630	2450
	32	2350	3530	2180	3270	2000	3000	1830	2750	1630	2450	1470	2200
	34	2120	3190	1960	2950	1790	2700	1640	2460	1460	2190	1310	1970
	36	1900	2850	1750	2630	1600	2410	1460	2200	1300	1950	1170	1750
	38	1700	2560	1570	2360	1440	2160	1310	1970	1170	1750	1050	1570
	40	1540	2310	1420	2130	1300	1950	1180	1780	1050	1580	945	1420
	42	1390	2090	1290	1930	1180	1770	1070	1610	954	1430	857	1290
	44	1270	1910	1170	1760	1070	1610	979	1470	869	1310	781	1170
	46	1160	1750	1070	1610	980	1470	896	1350	795	1200	715	1070
	48	1070	1600	985	1480	900	1350	823	1240	730	1100	656	986
	50	983	1480	907	1360	830	1250	758	1140	673	1010	605	909
Properties													
P_{wo}, kips		1590	2390	1420	2130	1260	1890	1100	1650	941	1410	804	1210
P_{wi}, kip/in.		87.7	132	82.6	124	77.5	116	71.9	108	65.8	98.7	60.2	90.3
P_{wb}, kips		11900	17900	9960	15000	8190	12300	6550	9850	5030	7560	3850	5790
P_{fb}, kips		2420	3640	2130	3200	1850	2790	1600	2400	1340	2010	1120	1690
L_p, ft		13.0		12.9		12.7		12.7		12.5		12.4	
L_r, ft		120		113		106		98.7		89.9		82.1	
A_g, in.^{2}		125		117		109		101		91.4		83.3	
I_x, in.^{4}		6600		6000		5440		4900		4330		3840	
I_y, in.^{4}		2360		2170		1990		1810		1610		1440	
r_y, in.		4.34		4.31		4.27		4.24		4.20		4.17	
r_x/r_y		1.67		1.66		1.66		1.65		1.64		1.63	
$P_{ex}L_c^2/10^4$, k-in.^{2}		189000		172000		156000		140000		124000		110000	
$P_{ey}L_c^2/10^4$, k-in.^{2}		67500		62100		57000		51800		46100		41200	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

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

W14

F_y = 70 ksi

Shape	W14×											
lb/ft	257		233		211		193		176		159	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	3170	4760	2870	4320	2600	3910	2380	3580	2170	3260	1960	2940
6	3070	4620	2780	4180	2520	3780	2310	3460	2100	3160	1890	2850
7	3040	4570	2750	4130	2490	3740	2280	3420	2080	3120	1870	2810
8	3000	4510	2710	4080	2450	3690	2250	3380	2050	3080	1850	2770
9	2950	4440	2670	4020	2420	3630	2210	3330	2020	3030	1820	2730
10	2910	4370	2630	3950	2380	3570	2180	3270	1980	2980	1790	2680
11	2850	4290	2580	3880	2330	3510	2140	3210	1940	2920	1750	2630
12	2800	4210	2530	3800	2290	3440	2090	3140	1900	2860	1710	2580
13	2740	4120	2480	3720	2240	3360	2050	3070	1860	2800	1680	2520
14	2680	4020	2420	3630	2180	3280	2000	3000	1820	2730	1630	2460
15	2610	3920	2360	3540	2130	3200	1940	2920	1770	2660	1590	2390
16	2540	3820	2290	3450	2070	3110	1890	2840	1720	2580	1550	2320
17	2470	3710	2230	3350	2010	3020	1840	2760	1670	2510	1500	2250
18	2390	3600	2160	3250	1950	2930	1780	2670	1620	2430	1450	2180
19	2320	3490	2090	3140	1880	2830	1720	2590	1560	2350	1400	2110
20	2240	3370	2020	3040	1820	2740	1660	2500	1510	2270	1350	2040
22	2090	3130	1880	2820	1690	2540	1540	2320	1400	2100	1250	1880
24	1930	2900	1730	2600	1560	2340	1420	2130	1280	1930	1150	1730
26	1770	2660	1590	2390	1420	2140	1300	1950	1170	1760	1050	1580
28	1610	2420	1440	2170	1290	1940	1180	1770	1060	1600	951	1430
30	1460	2190	1300	1960	1170	1750	1060	1590	955	1440	854	1280
32	1310	1970	1170	1760	1040	1570	949	1430	853	1280	762	1140
34	1160	1750	1040	1560	927	1390	841	1260	756	1140	675	1010
36	1040	1560	927	1390	827	1240	750	1130	674	1010	602	905
38	932	1400	832	1250	742	1120	673	1010	605	909	540	812
40	841	1260	751	1130	670	1010	608	914	546	821	487	733
Properties												
P_{wo}, kips	686	1030	579	869	494	741	424	635	370	555	311	467
P_{wi}, kip/in.	55.1	82.6	49.9	74.9	45.7	68.6	41.5	62.3	38.7	58.1	34.8	52.2
P_{wb}, kips	2940	4410	2190	3290	1700	2550	1270	1900	1030	1550	743	1120
P_{fb}, kips	936	1410	775	1160	638	958	543	816	450	676	371	558
L_p, ft	12.3		12.2		12.1		12.1		12.0		11.9	
L_r, ft	75.1		68.4		62.6		57.6		53.4		49.0	
A_g, in.^{2}	75.6		68.5		62.0		56.8		51.8		46.7	
I_x, in.^{4}	3400		3010		2660		2400		2140		1900	
I_y, in.^{4}	1290		1150		1030		931		838		748	
r_y, in.	4.13		4.10		4.07		4.05		4.02		4.00	
r_x/r_y	1.62		1.62		1.61		1.60		1.60		1.60	
$P_{ex}L_c^2/10^4$, k-in.^{2}	97300		86200		76100		68700		61300		54400	
$P_{ey}L_c^2/10^4$, k-in.^{2}	36900		32900		29500		26600		24000		21400	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

$F_y = 70$ ksi

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

W14

Shape	W14×											
lb/ft	145		132		120		109		99		90	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	1790	2690	1630	2440	1480	2220	1340	2020	1220	1830	1110	1670
6	1730	2600	1570	2350	1420	2140	1290	1940	1170	1760	1070	1610
7	1710	2570	1550	2320	1410	2110	1270	1910	1160	1740	1050	1580
8	1690	2530	1520	2290	1380	2080	1250	1880	1140	1710	1040	1560
9	1660	2490	1490	2250	1360	2040	1230	1850	1120	1680	1020	1530
10	1630	2450	1470	2200	1330	2000	1210	1810	1100	1650	997	1500
11	1600	2400	1430	2150	1300	1960	1180	1770	1070	1610	975	1470
12	1570	2350	1400	2100	1270	1910	1150	1730	1050	1570	951	1430
13	1530	2300	1360	2050	1240	1860	1120	1690	1020	1530	926	1390
14	1490	2240	1330	1990	1200	1810	1090	1640	989	1490	899	1350
15	1450	2180	1290	1930	1170	1750	1060	1590	959	1440	872	1310
16	1410	2120	1250	1870	1130	1700	1020	1540	927	1390	843	1270
17	1370	2060	1200	1810	1090	1640	988	1480	895	1350	814	1220
18	1320	1990	1160	1740	1050	1580	952	1430	862	1300	784	1180
19	1280	1920	1120	1680	1010	1520	915	1380	829	1250	753	1130
20	1230	1850	1070	1610	971	1460	878	1320	795	1190	722	1090
22	1140	1710	982	1480	888	1340	803	1210	726	1090	660	991
24	1050	1570	892	1340	806	1210	729	1100	658	989	597	898
26	954	1430	804	1210	726	1090	655	985	591	889	536	806
28	863	1300	718	1080	648	973	585	879	527	792	478	718
30	775	1160	636	956	573	861	516	776	465	698	421	632
32	689	1040	559	840	503	756	454	682	408	614	370	556
34	611	918	495	744	446	670	402	604	362	544	328	492
36	545	819	442	664	398	598	359	539	323	485	292	439
38	489	735	397	596	357	536	322	484	290	435	262	394
40	441	663	358	538	322	484	290	437	261	393	237	356
Properties												
P_{wo}, kips	268	402	245	368	212	318	179	268	156	234	134	202
P_{wi}, kip/in.	31.7	47.6	30.1	45.2	27.5	41.3	24.5	36.8	22.6	34.0	20.5	30.8
P_{wb}, kips	564	847	481	723	369	555	260	391	205	308	153	230
P_{fb}, kips	311	468	278	418	231	348	194	291	159	240	132	198
L_p, ft	11.9		11.2		11.3		12.7		14.1		15.3	
L_r, ft	45.7		41.6		39.0		36.8		34.8		33.0	
A_g, in.^{2}	42.7		38.8		35.3		32.0		29.1		26.5	
I_x, in.^{4}	1710		1530		1380		1240		1110		999	
I_y, in.^{4}	677		548		495		447		402		362	
r_y, in.	3.98		3.76		3.74		3.73		3.71		3.70	
r_x/r_y	1.59		1.67		1.67		1.67		1.66		1.66	
$P_{ex}L_c^2/10^4$, k-in.^{2}	48900		43800		39500		35500		31800		28600	
$P_{ey}L_c^2/10^4$, k-in.^{2}	19400		15700		14200		12800		11500		10400	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

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

W12

$F_y = 70$ ksi

Shape		W12×							
lb/ft		230[h]		210		190		170	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	2840	4270	2590	3890	2350	3530	2100	3150
	6	2700	4060	2470	3710	2230	3360	1990	2990
	7	2660	3990	2420	3640	2190	3290	1950	2940
	8	2600	3910	2370	3570	2150	3230	1910	2880
	9	2540	3820	2320	3480	2100	3150	1870	2810
	10	2480	3730	2260	3390	2040	3070	1820	2730
	11	2410	3620	2190	3300	1980	2980	1760	2650
	12	2340	3510	2130	3200	1920	2890	1710	2570
	13	2260	3400	2050	3090	1850	2790	1650	2480
	14	2180	3280	1980	2980	1790	2680	1590	2380
	15	2100	3150	1900	2860	1710	2580	1520	2290
	16	2010	3020	1820	2740	1640	2470	1460	2190
	17	1920	2890	1740	2620	1570	2360	1390	2090
	18	1840	2760	1660	2500	1490	2240	1320	1990
	19	1750	2620	1580	2370	1420	2130	1250	1890
	20	1660	2490	1500	2250	1340	2020	1190	1780
	22	1480	2220	1330	2010	1190	1800	1050	1580
	24	1310	1970	1180	1770	1050	1580	924	1390
	26	1140	1720	1030	1540	913	1370	800	1200
	28	988	1480	885	1330	788	1180	690	1040
	30	860	1290	771	1160	686	1030	601	904
	32	756	1140	678	1020	603	906	528	794
	34	670	1010	600	902	534	803	468	704
	36	597	898	535	805	476	716	418	628
	38	536	806	481	722	428	643	375	563
	40	484	727	434	652	386	580	338	508
Properties									
P_{wo}, kips		804	1210	688	1030	576	864	484	726
P_{wi}, kip/in.		60.2	90.3	55.1	82.6	49.5	74.2	44.8	67.2
P_{wb}, kips		4510	6770	3460	5210	2510	3780	1870	2810
P_{fb}, kips		1120	1690	946	1420	793	1190	638	958
L_p, ft		9.88		9.79		9.70		9.61	
L_r, ft		75.0		68.7		62.7		56.5	
A_g, in.^{2}		67.7		61.8		56.0		50.0	
I_x, in.^{4}		2420		2140		1890		1650	
I_y, in.^{4}		742		664		589		517	
r_y, in.		3.31		3.28		3.25		3.22	
r_x/r_y		1.80		1.80		1.79		1.78	
$P_{ex}L_c^2/10^4$, k-in.^{2}		69300		61300		54100		47200	
$P_{ey}L_c^2/10^4$, k-in.^{2}		21200		19000		16900		14800	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

F_y = 70 ksi

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

W12

Shape		W12×							
lb/ft		152		136		120		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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	1870	2820	1670	2510	1480	2220	1310	1970
	6	1780	2670	1590	2380	1400	2100	1240	1860
	7	1750	2620	1560	2340	1370	2060	1210	1820
	8	1710	2570	1520	2290	1340	2010	1190	1780
	9	1670	2500	1480	2230	1310	1960	1160	1740
	10	1620	2440	1440	2170	1270	1910	1120	1690
	11	1570	2360	1400	2100	1230	1850	1090	1630
	12	1520	2290	1350	2030	1190	1790	1050	1580
	13	1470	2200	1300	1960	1140	1720	1010	1520
	14	1410	2120	1250	1880	1100	1650	970	1460
	15	1350	2030	1200	1800	1050	1580	928	1390
	16	1290	1940	1150	1720	1000	1510	885	1330
	17	1230	1850	1090	1640	955	1440	842	1270
	18	1170	1760	1040	1560	906	1360	798	1200
	19	1110	1670	982	1480	857	1290	754	1130
	20	1050	1580	927	1390	808	1210	711	1070
	22	929	1400	819	1230	712	1070	625	940
	24	813	1220	715	1070	620	932	544	817
	26	702	1060	615	925	532	800	466	700
	28	606	910	530	797	459	690	402	604
	30	528	793	462	695	400	601	350	526
	32	464	697	406	610	352	528	308	462
	34	411	617	360	541	311	468	272	410
	36	366	551	321	482	278	417	243	365
	38	329	494	288	433	249	375	218	328
	40	297	446	260	391	225	338	197	296
Properties									
P_{wo}, kips		406	609	341	512	282	422	226	339
P_{wi}, kip/in.		40.6	60.9	36.9	55.3	33.1	49.7	28.5	42.7
P_{wb}, kips		1380	2080	1040	1560	753	1130	479	720
P_{fb}, kips		513	772	409	615	323	485	257	386
L_p, ft		9.52		9.43		9.34		9.28	
L_r, ft		51.0		45.8		41.3		37.3	
A_g, in.^{2}		44.7		39.9		35.2		31.2	
I_x, in.^{4}		1430		1240		1070		933	
I_y, in.^{4}		454		398		345		301	
r_y, in.		3.19		3.16		3.13		3.11	
r_x/r_y		1.77		1.77		1.76		1.76	
$P_{ex}L_c^2/10^4$, k-in.^{2}		40900		35500		30600		26700	
$P_{ey}L_c^2/10^4$, k-in.^{2}		13000		11400		9870		8620	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Note: Confirm ASTM A913 material availability before specifying, as discussed in Part 2.

Table 4-1c (continued)
Available Strength in Axial Compression, kips

F_y = 70 ksi

W-Shapes

W12

Shape		W12×									
lb/ft		96		87		79		72		65	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	1180	1780	1070	1610	972	1460	884	1330	801	1200
	6	1120	1680	1010	1520	919	1380	835	1260	755	1140
	7	1100	1650	994	1490	900	1350	818	1230	740	1110
	8	1070	1610	971	1460	879	1320	799	1200	722	1090
	9	1040	1570	945	1420	855	1290	777	1170	702	1060
	10	1010	1520	918	1380	830	1250	754	1130	681	1020
	11	981	1470	888	1330	803	1210	729	1100	658	990
	12	946	1420	857	1290	774	1160	703	1060	634	953
	13	911	1370	824	1240	744	1120	675	1020	609	916
	14	873	1310	790	1190	713	1070	647	972	583	877
	15	835	1260	755	1130	681	1020	618	928	557	836
	16	796	1200	719	1080	648	974	588	884	529	796
	17	757	1140	683	1030	615	925	558	838	502	754
	18	717	1080	646	972	582	875	528	793	474	713
	19	677	1020	610	917	549	825	497	747	447	671
	20	637	958	574	863	516	775	467	702	419	630
	22	560	842	503	757	452	679	409	614	366	550
	24	486	730	436	655	390	587	353	530	316	474
	26	416	625	373	560	333	501	301	453	269	404
	28	358	539	321	483	287	432	260	390	232	349
	30	312	469	280	421	250	376	226	340	202	304
	32	274	413	246	370	220	331	199	299	178	267
	34	243	365	218	327	195	293	176	265	157	236
	36	217	326	194	292	174	261	157	236	140	211
	38	195	293	174	262	156	234	141	212	126	189
	40	176	264	157	237	141	212	127	191	114	171
Properties											
P_{wo}, kips		193	289	169	254	146	219	127	191	109	164
P_{wi}, kip/in.		25.7	38.5	24.0	36.1	21.9	32.9	20.1	30.1	18.2	27.3
P_{wb}, kips		350	526	287	432	219	328	168	252	125	188
P_{fb}, kips		212	319	172	258	142	213	118	177	95.9	144
L_p, ft		9.22		9.16		9.92		11.0		12.2	
L_r, ft		34.7		32.3		30.3		28.8		27.3	
A_g, in.^{2}		28.2		25.6		23.2		21.1		19.1	
I_x, in.^{4}		833		740		662		597		533	
I_y, in.^{4}		270		241		216		195		174	
r_y, in.		3.09		3.07		3.05		3.04		3.02	
r_x/r_y		1.76		1.75		1.75		1.75		1.75	
$P_{ex}L_c^2/10^4$, k-in.^{2}		23800		21200		18900		17100		15300	
$P_{ey}L_c^2/10^4$, k-in.^{2}		7730		6900		6180		5580		4980	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Note: Confirm ASTMI A913 material availability before specifying, as discussed in Part 2.

F_y = 50 ksi

Table 4-2
Available Strength in Axial Compression, kips
HP-Shapes

HP18

Shape		HP18×							
lb/ft		204		181		157		135	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	1800	2710	1590	2390	1380	2080	1190	1800
	6	1770	2650	1560	2340	1350	2040	1170	1760
	7	1750	2630	1550	2330	1340	2020	1160	1740
	8	1740	2610	1540	2310	1330	2000	1150	1730
	9	1720	2590	1520	2290	1320	1980	1140	1710
	10	1700	2560	1500	2260	1300	1960	1130	1690
	11	1680	2530	1490	2230	1290	1940	1110	1670
	12	1660	2500	1470	2200	1270	1910	1100	1650
	13	1640	2460	1450	2170	1250	1880	1080	1620
	14	1610	2420	1420	2140	1230	1850	1060	1600
	15	1590	2380	1400	2100	1210	1820	1050	1570
	16	1560	2340	1370	2070	1190	1790	1030	1540
	17	1530	2300	1350	2030	1170	1760	1010	1510
	18	1500	2250	1320	1990	1150	1720	985	1480
	19	1470	2210	1290	1950	1120	1680	964	1450
	20	1440	2160	1270	1900	1100	1650	942	1420
	22	1370	2060	1210	1810	1040	1570	896	1350
	24	1300	1950	1140	1720	989	1490	848	1280
	26	1230	1850	1080	1620	933	1400	800	1200
	28	1160	1740	1010	1530	876	1320	750	1130
	30	1080	1630	950	1430	819	1230	700	1050
	32	1010	1520	884	1330	761	1140	650	977
	34	936	1410	820	1230	705	1060	601	904
	36	865	1300	756	1140	650	977	553	831
	38	795	1190	695	1040	596	896	507	761
	40	728	1090	635	954	544	818	461	693
Properties									
P_{wo}, kips		435	653	363	545	297	446	241	362
P_{wi}, kip/in.		37.7	56.5	33.3	50.0	29.0	43.5	25.0	37.5
P_{wb}, kips		1830	2740	1270	1910	840	1260	535	804
P_{fb}, kips		239	359	187	281	142	213	105	158
L_p, ft		15.2		15.1		18.1		21.4	
L_r, ft		67.8		61.3		55.8		50.5	
A_g, in.^{2}		60.2		53.2		46.2		39.9	
I_x, in.^{4}		3480		3020		2570		2200	
I_y, in.^{4}		1120		974		833		706	
r_y, in.		4.31		4.28		4.25		4.21	
r_x/r_y		1.76		1.76		1.75		1.76	
$P_{ex}L_c^2/10^4$, k-in.^{2}		99600		86400		73600		63000	
$P_{ey}L_c^2/10^4$, k-in.^{2}		32100		27900		23800		20200	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Menu

Table 4-2 (continued)
Available Strength in Axial Compression, kips

$F_y = 50$ ksi

HP16

HP-Shapes

Shape	HP16×											
lb/ft	183		162		141		121		101		88[c]	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	1620	2430	1430	2150	1250	1880	1070	1610	895	1350	753	1130
6	1580	2370	1390	2090	1220	1830	1040	1570	871	1310	736	1110
7	1570	2350	1380	2070	1200	1810	1030	1550	862	1300	730	1100
8	1550	2330	1360	2050	1190	1790	1020	1540	852	1280	723	1090
9	1530	2300	1350	2020	1180	1770	1010	1520	841	1260	715	1070
10	1510	2270	1330	2000	1160	1740	995	1490	829	1250	706	1060
11	1490	2240	1310	1970	1140	1720	979	1470	816	1230	697	1050
12	1470	2200	1290	1930	1120	1690	962	1450	802	1210	687	1030
13	1440	2160	1260	1900	1100	1660	944	1420	787	1180	676	1020
14	1410	2120	1240	1860	1080	1630	926	1390	771	1160	663	997
15	1390	2080	1210	1820	1060	1590	906	1360	754	1130	648	975
16	1360	2040	1190	1780	1030	1560	885	1330	736	1110	633	951
17	1320	1990	1160	1740	1010	1520	863	1300	718	1080	617	927
18	1290	1940	1130	1700	985	1480	841	1260	699	1050	600	902
19	1260	1890	1100	1650	958	1440	818	1230	679	1020	583	877
20	1230	1840	1070	1610	931	1400	794	1190	659	991	566	851
22	1160	1740	1010	1510	876	1320	746	1120	618	929	530	797
24	1080	1630	942	1420	819	1230	696	1050	576	866	494	742
26	1010	1520	877	1320	761	1140	646	971	534	802	457	686
28	939	1410	811	1220	703	1060	596	896	491	739	420	631
30	866	1300	746	1120	645	970	546	821	450	676	384	577
32	794	1190	682	1030	589	886	498	748	409	615	348	524
34	725	1090	620	932	535	804	451	678	370	556	314	473
36	657	988	561	843	482	725	405	609	331	498	281	423
38	592	889	503	756	433	651	364	547	297	447	253	380
40	534	803	454	682	391	587	328	494	268	404	228	343
Properties												
P_{wo}, kips	435	653	363	545	300	451	241	362	189	283	155	232
P_{wi}, kip/in.	37.7	56.5	33.3	50.0	29.2	43.8	25.0	37.5	20.8	31.3	18.0	27.0
P_{wb}, kips	2100	3160	1450	2190	974	1460	612	920	356	535	229	345
P_{fb}, kips	239	359	187	281	143	215	105	158	73.1	110	54.6	82.0
L_p, ft	13.6		13.5		13.4		16.7		20.2		22.9	
L_r, ft	67.6		60.2		54.5		48.6		43.6		40.6	
A_g, in.^{2}	54.1		47.7		41.7		35.8		29.9		25.8	
I_x, in.^{4}	2510		2190		1870		1590		1300		1110	
I_y, in.^{4}	818		697		599		504		412		349	
r_y, in.	3.89		3.82		3.79		3.75		3.71		3.68	
r_x/r_y	1.75		1.77		1.77		1.78		1.78		1.78	
$P_{ex}L_c^2/10^4$, k-in.^{2}	71800		62700		53500		45500		37200		31800	
$P_{ey}L_c^2/10^4$, k-in.^{2}	23400		19900		17100		14400		11800		9990	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

Table 4-2 (continued)
Available Strength in Axial Compression, kips
HP-Shapes

F_y = 50 ksi

HP14–HP12

Shape		HP14×								HP12×			
lb/ft		117		102		89		73[c]		89		84	
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	1030	1550	901	1350	781	1170	625	940	775	1170	737	1110
	6	1000	1500	875	1310	758	1140	610	917	742	1120	705	1060
	7	990	1490	865	1300	750	1130	604	908	731	1100	694	1040
	8	977	1470	855	1280	740	1110	598	899	717	1080	681	1020
	9	964	1450	843	1270	730	1100	591	888	703	1060	667	1000
	10	949	1430	829	1250	718	1080	583	876	687	1030	652	980
	11	933	1400	815	1220	705	1060	574	863	669	1010	636	955
	12	916	1380	800	1200	692	1040	565	849	651	978	618	929
	13	897	1350	783	1180	677	1020	554	832	631	949	599	901
	14	878	1320	766	1150	662	995	541	813	611	918	580	872
	15	857	1290	748	1120	646	971	527	793	590	886	560	842
	16	836	1260	729	1100	629	946	514	772	568	853	539	810
	17	813	1220	709	1070	612	920	499	750	545	820	518	779
	18	790	1190	689	1030	594	893	484	728	523	785	496	746
	19	767	1150	668	1000	576	866	469	705	500	751	474	713
	20	743	1120	646	972	557	838	453	681	476	716	452	680
	22	694	1040	603	906	519	780	422	634	430	646	408	614
	24	643	967	558	839	480	722	389	585	384	578	365	549
	26	593	891	514	772	441	663	357	537	340	512	323	486
	28	543	816	470	706	403	606	325	489	298	448	283	425
	30	494	742	427	641	365	549	294	442	260	390	247	371
	32	446	671	385	579	329	494	264	397	228	343	217	326
	34	400	602	344	518	294	441	235	354	202	304	192	289
	36	357	537	307	462	262	394	210	316	180	271	171	257
	38	320	482	276	414	235	353	188	283	162	243	154	231
	40	289	435	249	374	212	319	170	256	146	220	139	208
Properties													
P_{wo}, kips		201	302	162	243	134	201	100	150	158	238	158	236
P_{wi}, kip/in.		26.8	40.3	23.5	35.3	20.5	30.8	16.8	25.3	24.0	36.0	22.8	34.3
P_{wb}, kips		790	1190	531	798	354	532	195	294	660	991	572	859
P_{fb}, kips		121	182	93.0	140	70.8	106	47.7	71.7	97.0	146	87.8	132
L_p, ft		12.9		15.6		17.8		21.2		10.4		10.4	
L_r, ft		50.5		45.7		41.7		37.6		42.8		41.3	
A_g, in.^{2}		34.4		30.1		26.1		21.4		25.9		24.6	
I_x, in.^{4}		1220		1050		904		729		693		650	
I_y, in.^{4}		443		380		326		261		224		213	
r_y, in.		3.59		3.56		3.53		3.49		2.94		2.94	
r_x/r_y		1.66		1.66		1.67		1.67		1.76		1.75	
$P_{ex}L_c^2/10^4$, k-in.^{2}		34900		30100		25900		20900		19800		18600	
$P_{ey}L_c^2/10^4$, k-in.^{2}		12700		10900		9330		7470		6410		6100	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

Table 4-2 (continued)
Available Strength in Axial Compression, kips

F_y = 50 ksi

HP-Shapes

HP12–HP8

Shape	HP12×						HP10×				HP8×	
lb/ft	74		63		53[c]		57		42		36	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	653	981	551	828	460	692	500	751	371	558	317	477
6	624	938	526	791	443	666	469	706	348	523	287	432
7	614	923	518	778	436	655	459	690	340	511	277	416
8	603	906	508	763	427	642	447	672	331	497	266	400
9	591	888	497	747	418	628	434	652	321	482	254	381
10	577	867	485	729	408	613	420	631	310	465	241	362
11	562	845	472	710	397	597	404	608	298	448	227	341
12	546	821	459	690	386	579	388	584	286	430	213	320
13	530	796	445	668	373	561	372	559	273	411	199	299
14	512	770	430	646	361	542	355	533	260	391	184	277
15	494	743	414	622	347	522	337	506	247	371	170	256
16	476	715	398	598	334	502	319	480	233	351	156	235
17	457	687	382	574	320	481	301	453	220	330	143	214
18	437	658	365	549	306	460	283	426	206	310	129	194
19	418	628	348	524	292	438	265	399	193	290	117	175
20	398	599	332	498	277	417	248	373	180	270	105	158
22	359	540	298	448	249	374	214	322	154	232	86.9	131
24	320	482	265	399	221	332	182	273	131	196	73.0	110
26	283	426	234	351	194	292	155	233	111	167	62.2	93.5
28	247	372	203	305	169	254	133	201	95.9	144	53.7	80.7
30	216	324	177	266	147	221	116	175	83.5	126	46.7	70.3
32	189	285	156	234	129	194	102	154	73.4	110	41.1	61.8
34	168	252	138	207	114	172	90.5	136	65.0	97.7		
36	150	225	123	185	102	153	80.7	121	58.0	87.2		
38	134	202	110	166	91.6	138	72.5	109	52.1	78.2		
40	121	182	99.6	150	82.7	124	65.4	98.3	47.0	70.6		
Properties												
P_{wo}, kips	132	198	107	161	81.9	123	118	177	78.2	117	83.8	126
P_{wi}, kip/in.	20.2	30.3	17.2	25.8	14.5	21.8	18.8	28.3	13.8	20.8	14.8	22.3
P_{wb}, kips	393	591	243	365	147	221	397	597	158	237	241	363
P_{fb}, kips	69.6	105	49.6	74.6	35.4	53.2	59.7	89.8	33.0	49.6	37.1	55.7
L_p, ft	11.9		14.4		16.6		8.65		12.3		6.90	
L_r, ft	37.9		34.0		31.1		34.8		28.3		27.3	
A_g, in.^{2}	21.8		18.4		15.5		16.7		12.4		10.6	
I_x, in.^{4}	569		472		393		294		210		119	
I_y, in.^{4}	186		153		127		101		71.7		40.3	
r_y, in.	2.92		2.88		2.86		2.45		2.41		1.95	
r_x/r_y	1.75		1.76		1.76		1.71		1.71		1.72	
$P_{ex}L_c^2/10^4$, k-in.^{2}	16300		13500		11 200		8410		6010		3410	
$P_{ey}L_c^2/10^4$, k-in.^{2}	5320		4380		3630		2890		2050		1150	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

$F_y = 50$ ksi

Table 4-3
Available Strength in Axial Compression, kips
Rectangular HSS

HSS20–HSS16

Shape	HSS20×12×								HSS16×12×			
	5/8		1/2[c]		3/8[c]		5/16[c]		5/8		1/2	
t_{des}, in.	0.581		0.465		0.349		0.291		0.581		0.465	
lb/ft	127.37		103.30		78.52		65.87		110.36		89.68	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	1050	1570	792	1190	528	794	397	597	907	1360	737	1110
6	1030	1550	783	1180	522	785	393	591	892	1340	725	1090
7	1030	1540	779	1170	520	782	392	589	887	1330	721	1080
8	1020	1530	775	1170	518	778	391	587	881	1320	716	1080
9	1010	1520	771	1160	515	774	389	584	874	1310	710	1070
10	1000	1510	766	1150	511	769	387	582	867	1300	704	1060
11	994	1490	760	1140	508	764	385	578	858	1290	698	1050
12	985	1480	755	1130	504	758	383	575	849	1280	691	1040
13	974	1460	748	1120	500	752	380	571	840	1260	683	1030
14	963	1450	741	1110	496	745	377	567	829	1250	675	1010
15	951	1430	734	1100	491	738	375	563	819	1230	666	1000
16	938	1410	727	1090	486	731	371	558	807	1210	657	988
17	925	1390	718	1080	481	723	368	553	795	1190	647	973
18	911	1370	710	1070	475	715	365	548	782	1180	637	958
19	896	1350	701	1050	470	706	361	543	769	1160	627	942
20	881	1320	692	1040	464	697	358	537	756	1140	616	926
21	866	1300	682	1030	458	688	354	532	742	1110	605	909
22	850	1280	672	1010	451	678	350	526	727	1090	594	892
23	833	1250	662	995	445	668	346	519	712	1070	582	874
24	816	1230	652	980	438	658	341	513	697	1050	570	856
25	799	1200	641	963	431	648	336	505	682	1020	557	838
26	782	1180	630	947	424	637	331	497	666	1000	545	819
27	764	1150	619	930	416	626	325	489	650	977	532	800
28	746	1120	607	912	409	615	319	480	634	953	519	780
29	728	1090	594	892	401	603	314	471	618	928	506	761
30	710	1070	579	870	394	592	308	462	601	904	493	741
32	672	1010	550	826	378	568	296	444	568	854	467	701
34	635	955	520	781	362	544	283	426	535	804	440	661
36	598	898	490	736	346	520	271	407	502	754	413	621
38	561	843	460	692	329	495	258	388	469	705	387	582
40	524	788	431	647	313	470	245	369	437	656	361	542
Properties												
A_g, in.^{2}	35.0		28.3		21.5		18.1		30.3		24.6	
I_x, in.^{4}	1880		1550		1200		1010		1090		904	
I_y, in.^{4}	851		705		547		464		700		581	
r_y, in.	4.93		4.99		5.04		5.07		4.80		4.86	
r_x/r_y	1.49		1.48		1.48		1.48		1.25		1.25	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

HSS16

Table 4-3 (continued)
Available Strength in Axial Compression, kips

F_y = 50 ksi

Rectangular HSS

Shape	HSS16×12×				HSS16×8×							
	3/8[c]		5/16[c]		5/8		1/2		3/8[c]		5/16[c]	
t_{des}, in.	0.349		0.291		0.581		0.465		0.349		0.291	
lb/ft	68.31		57.36		93.34		76.07		58.10		48.86	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	512	770	386	580	769	1160	626	940	432	649	332	499
6	506	760	382	574	743	1120	605	909	421	632	324	486
7	504	757	381	572	733	1100	597	897	417	626	321	482
8	501	753	379	570	722	1090	589	885	412	619	317	477
9	498	748	377	567	710	1070	579	870	407	612	314	471
10	495	743	375	564	697	1050	569	855	402	604	309	465
11	491	738	373	561	683	1030	557	838	396	594	305	458
12	487	732	371	557	668	1000	545	820	389	585	300	451
13	483	725	368	553	652	979	532	800	382	574	295	443
14	478	718	365	549	634	954	519	780	375	563	289	435
15	473	711	362	545	617	927	505	759	367	551	283	426
16	468	703	359	540	598	899	490	736	359	539	277	417
17	462	695	356	535	579	870	475	714	350	526	271	407
18	457	687	352	530	559	841	459	690	341	513	264	397
19	451	678	349	524	539	811	443	666	332	499	257	387
20	445	668	345	518	519	780	427	642	323	485	250	376
21	438	658	341	512	498	749	411	617	313	471	243	366
22	431	648	337	506	478	718	394	592	304	456	236	355
23	425	638	332	499	457	687	378	567	293	441	229	343
24	418	628	328	492	436	656	361	543	281	422	221	332
25	410	617	322	484	416	625	344	518	268	403	213	321
26	403	606	316	475	395	594	328	493	256	385	206	309
27	395	594	311	467	375	564	312	469	244	366	198	298
28	388	583	305	458	356	534	296	445	232	348	190	286
29	380	571	299	449	336	505	280	421	220	330	183	275
30	372	559	292	440	317	477	265	398	208	313	175	263
32	356	534	280	421	280	421	235	353	185	278	158	237
34	338	508	267	402	248	373	208	313	164	247	140	210
36	318	478	255	383	221	333	186	279	146	220	125	188
38	298	448	242	363	199	299	167	250	131	197	112	168
40	278	418	229	344	179	269	150	226	119	178	101	152

Properties

	HSS16×12×3/8	HSS16×12×5/16	HSS16×8×5/8	HSS16×8×1/2	HSS16×8×3/8	HSS16×8×5/16
A_g, in.^{2}	18.7	15.7	25.7	20.9	16.0	13.4
I_x, in.^{4}	702	595	815	679	531	451
I_y, in.^{4}	452	384	274	230	181	155
r_y, in.	4.91	4.94	3.27	3.32	3.37	3.40
r_x/r_y	1.25	1.24	1.72	1.72	1.71	1.71

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

F_y = 50 ksi

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

HSS16–HSS14

Shape		HSS16×8×		HSS14×10×									
		1/4[c]		5/8		1/2		3/8[c]		5/16[c]		1/4[c]	
t_{des}, in.		0.233		0.581		0.465		0.349		0.291		0.233	
lb/ft		39.43		93.34		76.07		58.10		48.86		39.43	
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, L_c (ft), with respect to least radius of gyration, r_y	0	240	360	769	1160	626	940	462	695	360	542	251	377
	6	234	352	751	1130	611	919	454	682	354	532	247	372
	7	232	348	745	1120	606	911	451	678	352	528	246	370
	8	229	345	737	1110	600	902	447	672	349	524	245	368
	9	227	341	729	1100	594	893	444	667	346	520	243	365
	10	224	336	720	1080	587	882	439	660	343	515	241	363
	11	220	331	710	1070	579	870	434	653	339	510	239	360
	12	217	326	699	1050	570	857	429	645	335	504	237	356
	13	213	320	688	1030	561	843	424	637	331	498	235	353
	14	209	314	675	1020	551	829	418	628	327	491	232	349
	15	205	308	663	996	541	813	412	619	322	484	230	345
	16	201	302	649	976	530	797	405	609	317	476	227	341
	17	196	295	635	954	519	781	398	599	312	468	224	336
	18	191	288	620	932	508	763	391	587	306	460	221	332
	19	187	280	605	910	496	745	382	574	301	452	217	327
	20	182	273	590	886	483	727	372	560	295	443	214	322
	21	177	265	574	863	471	708	363	545	289	434	211	317
	22	171	258	558	838	458	688	353	531	283	425	207	311
	23	166	250	541	814	445	669	343	516	276	415	203	305
	24	161	242	525	789	432	649	333	501	270	405	199	299
	25	155	234	508	763	418	628	323	486	263	395	194	292
	26	150	225	491	738	405	608	313	470	256	385	189	284
	27	145	217	474	712	391	588	303	455	250	375	184	277
	28	139	209	457	687	377	567	292	440	243	365	179	270
	29	134	201	440	661	364	547	282	424	236	354	174	262
	30	128	193	423	636	350	526	272	409	229	344	169	255
	32	118	177	390	586	323	486	251	378	213	319	159	239
	34	107	161	357	536	297	446	231	348	196	294	149	224
	36	98.0	147	325	489	271	408	212	318	180	270	139	209
	38	90.0	135	294	442	247	371	193	290	164	246	129	194
	40	82.4	124	266	399	223	334	175	262	148	223	119	179

Properties

	HSS16×8×1/4	HSS14×10×5/8	HSS14×10×1/2	HSS14×10×3/8	HSS14×10×5/16	HSS14×10×1/4
A_g, in.^{2}	10.8	25.7	20.9	16.0	13.4	10.8
I_x, in.^{4}	368	687	573	447	380	310
I_y, in.^{4}	127	407	341	267	227	186
r_y, in.	3.42	3.98	4.04	4.09	4.12	4.14
r_x/r_y	1.70	1.30	1.29	1.29	1.29	1.29

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

Table 4-3 (continued)
Available Strength in Axial Compression, kips

F_y = 50 ksi

HSS12

Rectangular HSS

Shape	HSS12×10×								HSS12×8×			
	1/2		3/8		5/16[c]		1/4[c]		5/8		1/2	
t_{des}, in.	0.465		0.349		0.291		0.233		0.581		0.465	
lb/ft	69.27		53.00		44.60		36.03		76.33		62.46	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	569	855	437	657	351	527	247	372	629	945	515	774
6	555	835	427	642	344	517	244	366	605	910	496	746
7	550	827	423	636	341	513	243	365	597	897	490	736
8	545	819	419	630	339	509	241	362	588	883	482	725
9	539	810	415	623	336	505	239	360	577	868	474	713
10	532	799	409	615	332	499	237	357	566	850	465	699
11	524	788	404	607	329	494	235	354	553	832	455	684
12	516	776	398	598	325	488	233	350	540	812	445	668
13	508	763	391	588	320	481	231	347	526	791	433	651
14	499	750	384	578	316	474	228	343	511	769	422	634
15	489	735	377	567	311	467	225	339	496	745	409	615
16	479	720	370	556	306	459	222	334	480	721	396	596
17	469	704	362	544	300	451	219	330	464	697	383	576
18	458	688	354	531	295	443	216	325	447	672	370	556
19	446	671	345	519	289	434	213	320	430	646	356	535
20	435	654	336	506	282	424	209	315	412	620	342	514
21	423	636	327	492	275	413	206	309	395	594	328	493
22	411	618	318	479	267	402	202	303	377	567	314	472
23	399	599	309	465	260	390	198	298	360	541	300	451
24	386	581	300	451	252	379	193	290	343	515	286	430
25	374	562	290	436	244	367	188	283	325	489	272	409
26	361	543	281	422	236	355	183	276	308	463	258	388
27	349	524	271	408	228	343	178	268	292	438	244	367
28	336	505	262	393	220	331	173	260	275	413	231	347
29	323	486	252	379	212	319	168	253	259	389	218	328
30	311	467	242	364	204	307	163	245	243	366	205	309
32	286	430	224	336	189	284	153	229	214	321	181	272
34	262	393	205	308	173	260	142	214	189	285	160	241
36	238	358	187	281	158	238	130	195	169	254	143	215
38	215	324	170	255	144	216	118	178	152	228	128	193
40	194	292	153	230	130	195	107	161	137	206	116	174
Properties												
A_g, in.^{2}	19.0		14.6		12.2		9.90		21.0		17.2	
I_x, in.^{4}	395		310		264		216		397		333	
I_y, in.^{4}	298		234		200		164		210		178	
r_y, in.	3.96		4.01		4.04		4.07		3.16		3.21	
r_x/r_y	1.15		1.15		1.15		1.15		1.37		1.37	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

Table 4-3 (continued) Available Strength in Axial Compression, kips

Rectangular HSS

F_y = 50 ksi

HSS12

Shape		HSS12×8×								HSS12×6×			
		3/8		5/16[c]		1/4[c]		3/16[c]		5/8		1/2	
t_{des}, in.		0.349		0.291		0.233		0.174		0.581		0.465	
lb/ft		47.90		40.35		32.63		24.73		67.82		55.66	
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, L_c (ft), with respect to least radius of gyration, r_y	0	395	594	318	477	233	350	143	215	560	841	458	688
	6	381	573	309	464	227	341	140	211	524	787	430	646
	7	377	566	306	459	224	337	139	209	512	769	420	631
	8	371	558	302	454	222	333	138	208	498	748	409	615
	9	365	548	298	448	219	329	137	205	482	725	397	597
	10	358	538	293	441	216	324	135	203	466	700	384	577
	11	351	527	289	434	212	319	134	201	448	673	370	556
	12	343	515	283	426	209	314	132	198	429	645	355	534
	13	335	503	278	418	205	308	130	195	410	616	340	511
	14	326	490	272	409	201	301	128	192	390	586	324	487
	15	317	476	266	399	196	295	126	189	370	556	308	462
	16	307	462	259	389	192	288	123	185	349	525	291	438
	17	297	447	251	377	187	281	121	182	329	494	275	413
	18	287	432	242	364	182	273	118	178	308	463	258	388
	19	277	416	234	352	177	266	116	174	288	433	242	364
	20	267	401	225	338	172	258	113	170	268	403	226	339
	21	256	385	216	325	166	250	110	166	248	373	210	316
	22	245	369	208	312	161	242	107	161	229	345	195	293
	23	235	353	199	299	155	233	104	157	211	317	180	270
	24	224	337	190	285	150	225	101	151	194	291	165	248
	25	214	321	181	272	144	217	97.0	146	178	268	152	229
	26	203	305	172	259	139	208	93.4	140	165	248	141	211
	27	193	290	164	246	133	200	89.8	135	153	230	130	196
	28	183	274	155	233	127	191	86.1	129	142	214	121	182
	29	173	260	147	220	120	181	82.5	124	133	199	113	170
	30	163	245	138	208	114	171	79.0	119	124	186	106	159
	32	144	216	122	184	101	151	71.9	108	109	164	92.9	140
	34	127	192	108	163	89.2	134	65.2	98.0	96.4	145	82.2	124
	36	114	171	96.8	145	79.5	120	59.4	89.3	86.0	129	73.4	110
	38	102	153	86.8	131	71.4	107	54.4	81.8	77.2	116	65.8	99.0
	40	92.1	138	78.4	118	64.4	96.8	49.5	74.4			59.4	89.3

Properties

	3/8	5/16	1/4	3/16	5/8	1/2
A_g, in.^{2}	13.2	11.1	8.96	6.76	18.7	15.3
I_x, in.^{4}	262	224	184	140	321	271
I_y, in.^{4}	140	120	98.8	75.7	107	91.1
r_y, in.	3.27	3.29	3.32	3.35	2.39	2.44
r_x/r_y	1.37	1.37	1.36	1.36	1.73	1.73

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Table 4-3 (continued)
Available Strength in Axial Compression, kips

F_y = 50 ksi

HSS12–HSS10

Rectangular HSS

Shape		HSS12×6×								HSS10×8×			
		3/8		5/16^c		1/4^c		3/16^c		5/8		1/2	
t_{des}, in.		0.349		0.291		0.233		0.174		0.581		0.465	
lb/ft		42.79		36.10		29.23		22.18		67.82		55.66	
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, L_c (ft), with respect to least radius of gyration, r_y	0	353	531	282	424	205	308	134	202	560	841	458	688
	6	332	500	269	405	196	295	128	193	538	809	441	663
	7	325	489	265	398	193	290	126	190	530	797	435	653
	8	317	476	260	390	189	284	124	186	522	784	428	643
	9	308	463	254	382	185	278	121	183	512	770	420	631
	10	298	448	248	372	181	272	119	178	501	754	412	619
	11	288	432	241	362	176	265	116	174	490	736	403	605
	12	277	416	234	351	171	257	112	169	478	718	393	590
	13	265	399	224	337	166	249	109	164	465	698	382	575
	14	253	381	215	323	160	241	105	158	451	678	372	558
	15	241	362	205	307	154	232	102	153	437	657	360	541
	16	229	344	194	292	148	223	97.9	147	422	635	349	524
	17	216	325	184	276	142	214	94.0	141	407	612	336	506
	18	204	306	174	261	136	204	90.1	135	392	589	324	487
	19	191	288	163	245	130	195	86.1	129	376	565	312	468
	20	179	269	153	230	123	185	82.1	123	360	541	299	449
	21	167	251	143	215	117	176	78.0	117	344	517	286	430
	22	155	233	133	200	109	164	74.0	111	328	493	273	411
	23	144	216	124	186	101	152	70.0	105	312	470	260	391
	24	133	199	114	172	93.9	141	66.1	99.3	297	446	248	372
	25	122	184	105	158	86.5	130	62.1	93.3	281	422	235	353
	26	113	170	97.3	146	80.0	120	58.4	87.7	266	399	223	334
	27	105	157	90.2	136	74.2	111	55.0	82.7	251	377	210	316
	28	97.4	146	83.9	126	69.0	104	52.0	78.1	236	354	198	298
	29	90.8	136	78.2	118	64.3	96.6	49.2	73.9	221	333	187	280
	30	84.9	128	73.1	110	60.1	90.3	46.4	69.8	207	311	175	263
	32	74.6	112	64.2	96.5	52.8	79.4	40.8	61.3	182	274	154	231
	34	66.1	99.3	56.9	85.5	46.8	70.3	36.1	54.3	161	242	136	205
	36	58.9	88.6	50.7	76.3	41.7	62.7	32.2	48.5	144	216	121	183
	38	52.9	79.5	45.5	68.4	37.4	56.3	28.9	43.5	129	194	109	164
	40	47.7	71.7	41.1	61.8	33.8	50.8	26.1	39.2	116	175	98.4	148

Properties

	3/8	5/16^c	1/4^c	3/16^c	5/8	1/2
A_g, in.^{2}	11.8	9.92	8.03	6.06	18.7	15.3
I_x, in.^{4}	215	184	151	116	253	214
I_y, in.^{4}	72.9	62.8	51.9	40.0	178	151
r_y, in.	2.49	2.52	2.54	2.57	3.09	3.14
r_x/r_y	1.72	1.71	1.71	1.70	1.19	1.19

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

^c Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

F_y = 50 ksi

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

HSS10

Shape		HSS10×8×								HSS10×6×	
		3/8		5/16		1/4[c]		3/16[c]		5/8	
t_{des}, in.		0.349		0.291		0.233		0.174		0.581	
lb/ft		42.79		36.10		29.23		22.18		59.32	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	353	531	297	446	227	341	141	212	491	738
	6	340	512	286	430	220	331	138	207	458	689
	7	336	505	283	425	218	327	137	205	447	672
	8	331	497	278	418	215	323	135	203	434	653
	9	325	488	274	411	212	319	134	201	420	632
	10	319	479	268	403	209	314	132	199	405	609
	11	312	469	263	395	205	309	131	196	389	585
	12	304	457	257	386	202	303	129	194	372	560
	13	297	446	250	376	197	297	127	191	355	533
	14	288	434	243	366	193	290	125	187	337	506
	15	280	421	236	355	188	283	122	184	319	479
	16	271	407	229	344	184	276	120	180	300	451
	17	262	394	221	333	179	269	117	177	282	423
	18	253	380	214	321	174	261	115	173	263	396
	19	243	365	206	309	168	252	112	169	245	369
	20	234	351	198	297	161	243	109	164	228	342
	21	224	336	190	285	155	233	106	160	210	316
	22	214	322	182	273	148	223	103	156	194	291
	23	204	307	174	261	142	213	100	150	177	266
	24	195	293	165	249	135	204	96.3	145	163	245
	25	185	278	157	237	129	194	92.6	139	150	225
	26	176	264	149	225	123	184	88.9	134	139	208
	27	166	250	142	213	116	175	85.2	128	129	193
	28	157	236	134	201	110	165	81.5	122	120	180
	29	148	222	126	190	104	156	77.8	117	111	168
	30	139	209	119	179	98.0	147	74.2	112	104	157
	32	122	184	105	158	86.5	130	66.5	99.9	91.5	138
	34	108	163	92.9	140	76.6	115	58.9	88.5	81.1	122
	36	96.7	145	82.8	125	68.3	103	52.5	78.9	72.3	109
	38	86.8	130	74.3	112	61.3	92.1	47.1	70.8	64.9	97.6
	40	78.3	118	67.1	101	55.3	83.2	42.5	63.9		
Properties											
A_g, in.^{2}		11.8		9.92		8.03		6.06		16.4	
I_x, in.^{4}		169		145		119		91.4		201	
I_y, in.^{4}		120		103		84.7		65.1		89.4	
r_y, in.		3.19		3.22		3.25		3.28		2.34	
r_x/r_y		1.19		1.19		1.18		1.18		1.50	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Table 4-3 (continued)
Available Strength in Axial Compression, kips

$F_y = 50$ ksi

Rectangular HSS

HSS10

Shape		HSS10×6×									
		1/2		3/8		5/16		1/4[c]		3/16[c]	
t_{des}, in.		0.465		0.349		0.291		0.233		0.174	
lb/ft		48.85		37.69		31.84		25.82		19.63	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	404	607	311	468	262	394	199	299	132	198
	6	378	568	292	439	246	370	189	285	126	189
	7	369	555	286	429	241	362	186	280	124	186
	8	359	540	278	418	235	353	182	274	121	182
	9	348	523	270	406	228	343	178	268	119	178
	10	336	505	261	392	221	332	174	261	116	174
	11	323	486	251	378	213	320	169	254	113	169
	12	310	466	241	363	205	307	164	246	109	164
	13	296	445	231	347	196	294	158	238	106	159
	14	282	423	220	331	187	281	152	229	102	154
	15	267	401	209	314	178	267	145	218	98.3	148
	16	252	379	198	298	169	253	138	207	94.4	142
	17	237	357	187	281	159	239	130	196	90.4	136
	18	222	334	176	264	150	225	123	184	86.4	130
	19	208	312	164	247	141	211	115	173	82.2	124
	20	193	291	153	231	132	198	108	162	78.1	117
	21	179	269	143	215	123	184	101	151	74.0	111
	22	166	249	132	199	114	171	93.4	140	69.9	105
	23	152	229	122	184	105	158	86.6	130	65.8	98.9
	24	140	210	112	169	96.8	146	79.8	120	61.7	92.8
	25	129	194	103	155	89.3	134	73.5	110	57.0	85.6
	26	119	179	95.6	144	82.5	124	68.0	102	52.7	79.1
	27	110	166	88.7	133	76.5	115	63.0	94.7	48.8	73.4
	28	103	154	82.4	124	71.2	107	58.6	88.1	45.4	68.2
	29	95.7	144	76.8	116	66.3	99.7	54.6	82.1	42.3	63.6
	30	89.4	134	71.8	108	62.0	93.2	51.1	76.7	39.6	59.4
	32	78.6	118	63.1	94.9	54.5	81.9	44.9	67.4	34.8	52.2
	34	69.6	105	55.9	84.0	48.3	72.5	39.7	59.7	30.8	46.3
	36	62.1	93.3	49.9	75.0	43.0	64.7	35.5	53.3	27.5	41.3
	38	55.7	83.8	44.8	67.3	38.6	58.1	31.8	47.8	24.7	37.0
	40			40.4	60.7	34.9	52.4	28.7	43.2	22.2	33.4
Properties											
A_g, in.^{2}		13.5		10.4		8.76		7.10		5.37	
I_x, in.^{4}		171		137		118		96.9		74.6	
I_y, in.^{4}		76.8		61.8		53.3		44.1		34.1	
r_y, in.		2.39		2.44		2.47		2.49		2.52	
r_x/r_y		1.49		1.49		1.48		1.48		1.48	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

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

Menu

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

F_y = 50 ksi

HSS10–HSS9

Shape	HSS10×5×								HSS9×7×	
	3/8		5/16		1/4[c]		3/16[c]		5/8	
t_{des}, in.	0.349		0.291		0.233		0.174		0.581	
lb/ft	35.13		29.72		24.12		18.35		59.32	
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	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y										
0	290	435	245	368	185	278	122	183	491	738
6	265	398	224	337	173	260	114	171	466	700
7	256	385	217	326	169	254	111	167	457	687
8	247	371	209	314	164	246	108	163	447	672
9	236	355	200	301	159	239	105	158	436	655
10	225	339	191	288	153	230	102	153	424	637
11	214	321	182	273	147	221	97.9	147	411	618
12	202	303	172	258	141	212	93.9	141	398	598
13	190	285	161	243	133	199	89.8	135	383	576
14	177	266	151	227	124	187	85.5	129	368	554
15	165	248	141	212	116	174	81.2	122	353	531
16	152	229	130	196	108	162	76.7	115	337	507
17	140	211	120	181	99.6	150	72.3	109	321	483
18	129	193	110	166	91.6	138	67.8	102	305	459
19	117	176	101	151	83.8	126	63.4	95.3	289	435
20	106	159	91.4	137	76.3	115	59.0	88.7	273	411
21	96.2	145	82.9	125	69.2	104	53.9	81.0	257	387
22	87.6	132	75.5	113	63.1	94.8	49.1	73.8	242	363
23	80.2	121	69.1	104	57.7	86.7	44.9	67.5	226	340
24	73.6	111	63.4	95.3	53.0	79.6	41.3	62.0	211	317
25	67.9	102	58.5	87.9	48.8	73.4	38.0	57.2	196	295
26	62.7	94.3	54.1	81.2	45.1	67.9	35.2	52.9	182	273
27	58.2	87.5	50.1	75.3	41.9	62.9	32.6	49.0	169	253
28	54.1	81.3	46.6	70.1	38.9	58.5	30.3	45.6	157	236
29	50.4	75.8	43.4	65.3	36.3	54.5	28.3	42.5	146	220
30	47.1	70.8	40.6	61.0	33.9	51.0	26.4	39.7	137	205
32	41.4	62.3	35.7	53.6	29.8	44.8	23.2	34.9	120	180
34	36.7	55.2	31.6	47.5	26.4	39.7	20.6	30.9	106	160
36									94.9	143
38									85.1	128
40									76.8	115
Properties										
A_g, in.^{2}	9.67		8.17		6.63		5.02		16.4	
I_x, in.^{4}	120		104		85.8		66.2		174	
I_y, in.^{4}	40.6		35.2		29.3		22.7		117	
r_y, in.	2.05		2.07		2.10		2.13		2.68	
r_x/r_y	1.72		1.72		1.71		1.70		1.22	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

HSS9

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

F_y = 50 ksi

Shape		HSS9×7×									
		1/2		3/8		5/16		1/4[c]		3/16[c]	
t_{des}, in.		0.465		0.349		0.291		0.233		0.174	
lb/ft		48.85		37.69		31.84		25.82		19.63	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	404	607	311	468	262	394	209	314	137	205
	6	384	577	296	446	250	376	201	302	133	199
	7	377	567	291	438	246	369	198	297	131	197
	8	369	555	285	429	241	362	195	293	129	195
	9	360	542	279	419	235	354	191	287	128	192
	10	351	527	272	408	230	345	187	280	126	189
	11	341	512	264	397	223	335	182	273	123	185
	12	330	496	256	385	216	325	176	265	121	182
	13	318	478	247	372	209	315	170	256	118	177
	14	306	461	238	358	202	304	165	247	115	173
	15	294	442	229	344	194	292	158	238	111	167
	16	282	423	220	330	186	280	152	229	108	162
	17	269	404	210	316	178	268	146	219	104	157
	18	256	384	200	301	170	256	139	209	100	151
	19	243	365	190	286	162	244	133	199	96.6	145
	20	230	345	181	271	154	231	126	190	92.7	139
	21	217	326	171	257	146	219	120	180	88.8	133
	22	204	307	161	242	138	207	113	170	84.9	128
	23	191	288	151	228	130	195	107	160	80.9	122
	24	179	269	142	214	122	183	100	151	77.0	116
	25	167	251	133	200	114	171	94.0	141	72.3	109
	26	155	234	124	186	106	160	88.0	132	67.8	102
	27	144	217	115	173	99.0	149	82.0	123	63.3	95.2
	28	134	201	107	161	92.1	138	76.2	115	58.9	88.5
	29	125	188	99.8	150	85.8	129	71.1	107	54.9	82.5
	30	117	175	93.2	140	80.2	121	66.4	99.8	51.3	77.1
	32	103	154	81.9	123	70.5	106	58.4	87.7	45.1	67.8
	34	90.8	137	72.6	109	62.5	93.9	51.7	77.7	39.9	60.0
	36	81.0	122	64.7	97.3	55.7	83.7	46.1	69.3	35.6	53.5
	38	72.7	109	58.1	87.3	50.0	75.1	41.4	62.2	32.0	48.1
	40	65.6	98.7	52.4	78.8	45.1	67.8	37.4	56.2	28.9	43.4

Properties

	1/2	3/8	5/16	1/4[c]	3/16[c]
A_g, in.^{2}	13.5	10.4	8.76	7.10	5.37
I_x, in.^{4}	149	119	102	84.1	64.7
I_y, in.^{4}	100	80.4	69.2	57.2	44.1
r_y, in.	2.73	2.78	2.81	2.84	2.87
r_x/r_y	1.22	1.22	1.21	1.21	1.21

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

Menu

F_y = 50 ksi

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

HSS9

Shape		HSS9×5×											
		5/8		1/2		3/8		5/16		1/4[c]		3/16[c]	
t_{des}, in.		0.581		0.465		0.349		0.291		0.233		0.174	
lb/ft		50.81		42.05		32.58		27.59		22.42		17.08	
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, L_c (ft), with respect to least radius of gyration, r_y	0	419	630	347	522	269	404	227	342	181	272	120	180
	6	378	568	315	473	245	368	208	312	169	253	112	168
	7	364	548	304	457	237	356	201	302	164	246	109	164
	8	349	525	292	439	228	343	194	291	158	238	106	160
	9	333	500	279	419	218	328	186	279	152	228	103	155
	10	315	473	265	398	208	313	177	266	145	218	99.4	149
	11	297	446	250	376	197	296	168	252	138	207	95.5	144
	12	278	418	235	353	186	279	158	238	130	196	91.5	138
	13	259	389	220	330	174	262	149	224	122	184	87.3	131
	14	239	360	204	307	163	245	139	209	115	172	83.0	125
	15	220	331	189	284	151	227	129	194	107	161	78.5	118
	16	202	303	173	261	140	210	120	180	99.1	149	74.0	111
	17	184	276	159	238	128	193	110	166	91.4	137	69.5	104
	18	166	250	144	217	117	176	101	152	84.0	126	64.5	97.0
	19	149	224	130	196	107	160	92.0	138	76.7	115	59.1	88.8
	20	135	202	117	177	96.5	145	83.2	125	69.7	105	53.7	80.8
	21	122	184	107	160	87.5	131	75.5	113	63.2	95.0	48.7	73.3
	22	111	167	97.1	146	79.7	120	68.8	103	57.6	86.5	44.4	66.8
	23	102	153	88.8	134	72.9	110	62.9	94.6	52.7	79.2	40.6	61.1
	24	93.5	141	81.6	123	67.0	101	57.8	86.9	48.4	72.7	37.3	56.1
	25	86.2	130	75.2	113	61.7	92.8	53.3	80.1	44.6	67.0	34.4	51.7
	26	79.7	120	69.5	104	57.1	85.8	49.3	74.0	41.2	62.0	31.8	47.8
	27	73.9	111	64.5	96.9	52.9	79.5	45.7	68.6	38.2	57.4	29.5	44.3
	28	68.7	103	59.9	90.1	49.2	74.0	42.5	63.8	35.5	53.4	27.4	41.2
	29	64.1	96.3	55.9	84.0	45.9	69.0	39.6	59.5	33.1	49.8	25.6	38.4
	30	59.9	90.0	52.2	78.5	42.9	64.4	37.0	55.6	31.0	46.5	23.9	35.9
	32	52.6	79.1	45.9	69.0	37.7	56.6	32.5	48.9	27.2	40.9	21.0	31.6
	34							28.8	43.3	24.1	36.2	18.6	27.9

Properties

	5/8	1/2	3/8	5/16	1/4[c]	3/16[c]
A_g, in.^{2}	14.0	11.6	8.97	7.59	6.17	4.67
I_x, in.^{4}	133	115	92.5	79.8	66.1	51.1
I_y, in.^{4}	52.0	45.2	36.8	32.0	26.6	20.7
r_y, in.	1.92	1.97	2.03	2.05	2.08	2.10
r_x/r_y	1.60	1.59	1.58	1.58	1.57	1.58

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

HSS8

Table 4-3 (continued)
Available Strength in Axial Compression, kips

$F_y = 50$ ksi

Rectangular HSS

Shape	HSS8×6×									
	5/8		1/2		3/8		5/16		1/4	
t_{des}, in.	0.581		0.465		0.349		0.291		0.233	
lb/ft	50.81		42.05		32.58		27.59		22.42	
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	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y										
0	419	630	347	522	269	404	227	342	185	278
6	389	585	324	487	251	378	213	320	173	260
7	379	570	316	474	245	369	208	312	169	254
8	368	553	306	461	238	358	202	304	165	248
9	355	534	296	446	231	347	196	295	160	240
10	342	514	286	429	223	335	189	284	155	232
11	327	492	274	412	214	322	182	274	149	224
12	312	469	262	394	205	309	175	263	143	215
13	297	446	250	375	196	295	167	251	137	205
14	281	422	237	356	187	280	159	239	130	196
15	265	398	224	336	177	266	151	226	124	186
16	248	373	210	316	167	251	142	214	117	176
17	232	349	197	297	157	236	134	201	110	166
18	216	325	184	277	147	221	126	189	104	156
19	200	301	171	258	137	206	117	177	97.0	146
20	185	278	159	239	128	192	109	164	90.5	136
21	170	256	147	220	118	178	101	153	84.1	126
22	156	234	135	202	109	164	93.8	141	77.9	117
23	142	214	123	185	100	151	86.3	130	71.9	108
24	131	196	113	170	92.1	138	79.2	119	66.0	99.2
25	120	181	104	157	84.9	128	73.0	110	60.8	91.5
26	111	167	96.4	145	78.5	118	67.5	101	56.3	84.6
27	103	155	89.4	134	72.8	109	62.6	94.1	52.2	78.4
28	96.0	144	83.1	125	67.6	102	58.2	87.5	48.5	72.9
29	89.5	135	77.5	116	63.1	94.8	54.3	81.6	45.2	68.0
30	83.7	126	72.4	109	58.9	88.6	50.7	76.2	42.3	63.5
32	73.5	111	63.6	95.7	51.8	77.8	44.6	67.0	37.1	55.8
34	65.1	97.9	56.4	84.7	45.9	69.0	39.5	59.3	32.9	49.4
36	58.1	87.3	50.3	75.6	40.9	61.5	35.2	52.9	29.3	44.1
38			45.1	67.8	36.7	55.2	31.6	47.5	26.3	39.6
40							28.5	42.9	23.8	35.7
Properties										
A_g, in.^{2}	14.0		11.6		8.97		7.59		6.17	
I_x, in.^{4}	114		98.2		79.1		68.3		56.6	
I_y, in.^{4}	72.3		62.5		50.6		43.8		36.4	
r_y, in.	2.27		2.32		2.38		2.40		2.43	
r_x/r_y	1.26		1.25		1.25		1.25		1.25	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

F_y = 50 ksi

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

HSS8

Shape	HSS8×6×		HSS8×4×							
	3/16[c]		5/8		1/2		3/8		5/16	
t_{des}, in.	0.174		0.581		0.465		0.349		0.291	
lb/ft	17.08		42.30		35.24		27.48		23.34	
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	$\phi_c P_n$
Effective length, L_c (ft), with respect to least radius of gyration, r_y	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
0	128	192	350	526	292	438	227	341	193	289
6	122	183	297	446	250	375	196	295	167	251
7	119	180	279	420	236	355	186	280	159	238
8	117	176	261	392	221	332	175	263	149	225
9	114	172	241	362	205	309	163	245	140	210
10	111	167	221	332	189	284	151	227	130	195
11	108	162	200	301	173	260	139	209	119	179
12	104	157	180	271	156	235	126	190	109	164
13	101	151	161	241	140	211	114	172	98.5	148
14	96.9	146	142	213	125	188	102	154	88.5	133
15	93.0	140	124	186	110	165	91.0	137	78.9	119
16	88.9	134	109	163	96.6	145	80.1	120	69.7	105
17	84.6	127	96.4	145	85.6	129	71.0	107	61.7	92.7
18	79.6	120	85.9	129	76.4	115	63.3	95.1	55.0	82.7
19	74.6	112	77.1	116	68.5	103	56.8	85.4	49.4	74.2
20	69.7	105	69.6	105	61.9	93.0	51.3	77.1	44.6	67.0
21	64.9	97.6	63.1	94.9	56.1	84.3	46.5	69.9	40.4	60.8
22	60.2	90.5	57.5	86.5	51.1	76.8	42.4	63.7	36.8	55.4
23	55.7	83.7	52.6	79.1	46.8	70.3	38.8	58.3	33.7	50.7
24	51.2	77.0	48.3	72.7	43.0	64.6	35.6	53.5	31.0	46.5
25	47.2	70.9	44.6	67.0	39.6	59.5	32.8	49.3	28.5	42.9
26	43.6	65.6			36.6	55.0	30.3	45.6	26.4	39.6
27	40.5	60.8							24.5	36.8
28	37.6	56.6								
29	35.1	52.7								
30	32.8	49.3								
32	28.8	43.3								
34	25.5	38.4								
36	22.8	34.2								
38	20.4	30.7								
40	18.4	27.7								
Properties										
A_g, in.^{2}	4.67		11.7		9.74		7.58		6.43	
I_x, in.^{4}	43.7		82.0		71.8		58.7		51.0	
I_y, in.^{4}	28.2		26.6		23.6		19.6		17.2	
r_y, in.	2.46		1.51		1.56		1.61		1.63	
r_x/r_y	1.24		1.75		1.74		1.73		1.73	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Table 4-3 (continued)
Available Strength in Axial Compression, kips

F_y = 50 ksi

Rectangular HSS

HSS8–HSS7

Shape		HSS8×4×						HSS7×5×			
		1/4		3/16[c]		1/8[c]		1/2		3/8	
t_{des}, in.		0.233		0.174		0.116		0.465		0.349	
lb/ft		19.02		14.53		9.86		35.24		27.48	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	157	236	107	161	60.0	90.1	292	438	227	341
	6	137	205	96.8	146	54.2	81.5	263	395	206	309
	7	130	196	93.3	140	52.3	78.6	253	380	199	299
	8	123	185	89.3	134	50.2	75.4	242	364	191	287
	9	115	173	85.0	128	47.9	71.9	231	347	182	274
	10	107	161	80.4	121	45.4	68.2	219	328	173	260
	11	98.8	149	75.7	114	42.8	64.4	206	309	163	246
	12	90.5	136	70.1	105	40.2	60.4	192	289	154	231
	13	82.3	124	63.9	96.1	37.5	56.3	179	269	143	216
	14	74.2	112	57.9	87.0	34.8	52.3	166	249	133	200
	15	66.4	99.8	52.0	78.1	32.1	48.2	152	229	123	185
	16	58.9	88.5	46.3	69.7	29.4	44.2	139	209	113	170
	17	52.2	78.4	41.1	61.7	26.8	40.2	127	190	104	156
	18	46.5	69.9	36.6	55.0	24.5	36.8	114	172	94.2	142
	19	41.8	62.8	32.9	49.4	22.5	33.8	103	154	85.1	128
	20	37.7	56.6	29.7	44.6	20.6	31.0	92.7	139	76.8	115
	21	34.2	51.4	26.9	40.4	18.7	28.1	84.1	126	69.6	105
	22	31.1	46.8	24.5	36.8	17.0	25.6	76.6	115	63.4	95.4
	23	28.5	42.8	22.4	33.7	15.6	23.4	70.1	105	58.0	87.2
	24	26.2	39.3	20.6	31.0	14.3	21.5	64.4	96.8	53.3	80.1
	25	24.1	36.2	19.0	28.5	13.2	19.8	59.3	89.2	49.1	73.8
	26	22.3	33.5	17.6	26.4	12.2	18.3	54.9	82.5	45.4	68.3
	27	20.7	31.1	16.3	24.5	11.3	17.0	50.9	76.5	42.1	63.3
	28			15.1	22.7	10.5	15.8	47.3	71.1	39.2	58.9
	29							44.1	66.3	36.5	54.9
	30							41.2	61.9	34.1	51.3
	32									30.0	45.1

Properties

	1/4	3/16[c]	1/8[c]	1/2	3/8
A_g, in.^{2}	5.24	3.98	2.70	9.74	7.58
I_x, in.^{4}	42.5	33.1	22.9	60.6	49.5
I_y, in.^{4}	14.4	11.3	7.90	35.6	29.3
r_y, in.	1.66	1.69	1.71	1.91	1.97
r_x/r_y	1.72	1.70	1.71	1.31	1.30

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

F_y = 50 ksi

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

HSS7

Shape	HSS7×5×								HSS7×4×	
	5/16		1/4		3/16[c]		1/8[c]		1/2	
t_{des}, in.	0.291		0.233		0.174		0.116		0.465	
lb/ft	23.34		19.02		14.53		9.86		31.84	
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	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y										
0	193	289	157	236	115	173	62.6	94.1	264	396
6	175	263	143	215	107	161	59.2	88.9	224	337
7	169	254	138	208	104	156	58.0	87.1	212	318
8	162	244	133	200	101	152	56.6	85.1	198	297
9	155	233	127	191	97.3	146	55.1	82.8	183	275
10	148	222	121	182	92.8	139	53.4	80.3	168	253
11	140	210	115	173	88.0	132	51.6	77.6	153	230
12	131	197	108	163	83.1	125	49.7	74.7	138	207
13	123	185	101	152	78.0	117	47.3	71.1	123	185
14	114	172	94.6	142	72.9	110	44.8	67.4	109	164
15	106	159	87.8	132	67.8	102	42.3	63.6	95.7	144
16	97.5	146	81.0	122	62.7	94.3	39.8	59.8	84.1	126
17	89.3	134	74.4	112	57.8	86.8	37.3	56.0	74.5	112
18	81.3	122	68.0	102	52.9	79.5	34.7	52.2	66.4	99.9
19	73.6	111	61.8	92.9	48.2	72.5	32.3	48.5	59.6	89.6
20	66.4	99.9	55.8	83.9	43.6	65.6	29.8	44.8	53.8	80.9
21	60.3	90.6	50.6	76.1	39.6	59.5	27.4	41.2	48.8	73.4
22	54.9	82.5	46.1	69.3	36.1	54.2	25.0	37.5	44.5	66.8
23	50.2	75.5	42.2	63.4	33.0	49.6	22.8	34.3	40.7	61.2
24	46.1	69.4	38.7	58.2	30.3	45.6	21.0	31.5	37.4	56.2
25	42.5	63.9	35.7	53.7	27.9	42.0	19.3	29.0	34.4	51.8
26	39.3	59.1	33.0	49.6	25.8	38.8	17.9	26.8		
27	36.5	54.8	30.6	46.0	23.9	36.0	16.6	24.9		
28	33.9	51.0	28.5	42.8	22.3	33.5	15.4	23.2		
29	31.6	47.5	26.5	39.9	20.8	31.2	14.4	21.6		
30	29.5	44.4	24.8	37.3	19.4	29.2	13.4	20.2		
32	26.0	39.0	21.8	32.8	17.0	25.6	11.8	17.7		
34					15.1	22.7	10.4	15.7		
Properties										
A_g, in.^{2}	6.43		5.24		3.98		2.70		8.81	
I_x, in.^{4}	43.0		35.9		27.9		19.3		50.7	
I_y, in.^{4}	25.5		21.3		16.6		11.6		20.7	
r_y, in.	1.99		2.02		2.05		2.07		1.53	
r_x/r_y	1.30		1.30		1.29		1.29		1.57	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

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

HSS7

F_y = 50 ksi

Shape		HSS7×4×									
		3/8		5/16		1/4		3/16[c]		1/8[c]	
t_{des}, in.		0.349		0.291		0.233		0.174		0.116	
lb/ft		24.93		21.21		17.32		13.25		9.01	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	206	310	175	263	143	215	105	157	58.9	88.5
	6	177	266	151	227	124	186	93.6	141	53.1	79.8
	7	168	252	144	216	118	177	90.0	135	51.1	76.9
	8	157	236	135	203	111	167	85.1	128	49.0	73.6
	9	146	220	126	189	104	156	79.8	120	46.6	70.1
	10	135	203	117	175	96.6	145	74.2	111	44.1	66.3
	11	124	186	107	161	88.9	134	68.4	103	41.5	62.4
	12	112	169	97.6	147	81.3	122	62.7	94.2	38.8	58.4
	13	101	152	88.2	133	73.7	111	57.0	85.6	36.1	54.3
	14	90.1	135	79.0	119	66.3	99.7	51.4	77.2	33.4	50.2
	15	79.7	120	70.2	106	59.2	89.0	46.0	69.1	30.7	46.1
	16	70.0	105	61.8	92.9	52.3	78.6	40.8	61.3	28.0	42.1
	17	62.0	93.2	54.8	82.3	46.3	69.6	36.1	54.3	25.4	38.1
	18	55.3	83.2	48.9	73.4	41.3	62.1	32.2	48.4	22.6	34.0
	19	49.7	74.6	43.8	65.9	37.1	55.8	28.9	43.5	20.3	30.5
	20	44.8	67.4	39.6	59.5	33.5	50.3	26.1	39.2	18.3	27.6
	21	40.7	61.1	35.9	53.9	30.4	45.6	23.7	35.6	16.6	25.0
	22	37.0	55.7	32.7	49.2	27.7	41.6	21.6	32.4	15.2	22.8
	23	33.9	50.9	29.9	45.0	25.3	38.0	19.7	29.7	13.9	20.8
	24	31.1	46.8	27.5	41.3	23.2	34.9	18.1	27.2	12.7	19.1
	25	28.7	43.1	25.3	38.1	21.4	32.2	16.7	25.1	11.7	17.6
	26	26.5	39.9	23.4	35.2	19.8	29.8	15.4	23.2	10.8	16.3
	27					18.4	27.6	14.3	21.5	10.1	15.1
	28									9.35	14.1

Properties

	3/8	5/16	1/4	3/16[c]	1/8[c]
A_g, in.^{2}	6.88	5.85	4.77	3.63	2.46
I_x, in.^{4}	41.8	36.5	30.5	23.8	16.6
I_y, in.^{4}	17.3	15.2	12.8	10.0	7.03
r_y, in.	1.58	1.61	1.64	1.66	1.69
r_x/r_y	1.56	1.55	1.54	1.54	1.53

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

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

F_y = 50 ksi

HSS6

Shape		HSS6×5×											
		1/2		3/8		5/16		1/4		3/16		1/8[c]	
t_{des}, in.		0.465		0.349		0.291		0.233		0.174		0.116	
lb/ft		31.84		24.93		21.21		17.32		13.25		9.01	
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, L_c (ft), with respect to least radius of gyration, r_y	0	264	396	206	310	175	263	143	215	109	163	61.3	92.1
	1	263	395	205	309	175	263	142	214	108	163	61.2	92.0
	2	261	392	204	306	173	260	141	212	108	162	60.9	91.5
	3	257	386	201	302	171	257	139	210	106	160	60.4	90.7
	4	251	378	197	296	168	252	137	206	104	157	59.7	89.7
	5	245	368	192	288	163	246	134	201	102	153	58.8	88.4
	6	237	356	186	279	159	238	130	195	98.9	149	57.7	86.8
	7	228	342	179	269	153	230	125	188	95.7	144	56.5	84.9
	8	218	327	172	258	147	220	120	181	92.0	138	55.1	82.8
	9	207	311	163	246	140	210	115	173	88.0	132	53.5	80.4
	10	195	293	155	233	133	200	109	164	83.7	126	51.8	77.9
	11	183	275	146	219	125	188	103	155	79.3	119	50.0	75.1
	12	171	257	137	205	118	177	97.0	146	74.7	112	47.9	71.9
	13	159	238	127	191	110	165	90.7	136	70.0	105	45.4	68.3
	14	146	220	118	177	102	153	84.4	127	65.2	98.0	42.9	64.5
	15	134	201	108	163	93.9	141	78.0	117	60.5	90.9	40.3	60.6
	16	122	183	99.2	149	86.2	130	71.8	108	55.8	83.8	37.8	56.8
	17	110	166	90.2	136	78.7	118	65.7	98.8	51.2	76.9	35.2	52.9
	18	99.3	149	81.6	123	71.4	107	59.8	89.9	46.7	70.2	32.2	48.4
	19	89.1	134	73.3	110	64.3	96.7	54.1	81.3	42.4	63.7	29.3	44.0
	20	80.4	121	66.2	99.5	58.0	87.2	48.8	73.3	38.3	57.5	26.5	39.8
	21	72.9	110	60.0	90.2	52.7	79.1	44.3	66.5	34.7	52.2	24.0	36.1
	22	66.4	99.9	54.7	82.2	48.0	72.1	40.3	60.6	31.6	47.5	21.9	32.9
	23	60.8	91.4	50.0	75.2	43.9	66.0	36.9	55.5	28.9	43.5	20.0	30.1
	24	55.8	83.9	46.0	69.1	40.3	60.6	33.9	50.9	26.6	39.9	18.4	27.6
	25	51.5	77.3	42.4	63.7	37.2	55.8	31.2	46.9	24.5	36.8	16.9	25.4
	26	47.6	71.5	39.2	58.9	34.3	51.6	28.9	43.4	22.6	34.0	15.7	23.5
	27	44.1	66.3	36.3	54.6	31.9	47.9	26.8	40.2	21.0	31.6	14.5	21.8
	28	41.0	61.6	33.8	50.8	29.6	44.5	24.9	37.4	19.5	29.3	13.5	20.3
	29	38.2	57.5	31.5	47.3	27.6	41.5	23.2	34.9	18.2	27.4	12.6	18.9
	30	35.7	53.7	29.4	44.2	25.8	38.8	21.7	32.6	17.0	25.6	11.8	17.7

Properties

	1/2	3/8	5/16	1/4	3/16	1/8
A_g, in.^{2}	8.81	6.88	5.85	4.77	3.63	2.46
I_x, in.^{4}	41.1	33.9	29.6	24.7	19.3	13.4
I_y, in.^{4}	30.8	25.5	22.3	18.7	14.6	10.2
r_y, in.	1.87	1.92	1.95	1.98	2.01	2.03
r_x/r_y	1.16	1.16	1.15	1.15	1.15	1.15

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

HSS6

F_y = 50 ksi

Shape	HSS6×4×											
	1/2		3/8		5/16		1/4		3/16		1/8[c]	
t_{des}, in.	0.465		0.349		0.291		0.233		0.174		0.116	
lb/ft	28.43		22.37		19.08		15.62		11.97		8.16	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	236	355	185	278	157	237	129	193	98.2	148	57.9	87.0
1	235	353	184	277	157	236	128	193	97.8	147	57.7	86.7
2	232	348	182	273	155	233	127	190	96.7	145	57.2	85.9
3	226	340	178	267	152	228	124	187	94.8	142	56.3	84.6
4	219	329	173	259	147	221	121	181	92.2	139	55.1	82.8
5	210	315	166	249	142	213	116	175	88.9	134	53.6	80.6
6	199	300	158	238	135	203	111	167	85.1	128	51.9	77.9
7	188	282	149	224	128	193	106	159	80.9	122	49.8	74.9
8	175	263	140	210	120	181	99.3	149	76.2	115	47.6	71.5
9	161	243	130	195	112	168	92.6	139	71.2	107	45.2	67.9
10	148	222	119	179	103	155	85.8	129	66.1	99.3	42.6	64.1
11	134	201	109	164	94.5	142	78.8	118	60.8	91.4	39.9	60.0
12	120	181	98.4	148	85.8	129	71.7	108	55.5	83.4	37.2	55.9
13	107	161	88.2	133	77.2	116	64.8	97.4	50.3	75.5	34.4	51.8
14	94.3	142	78.4	118	68.9	104	58.1	87.3	45.2	67.9	31.6	47.5
15	82.3	124	68.9	104	60.9	91.6	51.6	77.6	40.3	60.5	28.3	42.5
16	72.3	109	60.5	91.0	53.5	80.5	45.4	68.3	35.5	53.4	25.1	37.7
17	64.0	96.2	53.6	80.6	47.4	71.3	40.3	60.5	31.5	47.3	22.2	33.4
18	57.1	85.9	47.8	71.9	42.3	63.6	35.9	54.0	28.1	42.2	19.8	29.8
19	51.3	77.1	42.9	64.5	38.0	57.1	32.2	48.4	25.2	37.9	17.8	26.7
20	46.3	69.5	38.7	58.2	34.3	51.5	29.1	43.7	22.7	34.2	16.0	24.1
21	42.0	63.1	35.1	52.8	31.1	46.7	26.4	39.7	20.6	31.0	14.5	21.9
22	38.2	57.5	32.0	48.1	28.3	42.6	24.0	36.1	18.8	28.2	13.3	19.9
23	35.0	52.6	29.3	44.0	25.9	38.9	22.0	33.1	17.2	25.8	12.1	18.2
24	32.1	48.3	26.9	40.4	23.8	35.8	20.2	30.4	15.8	23.7	11.1	16.7
25	29.6	44.5	24.8	37.3	21.9	33.0	18.6	28.0	14.6	21.9	10.3	15.4
26					20.3	30.5	17.2	25.9	13.5	20.2	9.49	14.3
27									12.5	18.8	8.80	13.2
Properties												
A_g, in.^{2}	7.88		6.18		5.26		4.30		3.28		2.23	
I_x, in.^{4}	34.0		28.3		24.8		20.9		16.4		11.4	
I_y, in.^{4}	17.8		14.9		13.2		11.1		8.76		6.15	
r_y, in.	1.50		1.55		1.58		1.61		1.63		1.66	
r_x/r_y	1.39		1.38		1.37		1.37		1.37		1.36	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

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

F_y = 50 ksi

HSS6

Shape		HSS6×3×											
		1/2		3/8		5/16		1/4		3/16		1/8[c]	
t_{des}, in.		0.465		0.349		0.291		0.233		0.174		0.116	
lb/ft		25.03		19.82		16.96		13.91		10.70		7.31	
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, L_c (ft), with respect to least radius of gyration, r_y	0	208	313	164	247	140	211	115	173	87.7	132	51.0	76.7
	1	206	310	163	245	139	209	114	172	87.1	131	50.7	76.3
	2	201	302	159	239	136	204	112	168	85.4	128	50.0	75.1
	3	193	290	153	230	131	197	108	162	82.6	124	48.7	73.2
	4	182	273	145	218	124	187	103	154	78.8	118	47.0	70.7
	5	169	254	135	203	116	175	96.3	145	74.1	111	44.9	67.6
	6	154	231	124	187	107	161	89.1	134	68.8	103	42.5	63.9
	7	138	207	113	169	97.3	146	81.3	122	63.1	94.8	39.8	59.8
	8	122	183	100	151	87.1	131	73.1	110	57.0	85.7	36.9	55.4
	9	105	158	88.0	132	76.7	115	64.8	97.4	50.8	76.4	33.8	50.8
	10	89.9	135	76.0	114	66.6	100	56.7	85.2	44.7	67.2	30.6	46.1
	11	75.2	113	64.7	97.2	57.0	85.7	48.8	73.4	38.8	58.3	27.2	40.9
	12	63.2	95.0	54.4	81.7	48.0	72.2	41.4	62.3	33.2	49.9	23.4	35.2
	13	53.8	80.9	46.3	69.6	40.9	61.5	35.3	53.1	28.3	42.5	19.9	29.9
	14	46.4	69.8	39.9	60.0	35.3	53.0	30.4	45.7	24.4	36.6	17.2	25.8
	15	40.4	60.8	34.8	52.3	30.7	46.2	26.5	39.9	21.2	31.9	15.0	22.5
	16	35.5	53.4	30.6	46.0	27.0	40.6	23.3	35.0	18.7	28.1	13.2	19.8
	17	31.5	47.3	27.1	40.7	23.9	36.0	20.6	31.0	16.5	24.9	11.7	17.5
	18	28.1	42.2	24.2	36.3	21.4	32.1	18.4	27.7	14.7	22.2	10.4	15.6
	19			21.7	32.6	19.2	28.8	16.5	24.8	13.2	19.9	9.33	14.0
	20							14.9	22.4	11.9	18.0	8.42	12.7
	21											7.64	11.5
Properties													
A_g, in.^{2}		6.95		5.48		4.68		3.84		2.93		2.00	
I_x, in.^{4}		26.8		22.7		20.1		17.0		13.4		9.43	
I_y, in.^{4}		8.69		7.48		6.67		5.70		4.55		3.23	
r_y, in.		1.12		1.17		1.19		1.22		1.25		1.27	
r_x/r_y		1.76		1.74		1.74		1.72		1.71		1.71	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

HSS5

Table 4-3 (continued)
Available Strength in Axial Compression, kips

F_y = 50 ksi

Rectangular HSS

Shape		HSS5×4×											
		1/2		3/8		5/16		1/4		3/16		1/8[c]	
t_{des}, in.		0.465		0.349		0.291		0.233		0.174		0.116	
lb/ft		25.03		19.82		16.96		13.91		10.70		7.31	
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, L_c (ft), with respect to least radius of gyration, r_y	0	208	313	164	247	140	211	115	173	87.7	132	56.4	84.8
	1	207	311	163	245	139	210	114	172	87.4	131	56.2	84.5
	2	204	307	161	242	138	207	113	170	86.3	130	55.7	83.6
	3	199	299	157	237	135	202	111	166	84.5	127	54.7	82.3
	4	192	289	153	229	131	196	107	161	82.1	123	53.5	80.4
	5	184	276	146	220	125	188	103	155	79.2	119	51.9	78.0
	6	174	262	139	209	119	179	98.6	148	75.7	114	50.1	75.2
	7	163	246	131	197	113	169	93.3	140	71.7	108	48.0	72.1
	8	152	228	123	184	105	159	87.5	131	67.4	101	45.6	68.6
	9	139	210	113	170	97.8	147	81.3	122	62.9	94.5	43.1	64.8
	10	127	191	104	156	89.9	135	75.0	113	58.1	87.4	40.1	60.3
	11	114	172	94.5	142	81.9	123	68.6	103	53.3	80.2	36.9	55.4
	12	102	154	85.1	128	73.9	111	62.2	93.4	48.5	72.9	33.6	50.5
	13	90.3	136	76.0	114	66.2	99.5	55.9	84.0	43.8	65.8	30.4	45.7
	14	78.9	119	67.2	101	58.7	88.2	49.8	74.8	39.2	58.9	27.3	41.0
	15	68.7	103	58.7	88.3	51.5	77.4	43.9	66.0	34.8	52.3	24.3	36.5
	16	60.4	90.8	51.6	77.6	45.3	68.0	38.6	58.0	30.6	46.0	21.4	32.2
	17	53.5	80.4	45.7	68.7	40.1	60.3	34.2	51.4	27.1	40.7	19.0	28.5
	18	47.7	71.7	40.8	61.3	35.8	53.7	30.5	45.8	24.2	36.3	16.9	25.4
	19	42.8	64.4	36.6	55.0	32.1	48.2	27.4	41.1	21.7	32.6	15.2	22.8
	20	38.7	58.1	33.0	49.7	29.0	43.5	24.7	37.1	19.6	29.4	13.7	20.6
	21	35.1	52.7	30.0	45.0	26.3	39.5	22.4	33.7	17.8	26.7	12.4	18.7
	22	31.9	48.0	27.3	41.0	23.9	36.0	20.4	30.7	16.2	24.3	11.3	17.0
	23	29.2	43.9	25.0	37.5	21.9	32.9	18.7	28.1	14.8	22.2	10.4	15.6
	24	26.8	40.4	22.9	34.5	20.1	30.2	17.2	25.8	13.6	20.4	9.51	14.3
	25			21.1	31.8	18.5	27.9	15.8	23.8	12.5	18.8	8.77	13.2
	26							14.6	22.0	11.6	17.4	8.10	12.2
	27											7.52	11.3
Properties													
A_g, in.^{2}		6.95		5.48		4.68		3.84		2.93		2.00	
I_x, in.^{4}		21.2		17.9		15.8		13.4		10.6		7.42	
I_y, in.^{4}		14.9		12.6		11.1		9.46		7.48		5.27	
r_y, in.		1.46		1.52		1.54		1.57		1.60		1.62	
r_x/r_y		1.20		1.19		1.19		1.19		1.19		1.19	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

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

F_y = 50 ksi

HSS5

Shape		HSS5×3×											
		1/2		3/8		5/16		1/4		3/16		1/8[c]	
t_{des}, in.		0.465		0.349		0.291		0.233		0.174		0.116	
lb/ft		21.63		17.27		14.83		12.21		9.42		6.46	
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, L_c (ft), with respect to least radius of gyration, r_y	0	180	271	143	215	123	184	101	152	77.2	116	49.5	74.4
	1	179	269	142	213	122	183	100	151	76.7	115	49.2	74.0
	2	174	261	139	208	119	179	97.9	147	75.1	113	48.5	72.8
	3	166	250	133	200	115	172	94.4	142	72.5	109	47.2	70.9
	4	156	235	126	189	109	163	89.6	135	69.0	104	45.4	68.3
	5	144	217	117	176	101	152	83.8	126	64.7	97.3	43.3	65.0
	6	131	197	107	161	93.1	140	77.2	116	59.9	90.0	40.8	61.3
	7	117	175	96.2	145	84.2	127	70.1	105	54.6	82.1	38.0	57.1
	8	102	154	85.2	128	75.0	113	62.7	94.2	49.1	73.8	34.4	51.7
	9	87.9	132	74.2	112	65.8	99.0	55.2	83.0	43.6	65.5	30.7	46.1
	10	74.3	112	63.7	95.7	56.9	85.5	48.0	72.1	38.1	57.2	27.0	40.6
	11	61.7	92.7	53.6	80.5	48.4	72.7	41.0	61.7	32.8	49.3	23.4	35.2
	12	51.8	77.9	45.0	67.7	40.7	61.1	34.6	52.0	27.8	41.8	20.0	30.1
	13	44.2	66.4	38.4	57.7	34.7	52.1	29.5	44.3	23.7	35.6	17.1	25.7
	14	38.1	57.2	33.1	49.7	29.9	44.9	25.4	38.2	20.5	30.7	14.7	22.1
	15	33.2	49.9	28.8	43.3	26.0	39.1	22.1	33.3	17.8	26.8	12.8	19.3
	16	29.2	43.8	25.3	38.1	22.9	34.4	19.5	29.2	15.7	23.5	11.3	16.9
	17	25.8	38.8	22.4	33.7	20.3	30.5	17.2	25.9	13.9	20.8	9.99	15.0
	18	23.0	34.6	20.0	30.1	18.1	27.2	15.4	23.1	12.4	18.6	8.91	13.4
	19			18.0	27.0	16.2	24.4	13.8	20.7	11.1	16.7	8.00	12.0
	20									10.0	15.1	7.22	10.8
Properties													
A_g, in.^{2}		6.02		4.78		4.10		3.37		2.58		1.77	
I_x, in.^{4}		16.4		14.1		12.6		10.7		8.53		6.03	
I_y, in.^{4}		7.18		6.25		5.60		4.81		3.85		2.75	
r_y, in.		1.09		1.14		1.17		1.19		1.22		1.25	
r_x/r_y		1.51		1.51		1.50		1.50		1.49		1.48	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r_y equal to or greater than 200.

Table 4-3 (continued)
Available Strength in Axial Compression, kips

HSS5–HSS4

$F_y = 50$ ksi

Rectangular HSS

Shape	HSS5×2 1/2×						HSS4×3×					
	1/4		3/16		1/8[c]		3/8		5/16		1/4	
t_{des}, in.	0.233		0.174		0.116		0.349		0.291		0.233	
lb/ft	11.36		8.78		6.03		14.72		12.70		10.51	
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, L_c (ft), with respect to least radius of gyration, r_y: 0	94.0	141	72.2	108	45.9	69.0	122	184	105	158	87.1	131
1	93.0	140	71.4	107	45.6	68.5	121	182	105	157	86.4	130
2	90.1	135	69.3	104	44.6	67.0	118	178	102	153	84.4	127
3	85.5	129	65.9	99.0	42.9	64.5	113	170	97.9	147	81.2	122
4	79.4	119	61.4	92.2	40.7	61.2	107	161	92.4	139	76.9	116
5	72.2	109	56.0	84.2	38.1	57.2	98.9	149	85.8	129	71.6	108
6	64.3	96.6	50.1	75.3	35.0	52.6	90.0	135	78.3	118	65.7	98.8
7	56.1	84.3	43.9	66.0	30.9	46.5	80.6	121	70.4	106	59.4	89.2
8	47.9	71.9	37.8	56.7	26.8	40.3	70.9	107	62.2	93.4	52.8	79.4
9	40.0	60.1	31.8	47.8	22.8	34.3	61.3	92.1	54.0	81.2	46.2	69.5
10	32.7	49.2	26.2	39.3	19.0	28.5	52.1	78.3	46.2	69.4	39.8	59.9
11	27.0	40.6	21.6	32.5	15.7	23.6	43.5	65.3	38.8	58.3	33.8	50.8
12	22.7	34.1	18.2	27.3	13.2	19.8	36.5	54.9	32.6	49.0	28.4	42.7
13	19.4	29.1	15.5	23.3	11.2	16.9	31.1	46.8	27.8	41.7	24.2	36.3
14	16.7	25.1	13.4	20.1	9.69	14.6	26.8	40.3	23.9	36.0	20.9	31.3
15	14.5	21.9	11.6	17.5	8.44	12.7	23.4	35.1	20.9	31.3	18.2	27.3
16	12.8	19.2	10.2	15.4	7.42	11.1	20.5	30.9	18.3	27.5	16.0	24.0
17			9.06	13.6	6.57	9.88	18.2	27.4	16.2	24.4	14.1	21.3
18							16.2	24.4	14.5	21.8	12.6	19.0
19											11.3	17.0

Properties

	HSS5×2 1/2×1/4	HSS5×2 1/2×3/16	HSS5×2 1/2×1/8	HSS4×3×3/8	HSS4×3×5/16	HSS4×3×1/4
A_g, in.^{2}	3.14	2.41	1.65	4.09	3.52	2.91
I_x, in.^{4}	9.40	7.51	5.34	7.93	7.14	6.15
I_y, in.^{4}	3.13	2.53	1.82	5.01	4.52	3.91
r_y, in.	0.999	1.02	1.05	1.11	1.13	1.16
r_x/r_y	1.73	1.74	1.71	1.25	1.26	1.25

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

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

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

F_y = 50 ksi

HSS4

Shape		HSS4×3×				HSS4×2½×							
		3/16		1/8		3/8		5/16		1/4		3/16	
t_{des}, in.		0.174		0.116		0.349		0.291		0.233		0.174	
lb/ft		8.15		5.61		13.44		11.64		9.66		7.51	
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, L_c (ft), with respect to least radius of gyration, r_y	0	67.1	101	46.1	69.3	112	168	96.7	145	79.9	120	61.7	92.7
	1	66.6	100	45.8	68.8	111	166	95.6	144	79.1	119	61.0	91.7
	2	65.1	97.8	44.8	67.3	107	160	92.3	139	76.5	115	59.1	88.9
	3	62.7	94.3	43.2	65.0	100	151	87.0	131	72.3	109	56.1	84.3
	4	59.5	89.5	41.1	61.8	91.8	138	80.1	120	66.9	101	52.1	78.3
	5	55.7	83.7	38.5	57.9	82.2	123	72.1	108	60.5	91.0	47.4	71.2
	6	51.3	77.1	35.6	53.5	71.7	108	63.4	95.2	53.6	80.5	42.2	63.4
	7	46.6	70.0	32.4	48.7	61.0	91.7	54.4	81.8	46.4	69.7	36.8	55.3
	8	41.7	62.6	29.1	43.7	50.7	76.2	45.6	68.6	39.2	59.0	31.4	47.2
	9	36.7	55.2	25.8	38.7	41.0	61.6	37.3	56.1	32.5	48.8	26.2	39.4
	10	31.9	47.9	22.5	33.8	33.2	49.9	30.2	45.4	26.4	39.7	21.5	32.3
	11	27.3	41.0	19.3	29.0	27.4	41.2	25.0	37.6	21.8	32.8	17.7	26.7
	12	23.0	34.6	16.3	24.6	23.0	34.6	21.0	31.6	18.3	27.5	14.9	22.4
	13	19.6	29.4	13.9	20.9	19.6	29.5	17.9	26.9	15.6	23.5	12.7	19.1
	14	16.9	25.4	12.0	18.0	16.9	25.4	15.4	23.2	13.5	20.2	10.9	16.5
	15	14.7	22.1	10.5	15.7	14.7	22.2	13.4	20.2	11.7	17.6	9.54	14.3
	16	12.9	19.4	9.19	13.8					10.3	15.5	8.38	12.6
	17	11.5	17.2	8.14	12.2								
	18	10.2	15.4	7.26	10.9								
	19	9.17	13.8	6.52	9.80								
	20			5.88	8.84								
Properties													
A_g, in.^{2}		2.24		1.54		3.74		3.23		2.67		2.06	
I_x, in.^{4}		4.93		3.52		6.77		6.13		5.32		4.30	
I_y, in.^{4}		3.16		2.27		3.17		2.89		2.53		2.06	
r_y, in.		1.19		1.21		0.922		0.947		0.973		0.999	
r_x/r_y		1.25		1.26		1.46		1.46		1.45		1.44	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

HSS4

Table 4-3 (continued)
Available Strength in Axial Compression, kips

F_y = 50 ksi

Rectangular HSS

Shape	HSS4×2½×		HSS4×2×									
	1/8		3/8		5/16		1/4		3/16		1/8	
t_{des}, in.	0.116		0.349		0.291		0.233		0.174		0.116	
lb/ft	5.18		12.17		10.58		8.81		6.87		4.75	
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, L_c (ft), with respect to least radius of gyration, r_y												
0	42.5	63.9	101	153	88.0	132	73.1	110	56.6	85.0	38.9	58.5
1	42.1	63.3	99.5	150	86.4	130	71.8	108	55.7	83.7	38.3	57.6
2	40.9	61.4	93.8	141	81.7	123	68.2	102	53.0	79.7	36.6	55.0
3	38.9	58.4	84.9	128	74.5	112	62.5	93.9	48.9	73.5	33.9	51.0
4	36.3	54.5	73.9	111	65.5	98.4	55.3	83.2	43.6	65.5	30.5	45.8
5	33.2	49.9	61.9	93.0	55.4	83.3	47.3	71.2	37.7	56.6	26.6	39.9
6	29.7	44.7	49.7	74.8	45.2	67.9	39.1	58.8	31.5	47.3	22.5	33.7
7	26.1	39.3	38.4	57.7	35.5	53.4	31.2	46.9	25.5	38.3	18.4	27.7
8	22.5	33.9	29.4	44.2	27.3	41.0	24.1	36.3	19.9	29.9	14.6	22.0
9	19.0	28.6	23.2	34.9	21.5	32.4	19.1	28.7	15.7	23.7	11.5	17.3
10	15.7	23.6	18.8	28.3	17.4	26.2	15.5	23.2	12.8	19.2	9.35	14.1
11	13.0	19.5	15.5	23.4	14.4	21.7	12.8	19.2	10.5	15.8	7.73	11.6
12	10.9	16.4	13.1	19.6	12.1	18.2	10.7	16.1	8.86	13.3	6.49	9.76
13	9.30	14.0					9.15	13.7	7.55	11.3	5.53	8.31
14	8.02	12.1										
15	6.99	10.5										
16	6.14	9.23										
17	5.44	8.18										
Properties												
A_g, in.^{2}	1.42		3.39		2.94		2.44		1.89		1.30	
I_x, in.^{4}	3.09		5.60		5.13		4.49		3.66		2.65	
I_y, in.^{4}	1.49		1.80		1.67		1.48		1.22		0.898	
r_y, in.	1.03		0.729		0.754		0.779		0.804		0.830	
r_x/r_y	1.43		1.77		1.75		1.75		1.73		1.72	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

F_y = 50 ksi

Table 4-4
Available Strength in Axial Compression, kips
Square HSS

HSS16–HSS14

Shape		HSS16×16×						HSS14×14×					
		1/2		3/8[c]		5/16[c]		5/8		1/2		3/8[c]	
t_{des}, in.		0.465		0.349		0.291		0.581		0.465		0.349	
lb/ft		103.30		78.52		65.87		110.36		89.68		68.31	
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, L_c (ft), with respect to least radius of gyration, r_y	0	847	1270	549	825	403	606	907	1360	737	1110	527	792
	6	839	1260	546	820	401	603	896	1350	727	1090	522	785
	7	836	1260	544	818	400	601	892	1340	724	1090	521	783
	8	833	1250	543	816	399	600	887	1330	720	1080	519	780
	9	829	1250	541	814	398	598	881	1320	716	1080	517	777
	10	825	1240	540	811	397	596	875	1320	711	1070	515	773
	11	821	1230	538	808	395	594	869	1310	706	1060	512	770
	12	816	1230	536	805	394	592	862	1300	700	1050	509	765
	13	810	1220	533	802	392	590	854	1280	694	1040	506	761
	14	805	1210	531	798	391	587	846	1270	688	1030	503	756
	15	798	1200	528	794	389	585	837	1260	681	1020	500	751
	16	792	1190	526	790	387	582	828	1240	674	1010	496	746
	17	785	1180	523	786	385	578	819	1230	666	1000	492	740
	18	778	1170	520	781	383	575	808	1220	658	989	488	734
	19	770	1160	516	776	380	572	798	1200	649	976	484	727
	20	762	1150	513	771	378	568	787	1180	640	963	480	721
	21	754	1130	509	765	375	564	775	1170	631	949	475	714
	22	746	1120	506	760	373	560	764	1150	622	935	470	707
	23	737	1110	502	754	370	556	752	1130	612	920	465	699
	24	728	1090	498	748	367	552	739	1110	602	905	460	691
	25	718	1080	493	742	364	548	726	1090	592	890	452	680
	26	709	1070	489	735	361	543	713	1070	582	874	444	668
	27	699	1050	485	729	358	538	700	1050	571	858	436	656
	28	689	1040	480	722	355	534	686	1030	560	842	428	644
	29	678	1020	475	715	352	529	673	1010	549	825	420	631
	30	668	1000	471	707	348	523	659	990	538	808	412	619
	32	646	971	460	692	341	513	630	947	515	774	395	593
	34	624	938	450	676	334	502	601	904	492	739	377	567
	36	601	904	439	660	326	490	572	860	468	704	360	540
	38	578	869	428	643	318	478	543	816	445	668	342	514
	40	555	834	416	625	310	466	513	772	421	633	324	487

Properties

	HSS16×16×1/2	HSS16×16×3/8	HSS16×16×5/16	HSS14×14×5/8	HSS14×14×1/2	HSS14×14×3/8
A_g, in.^{2}	28.3	21.5	18.1	30.3	24.6	18.7
$I_x = I_y$, in.^{4}	1130	873	739	897	743	577
$r_x = r_y$, in.	6.31	6.37	6.39	5.44	5.49	5.55

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

F_y = 50 ksi

HSS14–HSS12

Square HSS

Shape		HSS14×14×		HSS12×12×									
		5/16[c]		5/8		1/2		3/8		5/16[c]		1/4[c]	
t_{des}, in.		0.291		0.581		0.465		0.349		0.291		0.233	
lb/ft		57.36		93.34		76.07		58.10		48.86		39.43	
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, L_c (ft), with respect to least radius of gyration, r_y	0	388	584	769	1160	626	940	479	720	372	559	253	380
	6	385	579	756	1140	615	924	471	708	368	552	250	376
	7	384	577	751	1130	611	919	468	704	366	550	249	375
	8	383	576	746	1120	607	912	465	699	364	548	248	373
	9	382	573	739	1110	602	905	461	693	362	545	247	371
	10	380	571	732	1100	596	896	457	687	360	541	246	369
	11	378	568	725	1090	590	887	453	680	358	538	244	367
	12	376	566	717	1080	584	878	448	673	355	534	242	364
	13	374	563	708	1060	577	867	442	665	352	530	241	362
	14	372	559	699	1050	569	856	437	657	349	525	239	359
	15	370	556	689	1040	562	844	431	648	346	520	237	356
	16	367	552	678	1020	553	832	425	638	343	515	235	353
	17	365	548	667	1000	545	819	418	628	339	510	232	349
	18	362	544	656	986	535	805	411	618	335	504	230	346
	19	359	539	644	968	526	791	404	608	331	498	227	342
	20	356	535	632	949	516	776	397	596	327	492	225	338
	21	353	530	619	930	506	761	389	585	323	485	222	334
	22	349	525	606	911	496	745	381	573	319	479	219	330
	23	346	520	593	891	485	729	373	561	314	472	216	325
	24	342	514	579	870	474	713	365	549	307	461	213	321
	25	338	509	565	850	463	696	357	537	300	451	210	316
	26	335	503	551	829	452	680	349	524	293	440	207	311
	27	331	497	537	807	441	662	340	511	286	430	204	306
	28	327	491	523	786	429	645	331	498	279	419	200	301
	29	322	484	508	764	418	628	322	485	271	408	197	296
	30	318	478	494	742	406	610	314	471	264	397	194	291
	32	309	465	464	698	382	575	296	445	249	375	186	280
	34	300	451	435	654	359	540	278	418	234	352	179	269
	36	291	437	406	610	336	504	260	391	220	330	171	257
	38	281	422	377	567	313	470	243	365	205	308	163	246
	40	271	407	349	525	290	436	226	339	191	287	155	233

Properties

	HSS14×14×5/16	HSS12×12×5/8	HSS12×12×1/2	HSS12×12×3/8	HSS12×12×5/16	HSS12×12×1/4
A_g, in.^{2}	15.7	25.7	20.9	16.0	13.4	10.8
$I_x = I_y$, in.^{4}	490	548	457	357	304	248
$r_x = r_y$, in.	5.58	4.62	4.68	4.73	4.76	4.79

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Square HSS

F_y = 50 ksi

HSS12–HSS10

Shape	HSS12×12×		HSS10×10×									
	3/16[c]		5/8		1/2		3/8		5/16		1/4[c]	
t_{des}, in.	0.174		0.581		0.465		0.349		0.291		0.233	
lb/ft	29.84		76.33		62.46		47.90		40.35		32.63	
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, L_c (ft), with respect to least radius of gyration, r_y: 0	149	225	629	945	515	774	395	594	332	499	241	362
6	148	223	612	921	502	755	386	580	324	487	237	357
7	148	222	607	912	497	748	382	574	321	483	236	354
8	147	221	600	902	492	740	378	569	318	478	234	352
9	146	220	593	891	486	731	374	562	315	473	232	349
10	146	219	585	879	480	721	369	555	311	467	231	346
11	145	217	576	865	473	711	364	547	306	460	228	343
12	144	216	566	851	465	699	358	538	301	453	226	340
13	143	215	556	835	457	687	352	529	296	445	223	336
14	142	213	545	819	448	674	346	519	291	437	221	332
15	141	211	534	802	439	660	339	509	285	429	218	327
16	139	210	522	784	430	646	332	498	279	420	215	323
17	138	208	509	765	420	631	324	487	273	411	212	318
18	137	206	496	746	410	616	317	476	267	401	208	313
19	136	204	483	726	399	600	309	464	260	391	205	308
20	134	202	470	706	388	583	300	452	253	381	201	302
21	133	199	456	685	377	567	292	439	246	370	197	297
22	131	197	442	664	366	550	284	426	239	360	193	291
23	129	195	428	643	354	533	275	413	232	349	188	283
24	128	192	413	621	343	515	266	400	225	338	183	274
25	126	190	399	599	331	498	258	387	218	327	177	266
26	124	187	384	577	319	480	249	374	210	316	171	257
27	123	184	370	555	308	462	240	360	203	305	165	248
28	121	181	355	534	296	445	231	347	195	293	159	239
29	119	179	341	512	284	427	222	334	188	282	153	230
30	117	176	326	490	273	410	213	321	180	271	147	221
32	113	170	298	448	250	375	196	294	166	249	135	203
34	109	163	271	407	228	342	179	269	152	228	124	186
36	105	157	244	367	206	310	163	244	138	207	113	170
38	100	151	219	329	185	278	147	220	125	187	102	153
40	95.9	144	198	297	167	251	132	199	112	169	92.1	138

Properties

	HSS12×12×3/16	HSS10×10×5/8	HSS10×10×1/2	HSS10×10×3/8	HSS10×10×5/16	HSS10×10×1/4
A_g, in.^{2}	8.15	21.0	17.2	13.2	11.1	8.96
$I_x = I_y$, in.^{4}	189	304	256	202	172	141
$r_x = r_y$, in.	4.82	3.80	3.86	3.92	3.94	3.97

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

HSS10–HSS9

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

$F_y = 50$ ksi

Shape		HSS10×10×		HSS9×9×									
		3/16[c]		5/8		1/2		3/8		5/16		1/4[c]	
t_{des}, in.		0.174		0.581		0.465		0.349		0.291		0.233	
lb/ft		24.73		67.82		55.66		42.79		36.10		29.23	
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, L_c (ft), with respect to least radius of gyration, r_y	0	145	218	560	841	458	688	353	531	297	446	233	350
	6	143	215	542	814	444	667	343	515	288	433	228	342
	7	142	213	535	805	439	659	339	509	285	428	226	340
	8	141	212	528	794	433	651	334	503	281	423	224	337
	9	140	211	520	782	426	641	330	495	277	417	222	334
	10	139	209	511	768	419	630	324	488	273	410	220	330
	11	138	207	501	754	412	619	319	479	268	403	217	326
	12	137	205	491	738	403	606	312	470	263	396	213	321
	13	135	203	480	721	394	593	306	460	258	387	209	314
	14	134	201	468	704	385	579	299	449	252	379	204	307
	15	132	199	456	686	375	564	291	438	246	370	199	300
	16	130	196	443	666	365	549	284	427	240	360	194	292
	17	129	193	430	647	355	533	276	415	233	350	189	284
	18	127	191	417	626	344	517	268	403	226	340	184	276
	19	125	188	403	606	333	500	260	390	219	330	178	268
	20	123	185	389	585	322	483	251	377	212	319	172	259
	21	121	182	375	563	310	466	242	364	205	308	167	251
	22	119	178	360	542	299	449	234	351	198	297	161	242
	23	116	175	346	520	287	431	225	338	190	286	155	233
	24	114	172	331	498	275	414	216	325	183	275	149	224
	25	112	168	317	476	264	396	207	311	176	264	143	215
	26	109	164	302	455	252	379	198	298	168	253	137	206
	27	107	161	288	433	240	361	189	285	161	242	131	197
	28	105	157	274	412	229	344	181	272	154	231	125	188
	29	102	153	260	391	218	327	172	259	147	220	120	180
	30	99.4	149	247	371	207	311	164	246	139	210	114	171
	32	94.2	142	220	331	185	278	147	221	126	189	103	154
	34	88.8	134	195	293	164	247	131	197	112	169	91.9	138
	36	83.4	125	174	262	147	220	117	176	100	150	82.0	123
	38	78.0	117	156	235	132	198	105	158	89.9	135	73.6	111
	40	70.6	106	141	212	119	179	94.8	143	81.1	122	66.4	99.8

Properties

	HSS10×10×3/16	HSS9×9×5/8	HSS9×9×1/2	HSS9×9×3/8	HSS9×9×5/16	HSS9×9×1/4
A_g, in.^{2}	6.76	18.7	15.3	11.8	9.92	8.03
$I_x = I_y$, in.^{4}	108	216	183	145	124	102
$r_x = r_y$, in.	4.00	3.40	3.45	3.51	3.54	3.56

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

F_y = 50 ksi

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

HSS9–HSS8

Shape		HSS9×9×				HSS8×8×							
		3/16[c]		1/8[c]		5/8		1/2		3/8		5/16	
t_{des}, in.		0.174		0.116		0.581		0.465		0.349		0.291	
lb/ft		22.18		14.96		59.32		48.85		37.69		31.84	
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, L_c (ft), with respect to least radius of gyration, r_y	0	141	213	68.0	102	491	738	404	607	311	468	262	394
	6	139	209	66.8	100	471	707	388	583	299	450	252	379
	7	138	207	66.4	99.8	463	697	382	575	295	444	249	374
	8	137	206	65.9	99.1	455	684	376	565	290	436	245	368
	9	136	204	65.4	98.3	446	671	369	554	285	428	240	361
	10	134	202	64.8	97.4	436	656	361	542	279	419	236	354
	11	133	200	64.2	96.5	426	640	352	529	273	410	230	346
	12	131	197	63.5	95.4	414	623	343	516	266	400	225	338
	13	130	195	62.8	94.3	402	605	333	501	259	389	219	329
	14	128	192	62.0	93.1	390	586	323	486	251	378	212	319
	15	126	189	61.1	91.8	377	566	313	470	243	366	206	310
	16	124	186	60.2	90.5	363	546	302	454	235	354	199	299
	17	122	183	59.3	89.1	349	525	291	437	227	341	192	289
	18	119	179	58.3	87.6	335	504	279	420	218	328	185	278
	19	117	176	57.3	86.1	321	482	268	403	210	315	178	267
	20	115	172	56.2	84.5	307	461	256	385	201	302	171	256
	21	112	169	55.1	82.8	292	439	245	368	192	289	163	245
	22	110	165	54.0	81.1	278	417	233	350	183	275	156	234
	23	107	161	52.8	79.4	263	396	221	333	174	262	149	223
	24	104	157	51.6	77.6	249	374	210	315	166	249	141	212
	25	101	152	50.4	75.8	235	353	198	298	157	236	134	201
	26	98.6	148	49.2	73.9	221	333	187	281	148	223	127	191
	27	95.8	144	47.9	72.0	208	313	176	265	140	211	120	180
	28	92.9	140	46.6	70.1	195	293	165	249	132	198	113	170
	29	89.9	135	45.3	68.1	182	274	155	233	124	186	106	160
	30	87.0	131	44.0	66.2	170	256	145	217	116	174	99.5	150
	32	78.6	118	41.4	62.2	149	225	127	191	102	153	87.5	131
	34	70.5	106	38.7	58.2	132	199	113	169	90.2	136	77.5	116
	36	62.9	94.5	36.0	54.1	118	177	100	151	80.5	121	69.1	104
	38	56.5	84.9	33.6	50.4	106	159	90.2	136	72.2	109	62.0	93.2
	40	51.0	76.6	31.4	47.2	95.6	144	81.4	122	65.2	98.0	56.0	84.1

Properties

	HSS9×9×3/16	HSS9×9×1/8	HSS8×8×5/8	HSS8×8×1/2	HSS8×8×3/8	HSS8×8×5/16
A_g, in.^{2}	6.06	4.09	16.4	13.5	10.4	8.76
$I_x = I_y$, in.^{4}	78.2	53.5	146	125	100	85.6
$r_x = r_y$, in.	3.59	3.62	2.99	3.04	3.10	3.13

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

F_y = 50 ksi

HSS8–HSS7

Shape		HSS8×8×						HSS7×7×					
		1/4		3/16[c]		1/8[c]		5/8		1/2		3/8	
t_{des}, in.		0.233		0.174		0.116		0.581		0.465		0.349	
lb/ft		25.82		19.63		13.26		50.81		42.05		32.58	
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, L_c (ft), with respect to least radius of gyration, r_y	0	213	319	137	206	66.6	100	419	630	347	522	269	404
	6	205	308	134	201	65.2	98.0	396	595	329	494	255	383
	7	202	303	133	199	64.7	97.2	388	583	322	484	250	376
	8	199	299	131	197	64.1	96.3	379	569	315	474	245	368
	9	195	293	130	195	63.4	95.3	369	554	307	461	239	359
	10	191	287	128	193	62.7	94.2	358	538	298	448	232	349
	11	187	281	126	190	61.9	93.0	346	520	289	434	225	338
	12	182	274	124	187	61.0	91.7	334	502	279	419	218	327
	13	178	267	122	184	60.1	90.3	321	482	269	404	210	316
	14	173	260	120	180	59.1	88.8	307	462	258	387	202	303
	15	167	252	118	177	58.0	87.2	294	441	247	371	194	291
	16	162	243	115	173	56.9	85.6	280	420	235	354	185	278
	17	156	235	112	169	55.8	83.8	265	399	224	336	176	265
	18	151	227	110	165	54.6	82.0	251	377	212	319	168	252
	19	145	218	107	160	53.3	80.1	237	356	200	301	159	239
	20	139	209	104	156	52.0	78.2	223	335	189	284	150	226
	21	133	200	101	151	50.7	76.2	209	314	177	267	141	212
	22	127	191	97.1	146	49.3	74.2	195	293	166	250	133	200
	23	121	182	92.7	139	47.9	72.1	182	273	155	233	124	187
	24	115	173	88.3	133	46.5	69.9	169	253	145	217	116	175
	25	110	165	83.9	126	45.1	67.8	156	234	134	201	108	163
	26	104	156	79.5	120	43.6	65.6	144	216	124	186	100	151
	27	98.1	147	75.3	113	42.2	63.4	133	201	115	173	92.9	140
	28	92.5	139	71.1	107	40.7	61.1	124	186	107	161	86.4	130
	29	87.1	131	67.0	101	39.2	58.9	116	174	99.6	150	80.6	121
	30	81.7	123	63.0	94.7	37.7	56.6	108	162	93.1	140	75.3	113
	32	71.8	108	55.4	83.2	34.6	52.0	95.0	143	81.8	123	66.2	99.4
	34	63.6	95.6	49.0	73.7	31.9	48.0	84.1	126	72.4	109	58.6	88.1
	36	56.7	85.3	43.7	65.7	29.5	44.4	75.1	113	64.6	97.1	52.3	78.6
	38	50.9	76.5	39.3	59.0	27.0	40.5	67.4	101	58.0	87.2	46.9	70.5
	40	46.0	69.1	35.4	53.2	24.3	36.6	60.8	91.4	52.3	78.7	42.3	63.6

Properties

	HSS8×8×1/4	HSS8×8×3/16	HSS8×8×1/8	HSS7×7×5/8	HSS7×7×1/2	HSS7×7×3/8
A_g, in.^{2}	7.10	5.37	3.62	14.0	11.6	8.97
$I_x = I_y$, in.^{4}	70.7	54.4	37.4	93.4	80.5	65.0
$r_x = r_y$, in.	3.15	3.18	3.21	2.58	2.63	2.69

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

F_y = 50 ksi

HSS7–HSS6

Shape		HSS7×7×								HSS6×6×			
		5/16		1/4		3/16[c]		1/8[c]		5/8		1/2	
t_{des}, in.		0.291		0.233		0.174		0.116		0.581		0.465	
lb/ft		27.59		22.42		17.08		11.56		42.30		35.24	
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, L_c (ft), with respect to least radius of gyration, r_y	0	227	342	185	278	132	198	65.1	97.9	350	526	292	438
	6	216	324	176	264	127	191	63.2	95.0	323	486	270	406
	7	212	319	173	259	126	189	62.6	94.0	314	472	263	395
	8	207	312	169	254	124	186	61.8	92.9	304	456	255	383
	9	203	304	165	248	122	183	60.9	91.6	292	439	246	369
	10	197	296	161	242	120	180	60.0	90.1	280	421	236	355
	11	191	288	156	235	117	176	58.9	88.6	267	402	226	339
	12	185	278	151	227	115	172	57.8	86.9	254	382	215	323
	13	179	269	146	219	111	167	56.6	85.1	240	361	204	306
	14	172	258	141	211	107	161	55.4	83.2	226	340	193	289
	15	165	248	135	203	103	154	54.0	81.2	212	318	181	272
	16	158	237	129	194	98.4	148	52.6	79.1	198	297	170	255
	17	151	226	124	186	94.0	141	51.2	76.9	184	276	158	238
	18	143	215	118	177	89.6	135	49.7	74.6	170	255	147	221
	19	136	204	112	168	85.2	128	48.1	72.3	156	235	136	204
	20	129	193	106	159	80.8	121	46.5	69.9	143	215	125	188
	21	121	182	100	150	76.3	115	44.9	67.5	130	196	115	172
	22	114	172	94.2	142	72.0	108	43.2	65.0	119	179	104	157
	23	107	161	88.4	133	67.7	102	41.5	62.4	109	163	95.6	144
	24	100	150	82.8	125	63.4	95.3	39.8	59.9	99.8	150	87.8	132
	25	93.4	140	77.4	116	59.3	89.1	38.1	57.3	92.0	138	80.9	122
	26	86.7	130	72.0	108	55.3	83.1	36.4	54.7	85.1	128	74.8	112
	27	80.4	121	66.8	100	51.3	77.1	34.6	52.0	78.9	119	69.4	104
	28	74.8	112	62.1	93.4	47.7	71.7	32.9	49.5	73.4	110	64.5	96.9
	29	69.7	105	57.9	87.0	44.5	66.8	30.7	46.2	68.4	103	60.1	90.4
	30	65.1	97.9	54.1	81.3	41.6	62.5	28.7	43.2	63.9	96.0	56.2	84.4
	32	57.2	86.0	47.6	71.5	36.5	54.9	25.3	38.0	56.2	84.4	49.4	74.2
	34	50.7	76.2	42.1	63.3	32.4	48.6	22.4	33.6	49.7	74.8	43.7	65.7
	36	45.2	68.0	37.6	56.5	28.9	43.4	20.0	30.0	44.4	66.7	39.0	58.6
	38	40.6	61.0	33.7	50.7	25.9	38.9	17.9	26.9				
	40	36.6	55.1	30.4	45.8	23.4	35.1	16.2	24.3				

Properties

	5/16	1/4	3/16[c]	1/8[c]	5/8	1/2
A_g, in.^{2}	7.59	6.17	4.67	3.16	11.7	9.74
$I_x = I_y$, in.^{4}	56.1	46.5	36.0	24.8	55.2	48.3
$r_x = r_y$, in.	2.72	2.75	2.77	2.80	2.17	2.23

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

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

HSS6

F_y = 50 ksi

Shape		HSS6×6×									
		3/8		5/16		1/4		3/16		1/8[c]	
t_{des}, in.		0.349		0.291		0.233		0.174		0.116	
lb/ft		27.48		23.34		19.02		14.53		9.86	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	227	341	193	289	157	236	119	179	63.1	94.8
	6	211	317	179	270	146	220	111	167	60.5	90.9
	7	206	309	175	263	143	215	109	163	59.6	89.5
	8	199	300	170	255	139	208	106	159	58.5	87.9
	9	193	289	164	247	134	202	102	154	57.3	86.2
	10	185	279	158	238	129	195	98.8	148	56.1	84.3
	11	178	267	152	228	124	187	95.0	143	54.7	82.2
	12	170	255	145	218	119	179	91.0	137	53.2	80.0
	13	161	242	138	207	113	170	86.8	130	51.6	77.6
	14	153	229	131	197	108	162	82.5	124	50.0	75.1
	15	144	216	123	186	102	153	78.2	117	48.2	72.5
	16	135	203	116	175	95.9	144	73.7	111	46.4	69.8
	17	126	190	109	164	90.0	135	69.3	104	44.5	67.0
	18	118	177	102	153	84.1	126	64.9	97.6	42.6	64.1
	19	109	164	94.4	142	78.4	118	60.6	91.0	40.7	61.1
	20	101	152	87.4	131	72.7	109	56.3	84.6	38.7	58.1
	21	92.9	140	80.6	121	67.2	101	52.1	78.4	35.9	53.9
	22	85.0	128	74.0	111	61.9	93.0	48.1	72.3	33.1	49.8
	23	77.8	117	67.7	102	56.6	85.1	44.1	66.3	30.4	45.7
	24	71.4	107	62.2	93.5	52.0	78.1	40.5	60.9	27.9	42.0
	25	65.8	98.9	57.3	86.1	47.9	72.0	37.3	56.1	25.8	38.7
	26	60.8	91.4	53.0	79.6	44.3	66.6	34.5	51.9	23.8	35.8
	27	56.4	84.8	49.1	73.8	41.1	61.7	32.0	48.1	22.1	33.2
	28	52.5	78.8	45.7	68.7	38.2	57.4	29.8	44.7	20.5	30.9
	29	48.9	73.5	42.6	64.0	35.6	53.5	27.7	41.7	19.1	28.8
	30	45.7	68.7	39.8	59.8	33.3	50.0	25.9	39.0	17.9	26.9
	32	40.2	60.4	35.0	52.6	29.2	44.0	22.8	34.2	15.7	23.6
	34	35.6	53.5	31.0	46.6	25.9	38.9	20.2	30.3	13.9	20.9
	36	31.7	47.7	27.6	41.5	23.1	34.7	18.0	27.1	12.4	18.7
	38	28.5	42.8	24.8	37.3	20.7	31.2	16.2	24.3	11.1	16.8

Properties

Property	3/8	5/16	1/4	3/16	1/8[c]
A_g, in.^{2}	7.58	6.43	5.24	3.98	2.70
$I_x = I_y$, in.^{4}	39.5	34.3	28.6	22.3	15.5
$r_x = r_y$, in.	2.28	2.31	2.34	2.37	2.39

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

F_y = 50 ksi

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

HSS5½–HSS5

Shape		HSS5½×5½×										HSS5×5×	
		3/8		5/16		1/4		3/16		1/8[c]		1/2	
t_{des}, in.		0.349		0.291		0.233		0.174		0.116		0.465	
lb/ft		24.93		21.21		17.32		13.25		9.01		28.43	
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, L_c (ft), with respect to least radius of gyration, r_y	0	206	310	175	263	143	215	109	163	61.4	92.3	236	355
	6	189	284	161	242	131	197	100	151	58.4	87.7	210	316
	7	183	275	156	234	127	192	97.3	146	57.3	86.1	202	303
	8	176	265	151	226	123	185	94.1	141	56.1	84.3	192	289
	9	169	254	145	217	118	178	90.5	136	54.7	82.2	182	274
	10	161	243	138	208	113	170	86.7	130	53.2	80.0	172	258
	11	153	231	132	198	108	162	82.7	124	51.6	77.6	161	241
	12	145	218	125	187	102	154	78.5	118	49.9	75.0	149	224
	13	137	205	117	177	96.5	145	74.2	112	48.1	72.2	138	207
	14	128	192	110	166	90.6	136	69.8	105	46.2	69.4	127	190
	15	119	179	103	155	84.7	127	65.4	98.3	44.2	66.4	115	173
	16	110	166	95.6	144	78.8	118	61.0	91.7	42.0	63.1	105	157
	17	102	153	88.4	133	73.0	110	56.6	85.1	39.1	58.7	94.2	142
	18	93.6	141	81.4	122	67.3	101	52.3	78.6	36.2	54.4	84.1	126
	19	85.6	129	74.6	112	61.8	92.9	48.1	72.3	33.3	50.1	75.5	113
	20	77.7	117	68.0	102	56.4	84.8	44.1	66.2	30.6	46.0	68.1	102
	21	70.5	106	61.6	92.7	51.2	77.0	40.1	60.2	27.9	42.0	61.8	92.9
	22	64.2	96.5	56.2	84.4	46.7	70.1	36.5	54.9	25.4	38.2	56.3	84.6
	23	58.7	88.3	51.4	77.2	42.7	64.2	33.4	50.2	23.3	35.0	51.5	77.4
	24	53.9	81.1	47.2	70.9	39.2	58.9	30.7	46.1	21.4	32.1	47.3	71.1
	25	49.7	74.7	43.5	65.4	36.1	54.3	28.3	42.5	19.7	29.6	43.6	65.5
	26	46.0	69.1	40.2	60.4	33.4	50.2	26.2	39.3	18.2	27.4	40.3	60.6
	27	42.6	64.1	37.3	56.0	31.0	46.6	24.2	36.4	16.9	25.4	37.4	56.2
	28	39.6	59.6	34.7	52.1	28.8	43.3	22.5	33.9	15.7	23.6	34.8	52.2
	29	36.9	55.5	32.3	48.6	26.9	40.4	21.0	31.6	14.6	22.0	32.4	48.7
	30	34.5	51.9	30.2	45.4	25.1	37.7	19.6	29.5	13.7	20.6	30.3	45.5

Properties

	3/8	5/16	1/4	3/16	1/8[c]	1/2
A_g, in.^{2}	6.88	5.85	4.77	3.63	2.46	7.88
$I_x = I_y$, in.^{4}	29.7	25.9	21.7	17.0	11.8	26.0
$r_x = r_y$, in.	2.08	2.11	2.13	2.16	2.19	1.82

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

HSS5–HSS4½

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

F_y = 50 ksi

Square HSS

Shape		HSS5×5×										HSS4½×4½×	
		3/8		5/16		1/4		3/16		1/8[c]		1/2	
t_{des}, in.		0.349		0.291		0.233		0.174		0.116		0.465	
lb/ft		22.37		19.08		15.62		11.97		8.16		25.03	
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, L_c (ft), with respect to least radius of gyration, r_y	0	185	278	157	237	129	193	98.2	148	59.8	89.9	208	313
	1	184	277	157	236	128	193	97.9	147	59.7	89.7	207	311
	2	183	275	156	234	127	191	97.1	146	59.4	89.2	205	308
	3	180	271	153	231	126	189	95.8	144	58.8	88.4	201	302
	4	176	265	150	226	123	185	94.0	141	58.1	87.3	195	293
	5	172	258	146	220	120	180	91.7	138	57.2	86.0	188	283
	6	166	250	142	213	116	175	89.0	134	56.1	84.3	180	270
	7	160	240	137	205	112	168	85.9	129	54.8	82.3	171	256
	8	153	229	131	196	107	161	82.4	124	53.3	80.1	160	241
	9	145	218	124	187	102	154	78.7	118	51.7	77.7	150	225
	10	137	206	118	177	97.0	146	74.7	112	49.9	75.1	139	208
	11	129	193	111	166	91.5	137	70.5	106	48.0	72.2	127	191
	12	120	180	103	156	85.7	129	66.2	99.5	45.5	68.4	116	174
	13	111	167	96.2	145	79.8	120	61.8	92.9	42.6	64.0	105	157
	14	103	154	88.9	134	74.0	111	57.4	86.3	39.6	59.6	93.9	141
	15	94.0	141	81.7	123	68.2	102	53.0	79.7	36.7	55.2	83.4	125
	16	85.6	129	74.6	112	62.4	93.8	48.7	73.2	33.8	50.8	73.5	110
	17	75.5	116	67.8	102	56.9	85.5	44.5	66.8	31.0	46.5	65.1	97.8
	18	69.6	105	61.2	91.9	51.5	77.4	40.4	60.7	28.2	42.4	58.0	87.2
	19	62.5	93.9	54.9	82.5	46.3	69.6	36.4	54.8	25.5	38.4	52.1	78.3
	20	56.4	84.8	49.6	74.5	41.8	62.8	32.9	49.4	23.0	34.6	47.0	70.7
	21	51.2	76.9	44.9	67.6	37.9	57.0	29.8	44.8	20.9	31.4	42.6	64.1
	22	46.6	70.0	41.0	61.5	34.5	51.9	27.2	40.8	19.0	28.6	38.9	58.4
	23	42.6	64.1	37.5	56.3	31.6	47.5	24.9	37.4	17.4	26.2	35.5	53.4
	24	39.2	58.9	34.4	51.7	29.0	43.6	22.8	34.3	16.0	24.1	32.6	49.1
	25	36.1	54.2	31.7	47.7	26.7	40.2	21.0	31.6	14.7	22.2	30.1	45.2
	26	33.4	50.2	29.3	44.1	24.7	37.2	19.5	29.2	13.6	20.5	27.8	41.8
	27	30.9	46.5	27.2	40.9	22.9	34.5	18.0	27.1	12.6	19.0		
	28	28.8	43.2	25.3	38.0	21.3	32.1	16.8	25.2	11.8	17.7		
	29	26.8	40.3	23.6	35.4	19.9	29.9	15.6	23.5	11.0	16.5		

Properties

	3/8	5/16	1/4	3/16	1/8[c]	1/2
A_g, in.^{2}	6.18	5.26	4.30	3.28	2.23	6.95
$I_x = I_y$, in.^{4}	21.7	19.0	16.0	12.6	8.80	18.1
$r_x = r_y$, in.	1.87	1.90	1.93	1.96	1.99	1.61

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

F_y = 50 ksi

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

HSS4½–HSS4

Shape		HSS4½×4½×										HSS4×4×	
		3/8		5/16		1/4		3/16		1/8[c]		1/2	
t_{des}, in.		0.349		0.291		0.233		0.174		0.116		0.465	
lb/ft		19.82		16.96		13.91		10.70		7.31		21.63	
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, L_c (ft), with respect to least radius of gyration, r_y	0	164	247	140	211	115	173	87.7	132	57.7	86.8	180	271
	1	163	246	140	210	115	172	87.4	131	57.6	86.6	179	269
	2	162	243	138	208	113	170	86.5	130	57.2	86.0	176	265
	3	159	238	136	204	111	167	85.1	128	56.6	85.0	172	258
	4	154	232	132	199	109	163	83.0	125	55.6	83.6	166	249
	5	149	224	128	192	105	158	80.5	121	54.5	81.9	158	237
	6	143	215	123	185	101	152	77.5	117	53.1	79.8	149	224
	7	136	205	117	176	96.8	145	74.1	111	50.9	76.5	139	209
	8	129	194	111	167	91.8	138	70.4	106	48.4	72.8	128	193
	9	121	182	104	157	86.5	130	66.4	99.8	45.7	68.8	117	176
	10	112	169	97.3	146	80.9	122	62.2	93.5	43.0	64.6	106	160
	11	104	156	90.2	136	75.1	113	57.9	87.0	40.1	60.2	95.0	143
	12	95.3	143	82.9	125	69.3	104	53.5	80.4	37.1	55.8	84.1	126
	13	86.7	130	75.7	114	63.4	95.4	49.1	73.7	34.1	51.3	73.6	111
	14	78.3	118	68.6	103	57.7	86.7	44.7	67.2	31.2	46.9	63.7	95.8
	15	70.2	105	61.7	92.8	52.1	78.3	40.5	60.8	28.4	42.6	55.5	83.5
	16	62.3	93.7	55.1	82.9	46.7	70.2	36.4	54.7	25.6	38.4	48.8	73.3
	17	55.2	83.0	48.8	73.4	41.5	62.4	32.4	48.7	22.9	34.4	43.2	65.0
	18	49.2	74.0	43.6	65.5	37.0	55.6	28.9	43.4	20.4	30.7	38.6	58.0
	19	44.2	66.4	39.1	58.8	33.2	49.9	25.9	39.0	18.3	27.5	34.6	52.0
	20	39.9	59.9	35.3	53.0	30.0	45.1	23.4	35.2	16.5	24.9	31.2	46.9
	21	36.2	54.4	32.0	48.1	27.2	40.9	21.2	31.9	15.0	22.5	28.3	42.6
	22	33.0	49.5	29.2	43.8	24.8	37.3	19.4	29.1	13.7	20.5	25.8	38.8
	23	30.2	45.3	26.7	40.1	22.7	34.1	17.7	26.6	12.5	18.8	23.6	35.5
	24	27.7	41.6	24.5	36.8	20.8	31.3	16.3	24.4	11.5	17.3		
	25	25.5	38.4	22.6	34.0	19.2	28.8	15.0	22.5	10.6	15.9		
	26	23.6	35.5	20.9	31.4	17.7	26.7	13.9	20.8	9.78	14.7		
	27	21.9	32.9	19.4	29.1	16.5	24.7	12.8	19.3	9.07	13.6		
	28			18.0	27.1	15.3	23.0	11.9	18.0	8.44	12.7		
	29							11.1	16.7	7.86	11.8		

Properties

	3/8	5/16	1/4	3/16	1/8[c]	1/2
A_g, in.^{2}	5.48	4.68	3.84	2.93	2.00	6.02
$I_x = I_y$, in.^{4}	15.3	13.5	11.4	9.02	6.35	11.9
$r_x = r_y$, in.	1.67	1.70	1.73	1.75	1.78	1.41

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

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

HSS4

F_y = 50 ksi

Shape		HSS4×4×									
		3/8		5/16		1/4		3/16		1/8	
t_{des}, in.		0.349		0.291		0.233		0.174		0.116	
lb/ft		17.27		14.83		12.21		9.42		6.46	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	143	215	123	184	101	152	77.2	116	53.0	79.6
	1	142	214	122	184	100	151	76.9	116	52.8	79.3
	2	140	211	120	181	99.1	149	75.9	114	52.1	78.3
	3	137	206	118	177	96.8	146	74.3	112	51.0	76.7
	4	132	199	114	171	93.8	141	72.0	108	49.5	74.5
	5	127	190	109	164	90.0	135	69.2	104	47.7	71.7
	6	120	180	103	156	85.6	129	66.0	99.2	45.5	68.4
	7	113	169	97.3	146	80.7	121	62.3	93.7	43.1	64.8
	8	105	157	90.6	136	75.4	113	58.4	87.7	40.5	60.8
	9	96.4	145	83.6	126	69.8	105	54.2	81.4	37.7	56.6
	10	87.9	132	76.4	115	64.0	96.1	49.8	74.9	34.8	52.2
	11	79.4	119	69.2	104	58.1	87.4	45.5	68.3	31.8	47.8
	12	71.0	107	62.0	93.2	52.3	78.7	41.1	61.8	28.9	43.4
	13	62.8	94.4	55.1	82.8	46.7	70.2	36.8	55.4	26.0	39.1
	14	55.0	82.7	48.5	72.8	41.3	62.1	32.7	49.2	23.2	34.8
	15	47.9	72.0	42.2	63.5	36.1	54.3	28.8	43.2	20.5	30.8
	16	42.1	63.3	37.1	55.8	31.7	47.7	25.3	38.0	18.0	27.1
	17	37.3	56.1	32.9	49.4	28.1	42.3	22.4	33.6	16.0	24.0
	18	33.3	50.0	29.3	44.1	25.1	37.7	20.0	30.0	14.2	21.4
	19	29.9	44.9	26.3	39.6	22.5	33.8	17.9	26.9	12.8	19.2
	20	27.0	40.5	23.8	35.7	20.3	30.5	16.2	24.3	11.5	17.3
	21	24.4	36.7	21.5	32.4	18.4	27.7	14.7	22.1	10.5	15.7
	22	22.3	33.5	19.6	29.5	16.8	25.2	13.4	20.1	9.53	14.3
	23	20.4	30.6	18.0	27.0	15.4	23.1	12.2	18.4	8.72	13.1
	24	18.7	28.1	16.5	24.8	14.1	21.2	11.2	16.9	8.01	12.0
	25					13.0	19.5	10.4	15.6	7.38	11.1
	26									6.82	10.3
Properties											
A_g, in.²		4.78		4.10		3.37		2.58		1.77	
$I_x = I_y$, in.⁴		10.3		9.14		7.80		6.21		4.40	
$r_x = r_y$, in.		1.47		1.49		1.52		1.55		1.58	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

F_y = 50 ksi

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

Square HSS

HSS3½

Shape		HSS3½×3½×									
		3/8		5/16		1/4		3/16		1/8	
t_{des}, in.		0.349		0.291		0.233		0.174		0.116	
lb/ft		14.72		12.70		10.51		8.15		5.61	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	122	184	105	158	87.1	131	67.1	101	46.1	69.3
	1	122	183	105	157	86.6	130	66.7	100	45.8	68.9
	2	119	179	103	154	85.0	128	65.5	98.5	45.1	67.8
	3	115	173	99.6	150	82.5	124	63.7	95.7	43.8	65.9
	4	110	166	95.2	143	79.1	119	61.1	91.9	42.1	63.4
	5	104	156	90.0	135	74.9	113	58.0	87.2	40.1	60.2
	6	96.4	145	83.9	126	70.1	105	54.5	81.9	37.7	56.6
	7	88.5	133	77.3	116	64.8	97.4	50.5	75.9	35.0	52.6
	8	80.1	120	70.3	106	59.2	89.0	46.3	69.6	32.2	48.4
	9	71.6	108	63.1	94.9	53.4	80.3	42.0	63.1	29.3	44.0
	10	63.1	94.8	56.0	84.1	47.6	71.6	37.6	56.6	26.3	39.5
	11	54.9	82.5	49.0	73.7	41.9	63.0	33.3	50.1	23.4	35.2
	12	47.1	70.7	42.4	63.7	36.5	54.9	29.2	43.9	20.6	30.9
	13	40.1	60.3	36.2	54.4	31.3	47.1	25.2	37.9	17.9	26.8
	14	34.6	52.0	31.2	46.9	27.0	40.6	21.7	32.7	15.4	23.1
	15	30.1	45.3	27.2	40.8	23.5	35.4	18.9	28.5	13.4	20.2
	16	26.5	39.8	23.9	35.9	20.7	31.1	16.6	25.0	11.8	17.7
	17	23.5	35.2	21.2	31.8	18.3	27.5	14.7	22.2	10.4	15.7
	18	20.9	31.4	18.9	28.4	16.3	24.6	13.2	19.8	9.31	14.0
	19	18.8	28.2	16.9	25.5	14.7	22.0	11.8	17.7	8.36	12.6
	20	16.9	25.5	15.3	23.0	13.2	19.9	10.7	16.0	7.54	11.3
	21	15.4	23.1	13.9	20.8	12.0	18.0	9.66	14.5	6.84	10.3
	22					10.9	16.4	8.80	13.2	6.23	9.37
Properties											
A_g, in.^{2}		4.09		3.52		2.91		2.24		1.54	
$I_x = I_y$, in.^{4}		6.49		5.84		5.04		4.05		2.90	
$r_x = r_y$, in.		1.26		1.29		1.32		1.35		1.37	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

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

HSS3

F_y = 50 ksi

Shape		HSS3×3×									
		3/8		5/16		1/4		3/16		1/8	
t_{des}, in.		0.349		0.291		0.233		0.174		0.116	
lb/ft		12.17		10.58		8.81		6.87		4.75	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	101	153	88.0	132	73.1	110	56.6	85.0	38.9	58.5
	1	101	151	87.2	131	72.4	109	56.1	84.4	38.6	58.1
	2	97.8	147	84.9	128	70.6	106	54.8	82.3	37.7	56.7
	3	93.3	140	81.2	122	67.6	102	52.6	79.1	36.3	54.6
	4	87.4	131	76.2	115	63.7	95.8	49.7	74.7	34.4	51.7
	5	80.3	121	70.2	106	59.0	88.7	46.2	69.5	32.1	48.3
	6	72.4	109	63.6	95.6	53.7	80.7	42.3	63.5	29.5	44.4
	7	64.1	96.4	56.6	85.0	48.1	72.2	38.0	57.2	26.7	40.1
	8	55.7	83.7	49.4	74.2	42.3	63.5	33.7	50.6	23.8	35.8
	9	47.5	71.4	42.4	63.7	36.6	55.0	29.4	44.1	20.9	31.4
	10	39.8	59.8	35.7	53.6	31.1	46.7	25.2	37.8	18.0	27.1
	11	32.9	49.4	29.6	44.5	25.9	39.0	21.2	31.8	15.3	23.1
	12	27.6	41.5	24.9	37.4	21.8	32.8	17.8	26.8	12.9	19.4
	13	23.5	35.4	21.2	31.8	18.6	27.9	15.2	22.8	11.0	16.5
	14	20.3	30.5	18.3	27.4	16.0	24.1	13.1	19.7	9.48	14.2
	15	17.7	26.6	15.9	23.9	13.9	21.0	11.4	17.1	8.26	12.4
	16	15.5	23.3	14.0	21.0	12.3	18.4	10.0	15.1	7.26	10.9
	17	13.8	20.7	12.4	18.6	10.9	16.3	8.87	13.3	6.43	9.66
	18			11.0	16.6	9.69	14.6	7.91	11.9	5.73	8.62
	19							7.10	10.7	5.15	7.73

Properties

	3/8	5/16	1/4	3/16	1/8
A_g, in.^{2}	3.39	2.94	2.44	1.89	1.30
$I_x = I_y$, in.^{4}	3.78	3.45	3.02	2.46	1.78
$r_x = r_y$, in.	1.06	1.08	1.11	1.14	1.17

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

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

F_y = 50 ksi

HSS2½–HSS2¼

Shape		HSS2½×2½×								HSS2¼×2¼×	
		5/16		1/4		3/16		1/8		1/4	
t_{des}, in.		0.291		0.233		0.174		0.116		0.233	
lb/ft		8.45		7.11		5.59		3.90		6.26	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	70.4	106	59.0	88.6	46.1	69.3	32.0	48.1	52.1	78.3
	1	69.4	104	58.2	87.5	45.6	68.5	31.7	47.6	51.3	77.0
	2	66.6	100	56.0	84.2	43.9	66.1	30.6	46.0	48.8	73.4
	3	62.3	93.6	52.6	79.0	41.4	62.2	28.9	43.5	45.0	67.7
	4	56.6	85.1	48.1	72.3	38.1	57.2	26.7	40.2	40.2	60.4
	5	50.1	75.3	42.9	64.4	34.2	51.3	24.1	36.3	34.7	52.2
	6	43.1	64.8	37.2	56.0	29.9	45.0	21.3	32.0	29.1	43.7
	7	36.1	54.3	31.5	47.4	25.6	38.5	18.4	27.7	23.5	35.4
	8	29.5	44.3	26.0	39.1	21.4	32.2	15.5	23.4	18.4	27.7
	9	23.5	35.2	20.9	31.5	17.4	26.2	12.8	19.3	14.6	21.9
	10	19.0	28.6	17.0	25.5	14.1	21.2	10.4	15.6	11.8	17.7
	11	15.7	23.6	14.0	21.1	11.7	17.5	8.60	12.9	9.75	14.7
	12	13.2	19.8	11.8	17.7	9.80	14.7	7.22	10.9	8.19	12.3
	13	11.2	16.9	10.0	15.1	8.35	12.6	6.15	9.25	6.98	10.5
	14	9.69	14.6	8.65	13.0	7.20	10.8	5.31	7.98		
	15			7.53	11.3	6.27	9.43	4.62	6.95		
	16							4.06	6.11		

Properties

	HSS2½×2½×5/16	HSS2½×2½×1/4	HSS2½×2½×3/16	HSS2½×2½×1/8	HSS2¼×2¼×1/4
A_g, in.^{2}	2.35	1.97	1.54	1.07	1.74
$I_x = I_y$, in.^{4}	1.82	1.63	1.35	0.998	1.13
$r_x = r_y$, in.	0.880	0.908	0.937	0.965	0.806

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

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

F_y = 50 ksi

HSS2¼–HSS2

Square HSS

Shape		HSS2¼×2¼×				HSS2×2×					
		3/16		1/8		1/4		3/16		1/8	
t_{des}, in.		0.174		0.116		0.233		0.174		0.116	
lb/ft		4.96		3.48		5.41		4.32		3.05	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_y	0	41.0	61.6	28.6	43.0	45.2	67.9	35.6	53.5	25.1	37.8
	1	40.4	60.7	28.2	42.4	44.3	66.5	34.9	52.5	24.7	37.1
	2	38.6	58.0	27.0	40.7	41.5	62.4	32.9	49.5	23.4	35.1
	3	35.8	53.8	25.2	37.9	37.3	56.1	29.9	44.9	21.4	32.1
	4	32.2	48.4	22.8	34.3	32.2	48.4	26.0	39.1	18.8	28.3
	5	28.1	42.3	20.1	30.2	26.6	40.0	21.8	32.8	16.0	24.0
	6	23.8	35.8	17.2	25.9	21.0	31.6	17.6	26.4	13.1	19.6
	7	19.6	29.4	14.3	21.5	15.9	24.0	13.6	20.5	10.3	15.5
	8	15.6	23.4	11.6	17.4	12.2	18.3	10.4	15.7	7.93	11.9
	9	12.3	18.5	9.18	13.8	9.64	14.5	8.24	12.4	6.27	9.42
	10	9.97	15.0	7.43	11.2	7.81	11.7	6.67	10.0	5.08	7.63
	11	8.24	12.4	6.14	9.23	6.46	9.70	5.52	8.29	4.20	6.31
	12	6.92	10.4	5.16	7.76			4.63	6.97	3.53	5.30
	13	5.90	8.87	4.40	6.61						
	14			3.79	5.70						

Properties

	HSS2¼×2¼×3/16	HSS2¼×2¼×1/8	HSS2×2×1/4	HSS2×2×3/16	HSS2×2×1/8
A_g, in.^{2}	1.37	0.956	1.51	1.19	0.840
$I_x = I_y$, in.^{4}	0.953	0.712	0.747	0.641	0.486
$r_x = r_y$, in.	0.835	0.863	0.704	0.733	0.761

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

F_y = 46 ksi

Table 4-5
Available Strength in Axial Compression, kips
Round HSS

HSS20.000–HSS16.000

Shape		HSS20.000×				HSS18.000×				HSS16.000×			
		0.500		0.375		0.500		0.375		0.625		0.500	
t_{des}, in.		0.465		0.349		0.465		0.349		0.581		0.465	
lb/ft		104.00		78.67		93.54		70.66		103.00		82.85	
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, L_c (ft), with respect to radius of gyration, r	0	785	1180	592	890	705	1060	534	803	774	1160	625	940
	6	779	1170	588	884	699	1050	530	796	765	1150	618	929
	7	777	1170	586	881	696	1050	528	793	762	1140	615	925
	8	775	1160	585	879	694	1040	526	790	758	1140	613	921
	9	772	1160	583	876	691	1040	524	787	754	1130	609	916
	10	769	1160	580	872	688	1030	521	783	749	1130	605	910
	11	766	1150	578	869	684	1030	519	779	744	1120	601	904
	12	762	1150	575	865	680	1020	516	775	739	1110	597	897
	13	759	1140	572	860	676	1020	512	770	733	1100	592	890
	14	754	1130	569	856	671	1010	509	765	726	1090	587	882
	15	750	1130	566	851	666	1000	505	759	719	1080	582	874
	16	745	1120	563	846	661	994	501	754	712	1070	576	866
	17	740	1110	559	840	656	985	497	747	705	1060	570	856
	18	735	1100	555	834	650	977	493	741	697	1050	563	847
	19	730	1100	551	828	644	968	488	734	688	1030	557	837
	20	724	1090	547	821	638	958	484	727	680	1020	550	826
	21	718	1080	542	815	631	948	479	720	671	1010	543	816
	22	712	1070	537	808	624	938	474	712	661	994	535	804
	23	705	1060	533	801	617	928	468	704	652	980	528	793
	24	698	1050	528	793	610	917	463	696	642	965	520	781
	25	692	1040	522	785	602	905	457	688	632	950	511	769
	26	684	1030	517	777	595	894	452	679	621	934	503	756
	27	677	1020	512	769	587	882	446	670	611	918	495	743
	28	670	1010	506	761	579	870	440	661	600	902	486	730
	29	662	995	500	752	570	857	433	652	589	885	477	717
	30	654	983	494	743	562	845	427	642	578	868	468	704
	32	638	959	482	725	545	819	414	623	555	834	450	676
	34	621	933	470	706	527	792	401	602	532	799	431	648
	36	604	907	457	686	509	765	387	582	508	764	412	620
	38	586	880	443	666	490	737	373	561	484	728	393	591
	40	567	853	430	646	471	708	359	539	460	692	374	562

Properties

	HSS20.000×0.500	HSS20.000×0.375	HSS18.000×0.500	HSS18.000×0.375	HSS16.000×0.625	HSS16.000×0.500
A_g, in.^{2}	28.5	21.5	25.6	19.4	28.1	22.7
I, in.^{4}	1360	1040	985	754	838	685
r, in.	6.91	6.95	6.20	6.24	5.46	5.49

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Table 4-5 (continued)
Available Strength in Axial Compression, kips

F_y = 46 ksi

Round HSS

HSS16.000–HSS14.000

Shape	HSS16.000×								HSS14.000×			
	0.438		0.375		0.312		0.250		0.625		0.500	
t_{des}, in.	0.407		0.349		0.291		0.233		0.581		0.465	
lb/ft	72.87		62.64		52.32		42.09		89.36		72.16	
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, L_c (ft), with respect to radius of gyration, r												
0	548	824	474	712	397	596	317	476	675	1010	545	820
6	542	814	468	704	392	589	313	471	665	999	537	807
7	540	811	466	701	391	587	312	469	661	993	534	803
8	537	807	464	698	389	584	311	467	657	987	531	798
9	534	803	462	694	387	581	309	464	652	980	527	792
10	531	798	459	690	384	578	307	462	646	972	523	786
11	527	793	456	685	382	574	305	459	641	963	518	779
12	524	787	453	680	379	570	303	455	634	953	513	771
13	519	781	449	675	376	565	301	452	628	943	508	763
14	515	774	445	669	373	561	298	448	620	932	502	755
15	510	767	441	663	370	555	295	444	613	921	496	745
16	505	759	437	657	366	550	293	440	605	909	490	736
17	500	751	432	650	362	544	290	435	596	896	483	726
18	494	743	428	643	358	538	286	430	587	883	476	715
19	489	734	423	635	354	532	283	426	578	869	468	704
20	482	725	417	627	350	526	280	420	568	854	461	692
21	476	716	412	619	345	519	276	415	558	839	453	680
22	470	706	406	611	341	512	272	410	548	824	445	668
23	463	696	401	602	336	505	269	404	538	808	436	656
24	456	686	395	593	331	497	265	398	527	792	428	643
25	449	675	389	584	326	490	261	392	516	776	419	630
26	442	664	382	575	321	482	257	386	505	759	410	616
27	434	653	376	565	315	474	252	379	493	742	401	603
28	427	642	370	555	310	466	248	373	482	724	392	589
29	419	630	363	546	304	458	244	366	470	707	382	575
30	411	618	356	535	299	449	239	360	459	689	373	561
32	395	594	343	515	287	432	230	346	435	653	354	532
34	379	570	329	494	276	414	221	332	411	617	335	503
36	363	545	314	472	264	397	212	318	387	581	316	474
38	346	520	300	451	252	379	202	304	363	546	296	446
40	329	494	285	429	240	360	193	289	340	510	278	417
Properties												
A_g, in.^{2}	19.9		17.2		14.4		11.5		24.5		19.8	
I, in.^{4}	606		526		443		359		552		453	
r, in.	5.51		5.53		5.55		5.58		4.75		4.79	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Menu

F_y = 46 ksi

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Round HSS

HSS14.000–HSS12.750

Shape		HSS14.000×						HSS12.750×					
		0.375		0.312		0.250		0.500		0.375		0.250	
t_{des}, in.		0.349		0.291		0.233		0.465		0.349		0.233	
lb/ft		54.62		45.65		36.75		65.48		49.61		33.41	
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, L_c (ft), with respect to radius of gyration, r	0	413	621	344	517	278	418	493	741	375	563	252	379
	6	407	612	339	510	274	412	484	728	368	553	248	373
	7	405	608	337	507	273	410	481	723	365	549	246	370
	8	402	605	335	504	271	407	477	717	363	545	244	367
	9	400	600	333	501	269	405	473	711	360	541	242	364
	10	396	596	330	497	267	401	468	704	356	535	240	361
	11	393	591	328	492	265	398	463	697	353	530	238	357
	12	389	585	324	488	262	394	458	688	348	524	235	353
	13	385	579	321	483	260	390	452	680	344	517	232	349
	14	381	572	318	477	257	386	446	670	339	510	229	344
	15	376	566	314	472	254	381	439	660	335	503	226	339
	16	372	558	310	466	251	377	432	650	329	495	222	334
	17	366	551	306	459	247	372	425	639	324	487	219	329
	18	361	543	301	453	244	366	418	628	318	478	215	323
	19	356	535	297	446	240	361	410	616	312	470	211	317
	20	350	526	292	439	236	355	402	604	306	460	207	311
	21	344	517	287	432	232	349	393	591	300	451	203	305
	22	338	508	282	424	228	343	385	578	294	441	199	299
	23	332	499	277	416	224	337	376	565	287	432	194	292
	24	325	489	272	408	220	330	367	552	280	422	190	285
	25	319	479	266	400	216	324	358	538	274	411	185	279
	26	312	469	261	392	211	317	349	524	267	401	181	272
	27	305	459	255	383	207	310	339	510	260	390	176	265
	28	298	448	249	375	202	304	330	496	253	380	171	258
	29	291	438	244	366	197	297	321	482	245	369	167	250
	30	284	427	238	357	193	290	311	467	238	358	162	243
	32	270	406	226	339	183	275	292	439	224	337	152	229
	34	256	384	214	321	174	261	273	410	210	315	143	214
	36	241	363	202	303	164	246	254	382	195	294	133	200
	38	227	341	190	286	154	232	235	354	181	272	124	186
	40	213	320	178	268	145	218	217	327	168	252	115	172

Properties

	0.375	0.312	0.250	0.500	0.375	0.250
A_g, in.^{2}	15.0	12.5	10.1	17.9	13.6	9.16
I, in.^{4}	349	295	239	339	262	180
r, in.	4.83	4.85	4.87	4.35	4.39	4.43

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Table 4-5 (continued)
Available Strength in Axial Compression, kips

F_y = 46 ksi

Round HSS

HSS10.750–
HSS10.000

Shape		HSS10.750×						HSS10.000×					
		0.500		0.375		0.250		0.625		0.500		0.375	
t_{des}, in.		0.465		0.349		0.233		0.581		0.465		0.349	
lb/ft		54.79		41.59		28.06		62.64		50.78		38.58	
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, L_c (ft), with respect to radius of gyration, r	0	413	621	314	472	212	319	474	712	383	575	292	439
	6	402	605	306	460	207	311	459	690	371	558	283	426
	7	399	599	303	456	205	308	454	682	367	552	280	421
	8	394	593	300	451	203	305	448	674	363	545	277	416
	9	389	585	296	445	200	301	442	664	357	537	273	410
	10	384	577	292	439	198	297	434	653	352	529	269	404
	11	378	568	288	433	195	293	427	641	346	519	264	397
	12	372	559	283	426	192	288	418	628	339	509	259	389
	13	365	549	278	418	188	283	409	615	332	499	254	381
	14	358	538	273	410	185	278	400	601	324	487	248	373
	15	351	527	267	402	181	272	390	586	316	476	242	364
	16	343	515	261	393	177	266	379	570	308	463	236	355
	17	334	503	255	384	173	260	369	554	300	450	230	345
	18	326	490	249	374	169	254	358	537	291	437	223	335
	19	317	477	243	365	165	248	346	520	282	424	216	325
	20	308	464	236	355	160	241	335	503	273	410	209	314
	21	299	450	229	344	156	234	323	486	263	396	202	304
	22	290	436	222	334	151	227	311	468	254	382	195	293
	23	281	422	215	323	146	220	299	450	244	367	188	282
	24	271	408	208	313	142	213	287	432	235	353	181	272
	25	262	393	201	302	137	206	275	414	225	339	173	261
	26	252	379	194	291	132	199	263	396	216	324	166	250
	27	242	364	186	280	127	191	252	378	206	310	159	239
	28	233	350	179	269	123	184	240	360	197	296	152	228
	29	223	336	172	259	118	177	228	343	188	282	145	218
	30	214	322	165	248	113	170	217	326	179	268	138	207
	32	195	294	151	227	104	156	195	293	161	242	124	187
	34	177	267	137	206	94.4	142	173	260	143	216	111	167
	36	160	241	124	187	85.6	129	155	232	128	192	99.3	149
	38	144	216	112	168	77.0	116	139	208	115	173	89.1	134
	40	130	195	101	151	69.5	104	125	188	104	156	80.4	121

Properties

	HSS10.750×0.500	HSS10.750×0.375	HSS10.750×0.250	HSS10.000×0.625	HSS10.000×0.500	HSS10.000×0.375
A_g, in.^{2}	15.0	11.4	7.70	17.2	13.9	10.6
I, in.^{4}	199	154	106	191	159	123
r, in.	3.64	3.68	3.72	3.34	3.38	3.41

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

F_y = 46 ksi

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Round HSS

HSS10.000–HSS9.625

Shape	HSS10.000×						HSS9.625×					
	0.312		0.250		0.188		0.500		0.375		0.312	
t_{des}, in.	0.291		0.233		0.174		0.465		0.349		0.291	
lb/ft	32.31		26.06		19.72		48.77		37.08		31.06	
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, L_c (ft), with respect to radius of gyration, r												
0	245	368	197	296	148	222	369	555	281	422	235	353
6	237	357	191	287	144	216	357	537	272	409	228	342
7	235	353	189	284	142	214	353	530	269	404	225	338
8	232	349	187	281	140	211	348	523	265	399	222	334
9	229	344	184	277	139	208	343	515	261	393	219	329
10	225	339	182	273	136	205	337	506	257	386	215	323
11	221	333	178	268	134	202	330	496	252	379	211	317
12	217	327	175	263	132	198	323	486	247	371	207	311
13	213	320	172	258	129	194	316	475	241	363	202	304
14	208	313	168	252	126	190	308	463	236	354	197	297
15	203	305	164	246	123	186	300	451	229	345	192	289
16	198	298	160	240	120	181	291	438	223	335	187	281
17	193	290	156	234	117	176	283	425	217	326	182	273
18	187	282	151	227	114	171	274	411	210	315	176	265
19	182	273	147	221	111	166	265	398	203	305	170	256
20	176	264	142	214	107	161	255	384	196	295	165	247
21	170	256	138	207	104	156	246	369	189	284	159	239
22	164	247	133	200	100	151	236	355	182	273	153	230
23	158	238	128	192	96.6	145	227	340	174	262	147	221
24	152	229	123	185	93.1	140	217	326	167	251	141	212
25	146	220	118	178	89.5	134	207	312	160	241	135	203
26	140	211	114	171	85.9	129	198	297	153	230	129	194
27	134	202	109	164	82.3	124	188	283	146	219	123	185
28	128	193	104	156	78.7	118	179	269	139	208	117	176
29	122	184	99.3	149	75.2	113	170	255	132	198	111	167
30	117	175	94.7	142	71.7	108	161	242	125	188	106	159
32	105	158	85.6	129	64.9	97.5	143	216	112	168	94.5	142
34	94.3	142	76.8	115	58.4	87.7	127	191	99.1	149	83.9	126
36	84.1	126	68.5	103	52.1	78.3	113	170	88.4	133	74.8	112
38	75.5	114	61.5	92.5	46.7	70.2	102	153	79.3	119	67.1	101
40	68.2	102	55.5	83.4	42.2	63.4	91.8	138	71.6	108	60.6	91.1
Properties												
A_g, in.^{2}	8.88		7.15		5.37		13.4		10.2		8.53	
I, in.^{4}	105		85.3		64.8		141		110		93.0	
r, in.	3.43		3.45		3.47		3.24		3.28		3.30	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Table 4-5 (continued)
Available Strength in Axial Compression, kips

Round HSS

$F_y = 46$ ksi

HSS9.625–HSS8.625

Shape		HSS9.625×				HSS8.625×							
		0.250		0.188		0.625		0.500		0.375		0.322	
t_{des}, in.		0.233		0.174		0.581		0.465		0.349		0.300	
lb/ft		25.06		18.97		53.45		43.43		33.07		28.58	
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, L_c (ft), with respect to radius of gyration, r	0	189	284	142	214	405	609	328	493	250	375	216	325
	6	183	276	138	207	388	583	314	473	240	361	208	312
	7	181	272	136	205	382	574	310	465	236	355	205	308
	8	179	269	135	202	375	564	304	457	232	349	201	303
	9	176	265	133	200	368	553	298	448	228	343	198	297
	10	173	260	131	196	359	540	292	439	223	335	193	291
	11	170	256	128	193	351	527	285	428	218	328	189	284
	12	167	251	126	189	341	513	277	417	212	319	184	277
	13	163	245	123	185	331	497	269	405	206	310	179	269
	14	159	239	120	181	321	482	261	392	200	301	174	261
	15	155	233	117	176	310	465	252	380	194	291	168	253
	16	151	227	114	171	298	448	244	366	187	281	163	244
	17	147	221	111	167	287	431	234	352	180	271	157	236
	18	142	214	107	162	275	414	225	338	173	261	151	227
	19	138	207	104	156	263	396	216	324	166	250	145	217
	20	133	200	101	151	251	378	206	310	159	239	139	208
	21	128	193	97.1	146	239	360	197	295	152	228	132	199
	22	124	186	93.5	141	227	342	187	281	145	217	126	190
	23	119	179	90.0	135	215	324	177	267	138	207	120	180
	24	114	171	86.4	130	204	306	168	253	130	196	114	171
	25	109	164	82.8	124	192	289	159	239	123	185	108	162
	26	104	157	79.2	119	181	272	150	225	117	175	102	153
	27	99.7	150	75.6	114	170	255	141	212	110	165	96.1	144
	28	95.0	143	72.1	108	159	239	132	198	103	155	90.3	136
	29	90.4	136	68.6	103	148	223	123	185	96.6	145	84.8	127
	30	85.8	129	65.2	98.0	138	208	115	173	90.3	136	79.2	119
	32	76.9	116	58.5	88.0	122	183	101	152	79.4	119	69.6	105
	34	68.4	103	52.1	78.3	108	162	89.7	135	70.3	106	61.7	92.7
	36	61.0	91.7	46.5	69.8	96.2	145	80.0	120	62.7	94.3	55.0	82.7
	38	54.7	82.3	41.7	62.7	86.3	130	71.8	108	56.3	84.6	49.4	74.2
	40	49.4	74.2	37.6	56.6	77.9	117	64.8	97.5	50.8	76.3	44.6	67.0

Properties

	HSS9.625×0.250	HSS9.625×0.188	HSS8.625×0.625	HSS8.625×0.500	HSS8.625×0.375	HSS8.625×0.322
A_g, in.^{2}	6.87	5.17	14.7	11.9	9.07	7.85
I, in.^{4}	75.9	57.7	119	100	77.8	68.1
r, in.	3.32	3.34	2.85	2.89	2.93	2.95

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Table 4-5 (continued)
Available Strength in Axial Compression, kips

F_y = 46 ksi

Round HSS

HSS8.625–HSS7.500

Shape		HSS8.625×				HSS7.625×				HSS7.500×			
		0.250		0.188		0.375		0.328		0.500		0.375	
t_{des}, in.		0.233		0.174		0.349		0.305		0.465		0.349	
lb/ft		22.38		16.96		29.06		25.59		37.42		28.56	
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, L_c (ft), with respect to radius of gyration, r	0	169	254	127	191	220	330	193	290	284	426	216	325
	6	163	244	122	184	209	314	183	276	268	403	205	307
	7	160	241	121	181	205	308	180	270	263	395	201	301
	8	158	237	119	178	200	301	176	265	257	386	196	295
	9	155	233	117	175	195	294	172	258	250	376	191	287
	10	152	228	114	172	190	286	167	251	243	365	186	279
	11	148	223	112	168	184	277	162	244	235	353	180	270
	12	144	217	109	164	178	268	157	236	227	341	174	261
	13	140	211	106	159	172	258	151	227	218	327	167	251
	14	136	205	103	155	165	248	145	219	209	314	161	241
	15	132	199	99.7	150	158	238	140	210	200	300	154	231
	16	128	192	96.4	145	151	228	133	201	190	286	147	220
	17	123	185	93.0	140	144	217	127	191	181	271	139	210
	18	118	178	89.6	135	137	206	121	182	171	257	132	199
	19	114	171	86.1	129	130	195	115	172	161	243	125	188
	20	109	164	82.5	124	123	185	108	163	152	228	118	177
	21	104	157	78.9	119	116	174	102	154	142	214	111	167
	22	99.4	149	75.3	113	109	163	96.0	144	133	200	104	156
	23	94.6	142	71.7	108	102	153	90.0	135	124	187	97.0	146
	24	89.8	135	68.2	102	95.1	143	84.0	126	115	173	90.3	136
	25	85.1	128	64.7	97.2	88.5	133	78.3	118	107	160	83.8	126
	26	80.5	121	61.2	91.9	82.0	123	72.6	109	98.6	148	77.5	116
	27	76.0	114	57.8	86.8	76.1	114	67.3	101	91.4	137	71.9	108
	28	71.5	107	54.4	81.8	70.7	106	62.6	94.1	85.0	128	66.8	100
	29	67.2	101	51.2	76.9	65.9	99.1	58.4	87.7	79.3	119	62.3	93.6
	30	62.8	94.4	47.9	72.0	61.6	92.6	54.5	82.0	74.1	111	58.2	87.5
	32	55.2	83.0	42.1	63.3	54.1	81.4	47.9	72.0	65.1	97.8	51.2	76.9
	34	48.9	73.5	37.3	56.1	48.0	72.1	42.5	63.8	57.7	86.7	45.3	68.1
	36	43.6	65.6	33.3	50.0	42.8	64.3	37.9	56.9	51.4	77.3	40.4	60.7
	38	39.2	58.8	29.9	44.9	38.4	57.7	34.0	51.1	46.2	69.4	36.3	54.5
	40	35.3	53.1	26.9	40.5	34.7	52.1	30.7	46.1	41.7	62.6	32.7	49.2
Properties													
A_g, in.^{2}		6.14		4.62		7.98		7.01		10.3		7.84	
I, in.^{4}		54.1		41.3		52.9		47.1		63.9		50.2	
r, in.		2.97		2.99		2.58		2.59		2.49		2.53	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Round HSS

F_y = 46 ksi

HSS7.500–HSS7.000

Shape		HSS7.500×						HSS7.000×					
		0.312		0.250		0.188		0.500		0.375		0.312	
t_{des}, in.		0.291		0.233		0.174		0.465		0.349		0.291	
lb/ft		23.97		19.38		14.70		34.74		26.56		22.31	
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, L_c (ft), with respect to radius of gyration, r	0	182	273	147	220	110	166	263	395	201	302	169	254
	6	172	259	139	209	105	157	247	371	189	283	159	239
	7	169	254	136	205	103	154	241	362	184	277	155	233
	8	165	248	133	201	100	151	234	352	179	270	151	227
	9	161	242	130	196	98.0	147	227	342	174	262	147	221
	10	156	235	127	190	95.4	143	220	330	168	253	142	214
	11	152	228	123	184	92.5	139	212	318	162	244	137	206
	12	146	220	119	178	89.5	135	203	305	156	234	132	198
	13	141	212	114	172	86.3	130	194	292	149	224	126	190
	14	136	204	110	165	83.0	125	185	278	142	214	120	181
	15	130	195	105	158	79.6	120	175	264	135	203	115	172
	16	124	186	101	151	76.1	114	166	249	128	193	109	163
	17	118	177	95.9	144	72.6	109	156	235	121	182	103	154
	18	112	168	91.1	137	69.0	104	147	221	114	171	96.6	145
	19	106	159	86.3	130	65.4	98.3	137	206	107	160	90.6	136
	20	100	150	81.5	123	61.8	92.9	128	192	99.6	150	84.7	127
	21	94.1	141	76.7	115	58.3	87.6	119	179	92.6	139	78.9	119
	22	88.3	133	72.1	108	54.8	82.3	110	165	85.9	129	73.3	110
	23	82.5	124	67.5	101	51.3	77.1	101	152	79.4	119	67.8	102
	24	77.0	116	63.0	94.6	48.0	72.1	93.1	140	73.0	110	62.4	93.8
	25	71.5	108	58.6	88.1	44.7	67.2	85.8	129	67.2	101	57.5	86.4
	26	66.2	99.4	54.3	81.5	41.4	62.3	79.4	119	62.2	93.4	53.2	79.9
	27	61.4	92.2	50.3	75.6	38.4	57.7	73.6	111	57.6	86.6	49.3	74.1
	28	57.1	85.7	46.8	70.3	35.7	53.7	68.4	103	53.6	80.6	45.8	68.9
	29	53.2	79.9	43.6	65.5	33.3	50.1	63.8	95.9	50.0	75.1	42.7	64.2
	30	49.7	74.7	40.8	61.3	31.1	46.8	59.6	89.6	46.7	70.2	39.9	60.0
	32	43.7	65.7	35.8	53.8	27.4	41.1	52.4	78.8	41.0	61.7	35.1	52.8
	34	38.7	58.2	31.7	47.7	24.2	36.4	46.4	69.8	36.4	54.6	31.1	46.7
	36	34.5	51.9	28.3	42.5	21.6	32.5	41.4	62.2	32.4	48.7	27.7	41.7
	38	31.0	46.6	25.4	38.2	19.4	29.2	37.2	55.8	29.1	43.7	24.9	37.4
	40	28.0	42.0	22.9	34.5	17.5	26.3						
Properties													
A_g, in.^{2}		6.59		5.32		4.00		9.55		7.29		6.13	
I, in.^{4}		42.9		35.2		26.9		51.2		40.4		34.6	
r, in.		2.55		2.57		2.59		2.32		2.35		2.37	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

Table 4-5 (continued)
Available Strength in Axial Compression, kips

F_y = 46 ksi

Round HSS

HSS7.000–HSS6.875

Shape	HSS7.000×						HSS6.875×					
	0.250		0.188		0.125		0.500		0.375		0.312	
t_{des}, in.	0.233		0.174		0.116		0.465		0.349		0.291	
lb/ft	18.04		13.69		9.19		34.07		26.06		21.89	
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, L_c (ft), with respect to radius of gyration, r												
0	136	205	103	154	69.1	104	258	388	197	296	166	249
6	128	193	96.8	145	65.2	98.0	241	362	185	278	156	234
7	125	189	94.7	142	63.8	95.9	235	353	180	271	152	228
8	122	184	92.3	139	62.2	93.6	229	344	176	264	148	222
9	119	179	89.8	135	60.5	91.0	221	333	170	256	144	216
10	115	173	87.0	131	58.7	88.2	214	321	164	247	139	209
11	111	167	84.0	126	56.7	85.2	205	309	158	238	134	201
12	107	161	80.8	121	54.6	82.1	197	296	152	228	128	193
13	102	154	77.5	116	52.4	78.8	188	282	145	218	123	184
14	97.8	147	74.1	111	50.1	75.3	178	268	138	208	117	176
15	93.1	140	70.6	106	47.8	71.8	169	254	131	197	111	167
16	88.3	133	67.0	101	45.4	68.3	159	239	124	186	105	158
17	83.5	126	63.4	95.4	43.0	64.7	150	225	117	175	99.0	149
18	78.7	118	59.9	90.0	40.6	61.1	140	211	110	165	93.0	140
19	73.9	111	56.3	84.6	38.2	57.5	131	197	102	154	87.1	131
20	69.2	104	52.7	79.2	35.9	53.9	122	183	95.4	143	81.2	122
21	64.5	97.0	49.2	74.0	33.5	50.4	113	169	88.6	133	75.5	113
22	60.0	90.2	45.8	68.9	31.3	47.0	104	156	81.9	123	69.9	105
23	55.6	83.6	42.5	63.9	29.0	43.6	95.2	143	75.4	113	64.5	96.9
24	51.2	77.0	39.3	59.0	26.9	40.4	87.4	131	69.2	104	59.2	89.0
25	47.2	71.0	36.2	54.4	24.8	37.2	80.6	121	63.8	95.9	54.6	82.0
26	43.7	65.6	33.5	50.3	22.9	34.4	74.5	112	59.0	88.7	50.5	75.8
27	40.5	60.8	31.0	46.6	21.2	31.9	69.1	104	54.7	82.2	46.8	70.3
28	37.6	56.6	28.8	43.4	19.7	29.7	64.2	96.5	50.9	76.5	43.5	65.4
29	35.1	52.7	26.9	40.4	18.4	27.6	59.9	90.0	47.4	71.3	40.6	61.0
30	32.8	49.3	25.1	37.8	17.2	25.8	55.9	84.1	44.3	66.6	37.9	57.0
32	28.8	43.3	22.1	33.2	15.1	22.7	49.2	73.9	38.9	58.5	33.3	50.1
34	25.5	38.4	19.6	29.4	13.4	20.1	43.5	65.5	34.5	51.9	29.5	44.4
36	22.8	34.2	17.4	26.2	11.9	17.9	38.8	58.4	30.8	46.2	26.3	39.6
38	20.4	30.7	15.7	23.5	10.7	16.1			27.6	41.5	23.6	35.5
40			14.1	21.2	9.67*	14.5						
Properties												
A_g, in.^{2}	4.95		3.73		2.51		9.36		7.16		6.02	
I, in.^{4}	28.4		21.7		14.9		48.3		38.2		32.7	
r, in.	2.39		2.41		2.43		2.27		2.31		2.33	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

HSS6.875–
HSS6.625

Table 4-5 (continued)
Available Strength in Axial Compression, kips

F_y = 46 ksi

Round HSS

Shape		HSS6.875×				HSS6.625×					
		0.250		0.188		0.500		0.432		0.375	
t_{des}, in.		0.233		0.174		0.465		0.402		0.349	
lb/ft		17.71		13.44		32.74		28.60		25.06	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to radius of gyration, r	0	134	201	101	152	248	373	217	325	190	285
	6	126	189	94.7	142	230	346	201	303	177	265
	7	123	185	92.6	139	224	337	196	295	172	259
	8	120	180	90.3	136	218	327	190	286	167	251
	9	116	175	87.7	132	210	316	184	277	162	243
	10	112	169	84.8	128	202	304	177	266	156	234
	11	108	163	81.8	123	194	291	170	255	149	225
	12	104	156	78.6	118	185	278	162	244	143	215
	13	99.5	150	75.3	113	176	264	154	232	136	204
	14	94.9	143	71.9	108	166	250	146	220	129	194
	15	90.2	136	68.4	103	157	236	138	207	122	183
	16	85.4	128	64.8	97.4	147	221	130	195	115	172
	17	80.6	121	61.2	92.1	138	207	121	182	107	161
	18	75.8	114	57.7	86.7	128	193	113	170	100	151
	19	71.1	107	54.1	81.3	119	179	105	158	93.2	140
	20	66.4	99.8	50.6	76.0	110	165	97.2	146	86.3	130
	21	61.8	92.8	47.1	70.8	101	152	89.6	135	79.7	120
	22	57.3	86.1	43.8	65.8	92.2	139	82.0	123	73.1	110
	23	52.9	79.6	40.5	60.9	84.4	127	75.1	113	66.9	101
	24	48.6	73.1	37.3	56.0	77.5	116	68.9	104	61.4	92.4
	25	44.8	67.4	34.3	51.6	71.4	107	63.5	95.5	56.6	85.1
	26	41.4	62.3	31.7	47.7	66.0	99.3	58.7	88.3	52.4	78.7
	27	38.4	57.8	29.4	44.2	61.2	92.0	54.5	81.9	48.5	73.0
	28	35.7	53.7	27.4	41.1	56.9	85.6	50.6	76.1	45.1	67.9
	29	33.3	50.1	25.5	38.3	53.1	79.8	47.2	71.0	42.1	63.3
	30	31.1	46.8	23.8	35.8	49.6	74.6	44.1	66.3	39.3	59.1
	32	27.4	41.1	21.0	31.5	43.6	65.5	38.8	58.3	34.6	51.9
	34	24.2	36.4	18.6	27.9	38.6	58.0	34.4	51.6	30.6	46.0
	36	21.6	32.5	16.6	24.9	34.4	51.8	30.6	46.1	27.3	41.0
	38	19.4	29.2	14.9	22.3						
Properties											
A_g, in.^{2}		4.86		3.66		9.00		7.86		6.88	
I, in.^{4}		26.8		20.6		42.9		38.2		34.0	
r, in.		2.35		2.37		2.18		2.20		2.22	

ASD	LRFD	Note: Heavy line indicates L_c/r equal to or greater than 200.
Ω_c = 1.67	ϕ_c = 0.90	

F_y = 46 ksi

Table 4-5 (continued) Available Strength in Axial Compression, kips

Round HSS

HSS6.625

Shape		HSS6.625×									
		0.312		0.280		0.250		0.188		0.125	
t_{des}, in.		0.291		0.260		0.233		0.174		0.116	
lb/ft		21.06		18.99		17.04		12.94		8.69	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to radius of gyration, r	0	159	240	143	215	129	194	97.2	146	65.3	98.1
	6	149	224	134	201	120	181	90.9	137	61.1	91.9
	7	145	218	130	196	117	177	88.7	133	59.7	89.7
	8	141	212	127	190	114	172	86.3	130	58.1	87.3
	9	136	205	123	184	111	166	83.6	126	56.3	84.6
	10	131	198	118	178	107	160	80.7	121	54.4	81.7
	11	126	190	114	171	102	154	77.6	117	52.3	78.6
	12	121	182	109	163	98.1	147	74.4	112	50.2	75.4
	13	115	173	104	156	93.6	141	71.0	107	47.9	72.0
	14	109	164	98.4	148	88.9	134	67.5	101	45.6	68.5
	15	103	155	93.1	140	84.1	126	63.9	96.1	43.2	65.0
	16	97.3	146	87.8	132	79.3	119	60.3	90.7	40.9	61.4
	17	91.3	137	82.4	124	74.5	112	56.7	85.3	38.5	57.8
	18	85.3	128	77.1	116	69.7	105	53.2	79.9	36.1	54.2
	19	79.4	119	71.8	108	65.0	97.7	49.6	74.6	33.7	50.7
	20	73.7	111	66.6	100	60.4	90.7	46.1	69.4	31.4	47.2
	21	68.1	102	61.6	92.6	55.9	84.0	42.7	64.3	29.1	43.8
	22	62.7	94.2	56.7	85.3	51.5	77.4	39.5	59.3	26.9	40.4
	23	57.3	86.2	51.9	78.1	47.2	70.9	36.2	54.4	24.7	37.2
	24	52.6	79.1	47.7	71.7	43.3	65.1	33.3	50.0	22.7	34.1
	25	48.5	72.9	44.0	66.1	39.9	60.0	30.6	46.1	20.9	31.5
	26	44.9	67.4	40.6	61.1	36.9	55.5	28.3	42.6	19.4	29.1
	27	41.6	62.5	37.7	56.7	34.2	51.4	26.3	39.5	18.0	27.0
	28	38.7	58.1	35.0	52.7	31.8	47.8	24.4	36.7	16.7	25.1
	29	36.1	54.2	32.7	49.1	29.7	44.6	22.8	34.2	15.6	23.4
	30	33.7	50.6	30.5	45.9	27.7	41.7	21.3	32.0	14.5	21.9
	32	29.6	44.5	26.8	40.3	24.4	36.6	18.7	28.1	12.8	19.2
	34	26.2	39.4	23.8	35.7	21.6	32.4	16.6	24.9	11.3	17.0
	36	23.4	35.2	21.2	31.9	19.3	28.9	14.8	22.2	10.1	15.2
	38							13.3	19.9	9.06	13.6

Properties

	0.312	0.280	0.250	0.188	0.125
A_g, in.^{2}	5.79	5.20	4.68	3.53	2.37
I, in.^{4}	29.1	26.4	23.9	18.4	12.6
r, in.	2.24	2.25	2.26	2.28	2.30

ASD	LRFD	Note: Heavy line indicates L_c/r equal to or greater than 200.
Ω_c = 1.67	ϕ_c = 0.90	

Menu

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Round HSS

HSS6.000

$F_y = 46$ ksi

Shape		HSS6.000×											
		0.500		0.375		0.312		0.280		0.250		0.188	
t_{des}, in.		0.465		0.349		0.291		0.260		0.233		0.174	
lb/ft		29.40		22.55		18.97		17.12		15.37		11.68	
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, L_c (ft), with respect to radius of gyration, r	0	223	335	171	257	144	216	129	194	116	175	87.6	132
	1	222	334	170	256	143	216	129	194	116	174	87.4	131
	2	221	332	169	254	142	214	128	192	115	173	86.8	130
	3	218	327	167	251	141	212	126	190	114	171	85.8	129
	4	214	322	164	247	138	208	124	187	112	168	84.5	127
	5	209	314	161	242	135	204	122	183	110	165	82.7	124
	6	204	306	157	235	132	198	119	178	107	161	80.7	121
	7	197	296	152	228	128	192	115	173	104	156	78.3	118
	8	190	285	146	220	124	186	111	167	100	151	75.7	114
	9	182	273	140	211	119	178	107	161	96.3	145	72.8	109
	10	173	260	134	201	113	170	102	153	92.1	138	69.7	105
	11	164	247	127	191	108	162	97.2	146	87.7	132	66.5	99.9
	12	155	233	121	181	102	154	92.1	138	83.1	125	63.1	94.8
	13	146	219	113	170	96.3	145	86.8	131	78.4	118	59.6	89.5
	14	136	204	106	160	90.3	136	81.5	122	73.7	111	56.0	84.2
	15	126	190	99.0	149	84.3	127	76.1	114	68.9	103	52.4	78.8
	16	117	176	91.9	138	78.3	118	70.8	106	64.1	96.3	48.8	73.4
	17	108	162	84.8	127	72.4	109	65.5	98.4	59.3	89.2	45.3	68.1
	18	98.4	148	77.9	117	66.6	100	60.3	90.7	54.7	82.2	41.8	62.8
	19	89.7	135	71.2	107	61.0	91.7	55.3	83.1	50.2	75.4	38.4	57.8
	20	81.1	122	64.7	97.3	55.6	83.5	50.5	75.8	45.8	68.9	35.2	52.8
	21	73.6	111	58.7	88.2	50.4	75.8	45.7	68.8	41.6	62.5	31.9	48.0
	22	67.0	101	53.5	80.4	45.9	69.0	41.7	62.6	37.9	56.9	29.1	43.7
	23	61.3	92.2	48.9	73.5	42.0	63.2	38.1	57.3	34.7	52.1	26.6	40.0
	24	56.3	84.6	44.9	67.5	38.6	58.0	35.0	52.6	31.8	47.8	24.5	36.8
	25	51.9	78.0	41.4	62.3	35.6	53.5	32.3	48.5	29.3	44.1	22.5	33.9
	26	48.0	72.1	38.3	57.6	32.9	49.4	29.8	44.9	27.1	40.8	20.8	31.3
	28	41.4	62.2	33.0	49.6	28.4	42.6	25.7	38.7	23.4	35.1	18.0	27.0
	30	36.0	54.2	28.8	43.2	24.7	37.1	22.4	33.7	20.4	30.6	15.7	23.5
	32	31.7	47.6	25.3	38.0	21.7	32.6	19.7	29.6	17.9	26.9	13.8	20.7
	34									15.9	23.8	12.2	18.3
Properties													
A_g, in.^{2}		8.09		6.20		5.22		4.69		4.22		3.18	
I, in.^{4}		31.2		24.8		21.3		19.3		17.6		13.5	
r, in.		1.96		2.00		2.02		2.03		2.04		2.06	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

Table 4-5 (continued) Available Strength in Axial Compression, kips

$F_y = 46$ ksi

Round HSS

HSS6.000–HSS5.563

Shape		HSS6.000×		HSS5.563×											
		0.125		0.500		0.375		0.258		0.188		0.134	
t_{des}, in.		0.116		0.465		0.349		0.240		0.174		0.124	
lb/ft		7.85		27.06		20.80		14.63		10.80		7.78	
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, L_c (ft), with respect to radius of gyration, r	0	58.9	88.6	205	308	158	237	110	166	81.3	122	58.4	87.8
	1	58.8	88.4	205	308	157	236	110	166	81.0	122	58.2	87.5
	2	58.4	87.8	203	305	156	234	109	164	80.4	121	57.8	86.9
	3	57.8	86.8	200	300	154	231	108	162	79.3	119	57.0	85.7
	4	56.9	85.5	196	294	151	226	106	159	77.9	117	56.0	84.2
	5	55.7	83.8	191	286	147	221	103	155	76.0	114	54.7	82.2
	6	54.4	81.7	184	277	142	214	100	150	73.8	111	53.1	79.8
	7	52.8	79.4	178	267	137	206	96.6	145	71.3	107	51.3	77.2
	8	51.1	76.8	170	255	131	198	92.7	139	68.6	103	49.4	74.2
	9	49.2	73.9	162	243	125	188	88.5	133	65.5	98.5	47.2	70.9
	10	47.1	70.8	153	229	119	178	84.0	126	62.3	93.6	44.9	67.5
	11	45.0	67.6	143	216	112	168	79.3	119	58.9	88.6	42.5	63.9
	12	42.7	64.2	134	201	105	158	74.4	112	55.4	83.3	40.0	60.1
	13	40.4	60.7	125	187	97.7	147	69.5	104	51.9	78.0	37.5	56.3
	14	38.0	57.1	115	173	90.5	136	64.6	97.0	48.3	72.6	34.9	52.4
	15	35.6	53.5	106	159	83.3	125	59.6	89.6	44.7	67.2	32.3	48.6
	16	33.2	49.9	96.3	145	76.3	115	54.8	82.3	41.2	61.9	29.8	44.8
	17	30.9	46.4	87.3	131	69.5	105	50.0	75.2	37.7	56.7	27.3	41.1
	18	28.5	42.9	78.6	118	63.0	94.7	45.5	68.3	34.4	51.7	24.9	37.5
	19	26.3	39.5	70.6	106	56.6	85.1	41.0	61.6	31.1	46.8	22.6	34.0
	20	24.1	36.2	63.7	95.7	51.1	76.8	37.0	55.6	28.1	42.2	20.4	30.7
	21	21.9	32.9	57.8	86.8	46.3	69.6	33.5	50.4	25.5	38.3	18.5	27.8
	22	20.0	30.0	52.6	79.1	42.2	63.5	30.6	45.9	23.2	34.9	16.9	25.3
	23	18.3	27.5	48.2	72.4	38.6	58.1	28.0	42.0	21.2	31.9	15.4	23.2
	24	16.8	25.2	44.2	66.5	35.5	53.3	25.7	38.6	19.5	29.3	14.2	21.3
	25	15.5	23.2	40.8	61.3	32.7	49.1	23.7	35.6	18.0	27.0	13.1	19.6
	26	14.3	21.5	37.7	56.6	30.2	45.4	21.9	32.9	16.6	25.0	12.1	18.1
	28	12.3	18.5	32.5	48.8	26.1	39.2	18.9	28.4	14.3	21.5	10.4	15.6
	30	10.7	16.1	28.3	42.5	22.7	34.1	16.4	24.7	12.5	18.8	9.06	13.6
	32	9.44	14.2									7.97	12.0
	34	8.36	12.6										
Properties													
A_g, in.^{2}		2.14		7.45		5.72		4.01		2.95		2.12	
I, in.^{4}		9.28		24.4		19.5		14.2		10.7		7.84	
r, in.		2.08		1.81		1.85		1.88		1.91		1.92	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

Table 4-5 (continued)
Available Strength in Axial Compression, kips

F_y = 46 ksi

Round HSS

HSS5.500–
HSS5.000

Shape		HSS5.500×						HSS5.000×					
		0.500		0.375		0.258		0.500		0.375		0.312	
t_{des}, in.		0.465		0.349		0.240		0.465		0.349		0.291	
lb/ft		26.73		20.55		14.46		24.05		18.54		15.64	
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, L_c (ft), with respect to radius of gyration, r	0	203	305	156	234	109	164	182	274	140	211	118	178
	1	202	304	155	233	109	164	182	273	140	210	118	177
	2	200	301	154	231	108	163	180	270	138	208	117	176
	3	197	297	152	228	107	160	176	265	136	204	115	173
	4	193	290	149	223	105	157	172	258	133	199	112	168
	5	188	283	145	218	102	153	166	250	129	193	109	163
	6	182	273	140	211	98.9	149	159	240	124	186	105	157
	7	175	263	135	203	95.3	143	152	228	118	177	99.9	150
	8	167	251	129	194	91.4	137	144	216	112	168	94.8	143
	9	159	239	123	185	87.2	131	135	202	105	158	89.4	134
	10	150	225	117	175	82.6	124	125	189	98.4	148	83.7	126
	11	141	211	110	165	77.9	117	116	174	91.3	137	77.8	117
	12	131	197	103	154	73.1	110	106	160	84.2	126	71.8	108
	13	122	183	95.5	143	68.1	102	97.0	146	77.0	116	65.9	99.0
	14	112	168	88.3	133	63.2	94.9	87.7	132	69.9	105	60.0	90.1
	15	103	154	81.2	122	58.2	87.5	78.7	118	63.1	94.8	54.2	81.5
	16	93.5	141	74.2	112	53.4	80.3	70.0	105	56.5	84.9	48.7	73.2
	17	84.6	127	67.5	101	48.7	73.2	62.0	93.2	50.1	75.4	43.3	65.1
	18	76.0	114	61.0	91.6	44.1	66.3	55.3	83.1	44.7	67.2	38.6	58.1
	19	68.2	102	54.7	82.2	39.7	59.7	49.6	74.6	40.1	60.3	34.7	52.1
	20	61.5	92.5	49.4	74.2	35.8	53.9	44.8	67.3	36.2	54.5	31.3	47.0
	21	55.8	83.9	44.8	67.3	32.5	48.9	40.6	61.0	32.9	49.4	28.4	42.7
	22	50.9	76.4	40.8	61.3	29.6	44.5	37.0	55.6	29.9	45.0	25.9	38.9
	23	46.5	69.9	37.3	56.1	27.1	40.7	33.9	50.9	27.4	41.2	23.7	35.6
	24	42.7	64.2	34.3	51.5	24.9	37.4	31.1	46.7	25.2	37.8	21.7	32.7
	25	39.4	59.2	31.6	47.5	22.9	34.5	28.7	43.1	23.2	34.9	20.0	30.1
	26	36.4	54.7	29.2	43.9	21.2	31.9	26.5	39.8	21.4	32.2	18.5	27.8
	28	31.4	47.2	25.2	37.9	18.3	27.5						
	30			21.9	33.0	15.9	23.9						

Properties

	HSS5.500×0.500	HSS5.500×0.375	HSS5.500×0.258	HSS5.000×0.500	HSS5.000×0.375	HSS5.000×0.312
A_g, in.^{2}	7.36	5.65	3.97	6.62	5.10	4.30
I, in.^{4}	23.5	18.8	13.7	17.2	13.9	12.0
r, in.	1.79	1.83	1.86	1.61	1.65	1.67

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

F_y = 46 ksi

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Round HSS

HSS5.000–HSS4.500

Shape		HSS5.000×								HSS4.500×			
		0.258		0.250		0.188		0.125		0.375		0.337	
t_{des}, in.		0.240		0.233		0.174		0.116		0.349		0.313	
lb/ft		13.08		12.69		9.67		6.51		16.54		15.00	
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, L_c (ft), with respect to radius of gyration, r	0	98.9	149	96.1	144	72.7	109	49.0	73.7	125	188	113	171
	1	98.6	148	95.8	144	72.5	109	48.9	73.5	125	188	113	170
	2	97.6	147	94.8	143	71.8	108	48.4	72.7	123	185	111	168
	3	95.9	144	93.2	140	70.6	106	47.6	71.6	120	181	109	164
	4	93.7	141	91.1	137	69.0	104	46.6	70.0	117	175	106	159
	5	90.8	137	88.3	133	66.9	101	45.2	68.0	112	168	102	153
	6	87.5	132	85.1	128	64.5	97.0	43.6	65.6	107	160	96.8	145
	7	83.7	126	81.4	122	61.8	92.9	41.8	62.9	101	151	91.4	137
	8	79.6	120	77.4	116	58.8	88.4	39.9	59.9	94.1	141	85.5	129
	9	75.1	113	73.0	110	55.6	83.6	37.7	56.7	87.2	131	79.3	119
	10	70.4	106	68.5	103	52.2	78.5	35.5	53.3	80.1	120	72.9	110
	11	65.6	98.6	63.8	95.9	48.7	73.2	33.1	49.8	72.9	110	66.5	99.9
	12	60.7	91.2	59.0	88.7	45.1	67.8	30.8	46.2	65.7	98.8	60.0	90.2
	13	55.7	83.8	54.2	81.5	41.5	62.4	28.4	42.6	58.8	88.3	53.7	80.8
	14	50.9	76.5	49.5	74.3	38.0	57.1	26.0	39.1	52.1	78.2	47.7	71.7
	15	46.1	69.3	44.8	67.4	34.5	51.9	23.7	35.6	45.6	68.6	41.9	62.9
	16	41.5	62.4	40.3	60.6	31.1	46.8	21.4	32.2	40.1	60.3	36.8	55.3
	17	37.0	55.7	36.0	54.1	27.9	41.9	19.2	28.9	35.5	53.4	32.6	49.0
	18	33.0	49.6	32.1	48.3	24.9	37.4	17.2	25.8	31.7	47.6	29.1	43.7
	19	29.6	44.6	28.8	43.3	22.3	33.5	15.4	23.2	28.4	42.7	26.1	39.2
	20	26.8	40.2	26.0	39.1	20.1	30.3	13.9	20.9	25.7	38.6	23.5	35.4
	21	24.3	36.5	23.6	35.5	18.3	27.5	12.6	19.0	23.3	35.0	21.4	32.1
	22	22.1	33.2	21.5	32.3	16.6	25.0	11.5	17.3	21.2	31.9	19.5	29.3
	23	20.2	30.4	19.7	29.6	15.2	22.9	10.5	15.8	19.4	29.2	17.8	26.8
	24	18.6	27.9	18.1	27.1	14.0	21.0	9.65	14.5	17.8	26.8	16.4	24.6
	25	17.1	25.7	16.6	25.0	12.9	19.4	8.90	13.4				
	26	15.8	23.8	15.4	23.1	11.9	17.9	8.23	12.4				
	28	13.7	20.5	13.3	19.9	10.3	15.4	7.09	10.7				
Properties													
A_g, in.^{2}		3.59		3.49		2.64		1.78		4.55		4.12	
I, in.^{4}		10.2		9.94		7.69		5.31		9.87		9.07	
r, in.		1.69		1.69		1.71		1.73		1.47		1.48	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

HSS4.500–
HSS4.000

Table 4-5 (continued)
Available Strength in Axial Compression, kips

F_y = 46 ksi

Round HSS

Shape		HSS4.500×						HSS4.000×			
		0.237		0.188		0.125		0.313		0.250	
t_{des}, in.		0.220		0.174		0.116		0.291		0.233	
lb/ft		10.80		8.67		5.85		12.34		10.00	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to radius of gyration, r	0	81.5	123	65.0	97.7	44.1	66.2	93.4	140	76.0	114
	1	81.2	122	64.7	97.3	43.9	66.0	92.9	140	75.6	114
	2	80.2	121	63.9	96.1	43.4	65.2	91.3	137	74.4	112
	3	78.5	118	62.6	94.1	42.5	63.9	88.8	133	72.4	109
	4	76.2	115	60.8	91.4	41.3	62.1	85.4	128	69.6	105
	5	73.4	110	58.6	88.1	39.8	59.9	81.3	122	66.3	99.6
	6	70.1	105	56.0	84.2	38.1	57.3	76.4	115	62.4	93.8
	7	66.4	99.8	53.1	79.8	36.2	54.4	71.1	107	58.1	87.4
	8	62.3	93.7	49.9	75.0	34.0	51.2	65.4	98.3	53.5	80.5
	9	58.1	87.3	46.5	69.9	31.8	47.8	59.5	89.5	48.8	73.3
	10	53.6	80.6	43.0	64.6	29.4	44.3	53.6	80.5	44.0	66.1
	11	49.1	73.8	39.4	59.2	27.1	40.7	47.7	71.6	39.2	58.9
	12	44.6	67.0	35.8	53.8	24.7	37.1	41.9	63.0	34.6	51.9
	13	40.1	60.3	32.3	48.6	22.3	33.5	36.5	54.8	30.1	45.3
	14	35.8	53.9	28.9	43.4	20.0	30.1	31.5	47.3	26.0	39.1
	15	31.7	47.7	25.6	38.5	17.8	26.7	27.4	41.2	22.6	34.0
	16	27.9	41.9	22.5	33.9	15.7	23.6	24.1	36.2	19.9	29.9
	17	24.7	37.1	20.0	30.0	13.9	20.9	21.3	32.1	17.6	26.5
	18	22.0	33.1	17.8	26.8	12.4	18.6	19.0	28.6	15.7	23.6
	19	19.8	29.7	16.0	24.0	11.1	16.7	17.1	25.7	14.1	21.2
	20	17.8	26.8	14.4	21.7	10.0	15.1	15.4	23.2	12.7	19.1
	21	16.2	24.3	13.1	19.7	9.10	13.7	14.0	21.0	11.6	17.4
	22	14.7	22.2	11.9	17.9	8.29	12.5	12.7	19.1	10.5	15.8
	23	13.5	20.3	10.9	16.4	7.58	11.4				
	24	12.4	18.6	10.0	15.0	6.97	10.5				
	25	11.4	17.2	9.23	13.9	6.42	9.65				
Properties											
A_g, in.^{2}		2.96		2.36		1.60		3.39		2.76	
I, in.^{4}		6.79		5.54		3.84		5.87		4.91	
r, in.		1.52		1.53		1.55		1.32		1.33	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

Table 4-5 (continued)
Available Strength in Axial Compression, kips
Round HSS

$F_y = 46$ ksi

HSS4.000

Shape		HSS4.000×									
		0.237		0.226		0.220		0.188		0.125	
t_{des}, in.		0.220		0.210		0.205		0.174		0.116	
lb/ft		9.53		9.12		8.89		7.66		5.18	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to radius of gyration, r	0	71.9	108	68.9	103	67.2	101	57.6	86.5	39.1	58.8
	1	71.5	107	68.5	103	66.8	100	57.3	86.1	38.9	58.5
	2	70.4	106	67.4	101	65.8	98.9	56.4	84.7	38.3	57.6
	3	68.5	103	65.6	98.6	64.0	96.2	54.9	82.5	37.3	56.1
	4	65.9	99.1	63.2	94.9	61.7	92.7	52.9	79.5	36.0	54.1
	5	62.8	94.4	60.2	90.4	58.7	88.3	50.4	75.8	34.4	51.7
	6	59.2	89.0	56.7	85.2	55.3	83.2	47.5	71.5	32.5	48.8
	7	55.2	83.0	52.9	79.5	51.6	77.6	44.4	66.7	30.4	45.7
	8	50.9	76.5	48.8	73.3	47.6	71.5	41.0	61.6	28.1	42.3
	9	46.4	69.8	44.5	66.9	43.4	65.3	37.4	56.3	25.8	38.7
	10	41.9	63.0	40.2	60.3	39.2	58.9	33.8	50.9	23.3	35.1
	11	37.4	56.3	35.9	53.9	35.0	52.6	30.3	45.5	20.9	31.5
	12	33.1	49.7	31.7	47.6	30.9	46.5	26.8	40.2	18.6	28.0
	13	28.9	43.4	27.7	41.6	27.0	40.6	23.4	35.2	16.4	24.6
	14	25.0	37.5	23.9	35.9	23.3	35.1	20.3	30.5	14.2	21.3
	15	21.7	32.7	20.8	31.3	20.3	30.5	17.7	26.6	12.4	18.6
	16	19.1	28.7	18.3	27.5	17.9	26.8	15.5	23.3	10.9	16.3
	17	16.9	25.4	16.2	24.4	15.8	23.8	13.8	20.7	9.63	14.5
	18	15.1	22.7	14.5	21.7	14.1	21.2	12.3	18.4	8.59	12.9
	19	13.6	20.4	13.0	19.5	12.7	19.0	11.0	16.6	7.71	11.6
	20	12.2	18.4	11.7	17.6	11.4	17.2	9.94	14.9	6.95	10.5
	21	11.1	16.7	10.6	16.0	10.4	15.6	9.02	13.6	6.31	9.48
	22	10.1	15.2	9.68	14.6	9.45	14.2	8.21	12.3	5.75	8.64

Properties

	0.237	0.226	0.220	0.188	0.125
A_g, in.^{2}	2.61	2.50	2.44	2.09	1.42
I, in.^{4}	4.68	4.50	4.41	3.83	2.67
r, in.	1.34	1.34	1.34	1.35	1.37

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

Table 4-6
Available Strength in Axial Compression, kips

$F_y = 35$ ksi

PIPE 12–
PIPE 8

Pipe

Shape		Pipe 12				Pipe 10				Pipe 8			
		x-Strong		Std		x-Strong		Std		xx-Strong		x-Strong	
t_{des}, in.		0.465		0.349		0.465		0.340		0.816		0.465	
lb/ft		65.5		49.6		54.8		40.5		72.5		43.4	
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, L_c (ft), with respect to radius of gyration, r	0	367	551	287	432	316	476	241	362	419	630	249	375
	6	362	544	283	426	310	466	236	355	405	609	242	363
	7	360	541	282	424	308	463	235	353	400	601	239	359
	8	358	538	280	421	305	459	233	350	394	593	236	354
	9	355	534	278	418	303	455	231	347	388	583	232	349
	10	353	530	276	415	299	450	228	343	381	573	228	343
	11	350	526	274	412	296	445	226	339	373	561	224	337
	12	347	521	272	408	292	439	223	335	365	549	220	330
	13	343	516	269	405	288	433	220	330	357	536	215	323
	14	340	511	266	400	284	427	217	326	348	523	210	315
	15	336	505	263	396	279	420	213	320	338	508	204	307
	16	332	499	260	391	274	413	210	315	328	494	199	299
	17	328	493	257	386	269	405	206	310	318	478	193	290
	18	323	486	254	381	264	397	202	304	308	463	187	282
	19	319	479	250	376	259	389	198	298	297	447	181	273
	20	314	472	246	370	253	381	194	291	286	430	175	263
	21	309	464	243	365	248	372	190	285	275	414	169	254
	22	304	457	239	359	242	363	185	278	264	397	163	245
	23	298	449	235	353	236	354	181	272	253	380	156	235
	24	293	440	230	346	230	345	176	265	242	364	150	225
	25	288	432	226	340	224	336	172	258	231	347	144	216
	26	282	424	222	333	217	327	167	251	220	331	137	206
	27	276	415	217	327	211	317	162	244	209	314	131	197
	28	270	406	213	320	205	308	157	236	198	298	125	188
	29	264	397	208	313	198	298	153	229	188	283	119	178
	30	258	388	204	306	192	288	148	222	178	267	113	169
	32	246	370	194	292	179	269	138	207	158	237	101	152
	34	234	351	185	277	166	250	128	193	140	210	89.7	135
	36	221	333	175	263	154	231	119	179	124	187	80.0	120
	38	209	314	165	248	142	213	110	165	112	168	71.8	108
	40	197	296	156	234	130	195	101	152	101	152	64.8	97.5

Properties

	Pipe 12 x-Strong	Pipe 12 Std	Pipe 10 x-Strong	Pipe 10 Std	Pipe 8 xx-Strong	Pipe 8 x-Strong
A_g, in.^{2}	17.5	13.7	15.1	11.5	20.0	11.9
I, in.^{4}	339	262	199	151	154	100
r, in.	4.35	4.39	3.64	3.68	2.78	2.89

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

$F_y = 35$ ksi

PIPE 8–PIPE 5

Shape		Pipe 8		Pipe 6						Pipe 5	
		Std		xx-Strong		x-Strong		Std		xx-Strong	
t_{des}, in.		0.300		0.805		0.403		0.261		0.699	
lb/ft		28.6		53.2		28.6		19.0		38.6	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to radius of gyration, r	0	165	247	308	463	164	247	109	164	224	337
	6	160	240	290	436	155	233	103	155	205	309
	7	158	237	283	426	152	229	101	153	199	299
	8	156	234	276	415	149	224	99.3	149	192	288
	9	154	231	268	403	145	218	96.9	146	184	277
	10	151	227	260	391	141	212	94.2	142	176	264
	11	148	223	251	377	136	205	91.4	137	167	251
	12	146	219	241	362	132	198	88.4	133	158	237
	13	143	214	231	347	127	191	85.2	128	149	223
	14	139	209	221	332	122	183	81.9	123	139	209
	15	136	204	210	316	116	175	78.5	118	130	195
	16	132	199	199	299	111	167	75.1	113	120	181
	17	129	194	188	283	106	159	71.6	108	111	167
	18	125	188	177	267	100	151	68.0	102	102	153
	19	121	182	167	250	94.7	142	64.4	96.8	93.1	140
	20	117	176	156	234	89.2	134	60.9	91.5	84.5	127
	21	113	170	145	218	83.8	126	57.3	86.2	76.7	115
	22	109	164	135	203	78.5	118	53.9	81.0	69.9	105
	23	105	158	125	188	73.3	110	50.5	75.8	63.9	96.1
	24	101	152	115	173	68.3	103	47.1	70.8	58.7	88.2
	25	96.9	146	106	160	63.3	95.1	43.9	65.9	54.1	81.3
	26	92.8	139	98.2	148	58.5	88.0	40.6	61.1	50.0	75.2
	27	88.7	133	91.1	137	54.3	81.6	37.7	56.7	46.4	69.7
	28	84.7	127	84.7	127	50.5	75.8	35.0	52.7	43.1	64.8
	29	80.7	121	78.9	119	47.0	70.7	32.7	49.1	40.2	60.4
	30	76.8	115	73.8	111	44.0	66.1	30.5	45.9		
	32	69.1	104	64.8	97.4	38.6	58.1	26.8	40.3		
	34	61.7	92.7	57.4	86.3	34.2	51.4	23.8	35.7		
	36	55.0	82.7			30.5	45.9	21.2	31.9		
	38	49.4	74.2								
	40	44.6	67.0								
Properties											
A_g, in.^{2}		7.85		14.7		7.83		5.20		10.7	
I, in.^{4}		68.1		63.5		38.3		26.5		32.2	
r, in.		2.95		2.08		2.20		2.25		1.74	
ASD		LRFD		Note: Heavy line indicates L_c/r equal to or greater than 200.							
$\Omega_c = 1.67$		$\phi_c = 0.90$									

Menu

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

$F_y = 35$ ksi

PIPE 5–PIPE 4

Pipe

Shape		Pipe 5				Pipe 4					
		x-Strong		Std		xx-Strong		x-Strong		Std	
t_{des}, in.		0.349		0.241		0.628		0.315		0.221	
lb/ft		20.8		14.6		27.6		15.0		10.8	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to radius of gyration, r	0	120	180	84.0	126	161	241	86.8	130	62.0	93.2
	6	111	167	78.0	117	140	210	76.9	116	55.2	83.0
	7	108	162	75.9	114	133	200	73.6	111	52.9	79.6
	8	105	157	73.5	111	126	189	70.0	105	50.4	75.8
	9	101	152	71.0	107	118	177	66.1	99.3	47.7	71.8
	10	96.8	146	68.2	103	110	165	62.0	93.1	44.9	67.5
	11	92.5	139	65.3	98.1	101	152	57.7	86.8	42.0	63.1
	12	88.1	132	62.2	93.6	92.7	139	53.4	80.3	38.9	58.5
	13	83.5	125	59.1	88.8	84.3	127	49.1	73.8	35.9	54.0
	14	78.7	118	55.8	83.9	76.0	114	44.9	67.4	32.9	49.5
	15	74.0	111	52.6	79.0	68.1	102	40.7	61.2	30.0	45.1
	16	69.2	104	49.3	74.1	60.3	90.7	36.7	55.1	27.1	40.8
	17	64.4	96.9	46.0	69.1	53.5	80.3	32.8	49.2	24.4	36.6
	18	59.8	89.8	42.8	64.3	47.7	71.7	29.2	43.9	21.7	32.7
	19	55.2	83.0	39.6	59.5	42.8	64.3	26.2	39.4	19.5	29.3
	20	50.7	76.3	36.5	54.9	38.6	58.0	23.7	35.6	17.6	26.5
	21	46.4	69.8	33.5	50.4	35.0	52.6	21.5	32.3	16.0	24.0
	22	42.3	63.6	30.6	45.9	31.9	48.0	19.6	29.4	14.6	21.9
	23	38.7	58.2	28.0	42.0	29.2	43.9	17.9	26.9	13.3	20.0
	24	35.5	53.4	25.7	38.6			16.4	24.7	12.2	18.4
	25	32.8	49.2	23.7	35.6					11.3	16.9
	26	30.3	45.5	21.9	32.9						
	27	28.1	42.2	20.3	30.5						
	28	26.1	39.2	18.9	28.4						
	29	24.3	36.6	17.6	26.4						
	30	22.7	34.2	16.4	24.7						

Properties

	Pipe 5 x-Strong	Pipe 5 Std	Pipe 4 xx-Strong	Pipe 4 x-Strong	Pipe 4 Std
A_g, in.^{2}	5.73	4.01	7.66	4.14	2.96
I, in.^{4}	19.5	14.3	14.7	9.12	6.82
r, in.	1.85	1.88	1.39	1.48	1.51

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

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

F_y = 35 ksi

Pipe

PIPE 3½–PIPE 3

Shape	Pipe 3½				Pipe 3					
	x-Strong		Std		xx-Strong		x-Strong		Std	
t_{des}, in.	0.296		0.211		0.559		0.280		0.201	
lb/ft	12.5		9.12		18.6		10.3		7.58	
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	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
0	71.9	108	52.4	78.7	108	163	59.3	89.1	43.4	65.2
6	61.6	92.6	45.2	67.9	85.6	129	48.4	72.7	35.7	53.7
7	58.2	87.5	42.8	64.4	78.6	118	44.9	67.5	33.3	50.1
8	54.6	82.1	40.3	60.6	71.2	107	41.3	62.0	30.7	46.2
9	50.8	76.3	37.6	56.5	63.7	95.7	37.5	56.3	28.0	42.2
10	46.8	70.3	34.8	52.2	56.2	84.5	33.6	50.6	25.3	38.1
11	42.8	64.3	31.9	47.9	49.0	73.6	29.9	44.9	22.6	34.0
12	38.7	58.2	29.0	43.6	42.1	63.3	26.2	39.4	20.0	30.0
13	34.8	52.3	26.2	39.4	35.9	53.9	22.7	34.1	17.5	26.2
14	31.0	46.6	23.4	35.2	30.9	46.5	19.6	29.4	15.1	22.7
15	27.3	41.0	20.8	31.3	26.9	40.5	17.1	25.6	13.1	19.8
16	24.0	36.1	18.3	27.5	23.7	35.6	15.0	22.5	11.6	17.4
17	21.3	32.0	16.2	24.4	21.0	31.5	13.3	20.0	10.2	15.4
18	19.0	28.5	14.5	21.7			11.8	17.8	9.13	13.7
19	17.0	25.6	13.0	19.5			10.6	16.0	8.19	12.3
20	15.4	23.1	11.7	17.6						
21	13.9	20.9	10.6	16.0						
22			9.68	14.6						

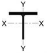
Effective length, L_c (ft), with respect to radius of gyration, r

Properties

	Pipe 3½ x-Strong	Pipe 3½ Std	Pipe 3 xx-Strong	Pipe 3 x-Strong	Pipe 3 Std
A_g, in.^{2}	3.43	2.50	5.17	2.83	2.07
I, in.^{4}	5.94	4.52	5.79	3.70	2.85
r, in.	1.31	1.34	1.06	1.14	1.17

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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



WT18

Table 4-7
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

$F_y = 50$ ksi

Shape			WT18×									
lb/ft			151[c]		141[c]		131[c]		123.5[c]		115.5[c]	
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	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	1310	1960	1200	1810	1100	1660	1030	1550	957	1440
		10	1260	1900	1160	1750	1070	1610	997	1500	927	1390
		12	1250	1870	1150	1720	1050	1580	983	1480	914	1370
		14	1230	1840	1130	1700	1040	1560	967	1450	898	1350
		16	1200	1810	1110	1660	1020	1530	948	1420	881	1320
		18	1180	1770	1080	1630	994	1490	927	1390	862	1300
		20	1150	1720	1060	1590	970	1460	905	1360	841	1260
		22	1120	1680	1030	1540	944	1420	881	1320	819	1230
		24	1080	1620	997	1500	916	1380	855	1280	795	1190
		26	1040	1560	964	1450	887	1330	828	1240	770	1160
		28	1000	1500	931	1400	856	1290	799	1200	743	1120
		30	959	1440	893	1340	824	1240	769	1160	716	1080
		32	917	1380	854	1280	791	1190	739	1110	687	1030
		34	874	1310	813	1220	755	1130	708	1060	659	990
		36	830	1250	773	1160	717	1080	676	1020	629	946
		40	743	1120	691	1040	641	964	605	909	568	854
	Y-Y Axis	0	1310	1960	1200	1810	1100	1660	1030	1550	957	1440
		10	1130	1690	1020	1540	916	1380	836	1260	758	1140
		12	1110	1670	1010	1520	904	1360	826	1240	749	1130
		14	1080	1630	987	1480	887	1330	811	1220	736	1110
		16	1050	1570	959	1440	863	1300	791	1190	719	1080
		18	1000	1510	924	1390	833	1250	765	1150	696	1050
		20	955	1430	880	1320	798	1200	733	1100	669	1010
		22	901	1350	831	1250	755	1130	698	1050	637	957
		24	845	1270	780	1170	708	1060	657	988	602	905
		26	788	1180	726	1090	659	991	612	920	563	846
		28	730	1100	672	1010	610	916	566	850	520	782
		30	672	1010	619	930	560	842	520	781	478	718
		32	615	924	566	850	512	769	474	713	435	654
		34	559	841	514	773	464	698	430	647	394	592
		36	505	759	464	697	418	628	387	582	355	533
		40	412	619	379	569	342	514	317	477	291	438

Properties

	151[c]	141[c]	131[c]	123.5[c]	115.5[c]
A_g, in.^{2}	44.5	41.5	38.5	36.3	34.1
r_x, in.	5.37	5.36	5.36	5.36	5.36
r_y, in.	3.82	3.80	3.76	3.74	3.71

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

Menu

F_y = 50 ksi

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

Concentrically Loaded WT-Shapes

WT18

Shape		WT18× 128[c]		116[c]		105[c]		97[c]		91[c]	
lb/ft											
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	1100	1660	973	1460	876	1320	790	1190	730	1100
	10	1070	1610	946	1420	852	1280	768	1150	710	1070
	12	1060	1590	934	1400	841	1260	758	1140	701	1050
	14	1040	1570	920	1380	829	1250	747	1120	691	1040
	16	1030	1540	905	1360	815	1230	734	1100	679	1020
	18	1010	1510	887	1330	800	1200	720	1080	666	1000
	20	984	1480	868	1300	783	1180	705	1060	652	980
	22	960	1440	847	1270	764	1150	688	1030	637	957
	24	932	1400	825	1240	745	1120	671	1010	620	933
	26	901	1350	802	1200	724	1090	652	979	603	907
	28	870	1310	777	1170	702	1050	632	950	585	879
	30	837	1260	751	1130	679	1020	611	919	566	851
	32	804	1210	724	1090	655	985	590	887	546	821
	34	770	1160	693	1040	631	948	568	854	526	791
	36	735	1110	662	995	603	907	545	820	505	760
	40	665	1000	598	899	546	820	499	751	463	696
Y-Y Axis	0	1100	1660	973	1460	876	1320	790	1190	730	1100
	10	895	1340	780	1170	672	1010	590	887	531	798
	12	847	1270	745	1120	643	966	566	851	510	767
	14	789	1190	697	1050	604	907	535	804	483	727
	16	724	1090	640	962	555	834	498	748	451	677
	18	656	986	579	870	502	755	451	678	413	621
	20	587	882	517	777	448	673	402	604	369	554
	22	518	778	455	684	393	591	353	531	324	487
	24	452	679	396	595	340	511	305	459	280	421
	26	389	585	341	512	294	442	264	397	244	366
	28	338	508	296	445	257	386	231	347	213	320
	30	296	445	260	391	226	339	203	306	188	283
	32	261	393	230	345	200	300	180	271	167	251
	34	232	349	204	307	178	267	161	242	149	224
	36	208	312	183	275	160	240	144	217	134	201
	40	169	254	149	224	130	196	118	177	109	164
Properties											
A_g, in.^{2}		37.6		34.0		30.9		28.5		26.8	
r_x, in.		5.66		5.63		5.65		5.62		5.62	
r_y, in.		2.65		2.62		2.58		2.56		2.55	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

Menu

WT18

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi

Shape			WT18×							
lb/ft			85[c]		80[c]		75[c]		67.5[c]	
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	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	669	1010	620	932	576	866	508	763
		10	651	978	603	906	560	842	494	742
		12	642	966	596	895	553	832	488	733
		14	633	952	587	882	545	820	481	723
		16	622	936	577	867	536	806	473	711
		18	611	918	566	851	526	791	465	698
		20	598	898	554	833	515	774	455	684
		22	584	877	541	813	503	756	445	669
		24	568	854	527	792	490	737	434	652
		26	553	830	513	770	477	716	422	634
		28	536	805	497	747	462	695	410	616
		30	518	779	481	723	448	673	397	597
		32	500	752	464	698	432	650	384	577
		34	482	724	447	672	417	626	370	557
		36	463	696	430	646	400	602	356	536
		40	424	638	394	592	367	552	328	493
	Y-Y Axis	0	669	1010	620	932	576	866	508	763
		10	470	707	418	628	367	552	282	424
		12	453	681	402	605	354	533	272	408
		14	430	646	382	575	337	507	258	388
		16	401	603	358	538	316	475	242	364
		18	369	555	329	495	291	438	223	335
		20	333	500	298	448	264	397	200	300
		22	292	439	261	392	231	347	178	267
		24	253	380	227	341	203	304	158	237
		26	220	331	199	299	178	268	140	211
		28	193	291	175	263	157	237	125	188
		30	171	257	155	233	140	210	112	168
		32	152	228	138	207	125	187	100	151
		34	136	204	123	185	112	168	90.5	136
		36	122	183	111	167	101	151	81.9	123
		40	99.9	150	91.1	137	82.9	125		
Properties										
A_g, in.^{2}			25.0		23.5		22.1		19.9	
r_x, in.			5.61		5.61		5.62		5.66	
r_y, in.			2.53		2.50		2.47		2.38	

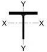
ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

F_y = 50 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes



WT16.5

Shape			WT16.5×									
lb/ft			193.5[h]		177[h]		159		145.5[c]		131.5[c]	
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	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	1710	2570	1560	2340	1400	2110	1280	1930	1140	1710
		10	1640	2460	1500	2250	1340	2020	1230	1850	1090	1640
		12	1610	2420	1470	2210	1320	1980	1200	1810	1070	1610
		14	1570	2370	1440	2160	1290	1940	1180	1770	1050	1580
		16	1540	2310	1400	2110	1260	1890	1150	1730	1030	1550
		18	1490	2250	1360	2050	1220	1840	1120	1680	1000	1510
		20	1450	2180	1320	1980	1180	1780	1080	1620	972	1460
		22	1400	2100	1280	1920	1140	1720	1040	1570	940	1410
		24	1350	2030	1230	1840	1100	1650	1000	1510	903	1360
		26	1290	1940	1180	1770	1050	1580	960	1440	865	1300
		28	1240	1860	1130	1690	1010	1510	916	1380	825	1240
		30	1180	1770	1070	1610	958	1440	872	1310	785	1180
		32	1120	1690	1020	1530	909	1370	827	1240	744	1120
		34	1060	1600	964	1450	859	1290	781	1170	702	1060
		36	1000	1510	910	1370	810	1220	736	1110	661	993
		40	886	1330	802	1200	712	1070	646	971	579	871
	Y-Y Axis	0	1710	2570	1560	2340	1400	2110	1280	1930	1140	1710
		10	1540	2310	1390	2090	1230	1850	1110	1670	979	1470
		12	1500	2250	1360	2040	1200	1810	1090	1630	962	1450
		14	1440	2170	1310	1970	1170	1750	1050	1580	936	1410
		16	1380	2080	1260	1890	1120	1680	1010	1520	900	1350
		18	1320	1980	1200	1800	1060	1600	962	1450	858	1290
		20	1250	1870	1130	1700	1010	1510	909	1370	811	1220
		22	1170	1760	1060	1600	944	1420	853	1280	761	1140
		24	1100	1650	992	1490	881	1320	796	1200	709	1070
		26	1020	1530	920	1380	816	1230	737	1110	656	986
		28	940	1410	849	1280	752	1130	678	1020	603	906
		30	863	1300	778	1170	689	1030	620	932	551	828
		32	787	1180	709	1070	626	942	563	846	500	751
		34	714	1070	642	965	566	851	508	764	450	676
		36	642	966	577	866	508	763	455	684	403	606
		40	522	785	469	704	413	621	371	557	328	494

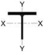
Properties

	193.5	177	159	145.5	131.5
A_g, in.^{2}	57.0	52.1	46.8	42.8	38.7
r_x, in.	5.07	5.03	4.99	4.96	4.93
r_y, in.	3.77	3.74	3.71	3.68	3.65

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.



WT16.5

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

Concentrically Loaded WT-Shapes

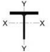
F_y = 50 ksi

Shape		WT16.5×							
lb/ft		120.5[c]		110.5[c]		100.5[c]		84.5[c]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	1040	1560	935	1400	837	1260	677	1020
	10	997	1500	900	1350	806	1210	654	983
	12	981	1470	885	1330	793	1190	644	968
	14	961	1450	868	1300	777	1170	633	951
	16	940	1410	848	1270	760	1140	620	931
	18	916	1380	827	1240	741	1110	605	910
	20	890	1340	803	1210	720	1080	590	886
	22	861	1290	778	1170	697	1050	573	861
	24	832	1250	751	1130	673	1010	555	834
	26	798	1200	723	1090	648	974	536	805
	28	762	1150	693	1040	622	935	516	776
	30	725	1090	663	996	595	894	496	745
	32	688	1030	629	945	567	853	475	714
	34	650	977	594	893	539	811	453	681
	36	612	920	559	841	510	766	432	649
	40	537	808	491	738	447	672	388	583
Y-Y Axis	0	1040	1560	935	1400	837	1260	677	1020
	10	867	1300	761	1140	656	987	516	775
	12	853	1280	751	1130	648	974	493	741
	14	834	1250	735	1100	636	956	463	696
	16	807	1210	714	1070	619	930	428	643
	18	771	1160	686	1030	597	898	389	585
	20	729	1100	653	982	571	858	345	519
	22	685	1030	614	923	541	813	301	452
	24	638	959	572	860	507	761	258	388
	26	590	887	529	795	469	704	223	335
	28	542	815	486	730	430	646	194	292
	30	495	743	443	665	392	589	171	256
	32	448	674	401	602	354	532	151	227
	34	403	605	359	540	318	477	134	202
	36	361	543	323	485	286	429	120	181
	40	295	443	264	397	234	352	98.1	147
Properties									
A_g, in.^{2}		35.6		32.6		29.7		24.7	
r_x, in.		4.96		4.95		4.95		5.12	
r_y, in.		3.62		3.59		3.56		2.50	

ASD	LRFD	
Ω_c = 1.67	ϕ_c = 0.90	[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

F_y = 50 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes



WT16.5

Shape		WT16.5×							
lb/ft		76[c]		70.5[c]		65[c]		59[c]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	607	913	548	824	500	751	446	670
	10	587	882	530	797	484	727	432	649
	12	578	869	523	785	477	716	425	639
	14	568	854	513	772	468	704	418	629
	16	557	837	503	756	459	690	410	617
	18	544	818	492	739	449	675	401	603
	20	530	797	479	721	438	658	391	588
	22	515	774	466	700	426	640	381	573
	24	499	750	452	679	413	621	370	556
	26	482	725	437	657	400	601	358	538
	28	465	699	421	633	386	580	345	519
	30	447	672	405	609	371	558	333	500
	32	428	644	388	584	356	535	319	480
	34	409	615	371	558	341	512	306	460
	36	390	586	354	532	325	489	292	439
	40	351	528	319	480	294	442	264	397
Y-Y Axis	0	607	913	548	824	500	751	446	670
	10	434	652	374	562	315	474	250	376
	12	416	626	359	539	303	455	240	361
	14	393	591	339	510	287	431	228	343
	16	365	548	315	474	267	401	212	319
	18	333	500	288	433	244	367	194	292
	20	296	446	258	387	217	326	173	260
	22	258	387	223	336	189	284	153	230
	24	222	334	193	291	165	248	135	203
	26	193	290	169	253	145	218	120	180
	28	169	254	148	222	128	192	106	160
	30	149	223	131	196	113	170	94.7	142
	32	132	198	116	174	101	152	84.8	127
	34	118	177	104	156	90.3	136	76.3	115
	36	106	159	93.2	140	81.3	122	68.9	103
	40	86.3	130	76.3	115				

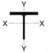
Properties

	76	70.5	65	59
A_g, in.^{2}	22.5	20.7	19.1	17.4
r_x, in.	5.14	5.15	5.18	5.20
r_y, in.	2.47	2.43	2.38	2.32

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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



WT15

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

F_y = 50 ksi

Concentrically Loaded WT-Shapes

Shape		WT15×											
lb/ft		195.5[h]		178.5[h]		163[h]		146		130.5		117.5[c]	
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, L_c (ft), with respect to indicated axis													
X-X Axis	0	1720	2590	1570	2360	1440	2160	1290	1940	1150	1730	1030	1550
	10	1640	2470	1490	2250	1360	2050	1220	1840	1090	1640	981	1470
	12	1610	2410	1460	2200	1330	2010	1190	1790	1070	1610	960	1440
	14	1560	2350	1420	2140	1300	1950	1160	1750	1040	1560	934	1400
	16	1520	2280	1380	2080	1260	1890	1130	1690	1010	1510	904	1360
	18	1470	2210	1330	2010	1220	1830	1090	1630	971	1460	872	1310
	20	1410	2130	1280	1930	1170	1760	1040	1570	933	1400	837	1260
	22	1360	2040	1230	1850	1120	1680	999	1500	892	1340	799	1200
	24	1300	1950	1170	1760	1070	1610	952	1430	850	1280	761	1140
	26	1230	1850	1120	1680	1010	1520	903	1360	806	1210	721	1080
	28	1170	1760	1060	1590	959	1440	853	1280	761	1140	680	1020
	30	1100	1660	997	1500	904	1360	803	1210	716	1080	638	959
	32	1040	1560	936	1410	848	1270	752	1130	670	1010	597	897
	34	973	1460	875	1320	792	1190	702	1060	625	940	556	835
	36	907	1360	815	1230	737	1110	652	980	580	872	515	774
	40	781	1170	699	1050	630	947	556	836	494	743	437	657
Y-Y Axis	0	1720	2590	1570	2360	1440	2160	1290	1940	1150	1730	1030	1550
	10	1570	2360	1420	2130	1290	1940	1140	1720	1000	1510	891	1340
	12	1520	2280	1380	2070	1250	1880	1110	1670	979	1470	870	1310
	14	1460	2190	1320	1990	1200	1810	1070	1610	944	1420	841	1260
	16	1390	2100	1260	1900	1150	1720	1020	1530	901	1350	804	1210
	18	1320	1990	1200	1800	1090	1630	966	1450	853	1280	761	1140
	20	1250	1870	1130	1700	1020	1540	909	1370	801	1200	715	1070
	22	1170	1760	1060	1590	955	1440	849	1280	747	1120	667	1000
	24	1090	1630	982	1480	887	1330	788	1180	692	1040	617	928
	26	1010	1510	907	1360	818	1230	726	1090	636	956	567	852
	28	925	1390	833	1250	749	1130	664	999	581	873	518	778
	30	845	1270	760	1140	682	1020	604	908	527	792	469	705
	32	767	1150	688	1030	617	927	546	820	475	714	422	634
	34	692	1040	620	932	553	832	489	735	424	637	376	566
	36	619	930	554	833	494	743	437	657	379	570	337	506
	40	502	755	450	676	402	604	355	534	308	463	274	412
Properties													
A_g, in.^{2}		57.6		52.5		48.0		43.0		38.5		34.7	
r_x, in.		4.61		4.56		4.52		4.48		4.46		4.41	
r_y, in.		3.67		3.64		3.60		3.58		3.53		3.51	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.
[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi

WT15

Shape			WT15×							
lb/ft			105.5[c]		95.5[c]		86.5[c]		74[c]		66[c]	
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	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	912	1370	808	1210	719	1080	610	916	535	805
		10	869	1310	770	1160	686	1030	584	878	514	772
		12	851	1280	754	1130	672	1010	573	862	504	758
		14	830	1250	735	1110	655	985	561	843	494	742
		16	806	1210	714	1070	637	957	547	822	482	724
		18	780	1170	691	1040	617	927	531	799	468	704
		20	751	1130	667	1000	595	894	514	773	454	682
		22	718	1080	640	962	571	858	496	746	438	658
		24	684	1030	612	920	546	821	477	717	422	634
		26	648	974	582	875	521	783	457	687	404	608
		28	611	919	549	826	494	743	437	656	387	581
		30	575	864	516	776	467	703	415	624	368	553
		32	538	808	483	726	438	658	394	592	350	525
		34	501	753	450	676	408	613	370	556	331	497
		36	465	698	417	627	378	568	345	519	311	468
		40	395	593	354	532	321	483	297	447	269	404
	Y-Y Axis	0	912	1370	808	1210	719	1080	610	916	535	805
		10	770	1160	664	998	570	857	464	697	384	577
		12	756	1140	654	982	562	845	435	654	362	545
		14	734	1100	638	959	550	827	401	602	335	504
		16	704	1060	616	926	533	801	359	540	302	455
		18	669	1000	589	886	511	769	314	472	265	398
		20	629	945	555	834	486	730	270	406	227	342
		22	587	882	518	779	456	686	228	343	193	289
		24	543	817	479	721	422	635	194	292	165	248
		26	499	750	440	662	388	583	167	251	142	214
		28	455	684	401	603	353	530	145	218	124	186
		30	412	620	363	545	318	479	127	191	109	164
		32	371	557	325	489	285	428	112	168	96.3	145
		34	330	496	290	436	254	382	99.6	150	85.8	129
		36	296	445	260	391	228	343	89.1	134	76.8	115
		40	241	362	212	319	187	281				

Properties

	105.5	95.5	86.5	74	66
A_g, in.^{2}	31.1	28.0	25.4	21.8	19.5
r_x, in.	4.43	4.42	4.42	4.63	4.66
r_y, in.	3.49	3.46	3.42	2.28	2.25

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Menu

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

$F_y = 50$ ksi

WT15

Shape		WT15×									
lb/ft		62[c]		58[c]		54[c]		49.5[c]		45[c]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	493	740	458	688	420	632	376	565	331	498
	10	473	710	440	661	404	607	361	543	318	478
	12	464	698	432	649	397	596	355	534	313	470
	14	454	683	423	635	388	584	348	523	306	460
	16	443	666	412	620	379	570	340	510	299	449
	18	431	648	401	603	369	554	331	497	291	437
	20	418	628	389	585	358	538	321	482	282	424
	22	403	606	376	565	346	520	310	466	273	410
	24	388	584	362	544	333	501	299	450	263	396
	26	373	560	347	522	320	481	288	432	253	380
	28	356	535	332	499	306	461	276	414	242	364
	30	339	510	317	476	292	439	263	396	231	348
	32	322	484	301	452	278	418	250	376	220	331
	34	305	458	285	428	263	396	238	357	209	314
	36	288	432	269	404	249	374	225	338	197	297
	40	251	377	236	355	220	330	199	299	175	262
Y-Y Axis	0	493	740	458	688	420	632	376	565	331	498
	10	342	514	303	455	258	388	210	316	168	253
	12	324	486	286	430	245	368	199	300	160	241
	14	300	451	266	399	227	341	185	279	150	225
	16	272	409	241	362	206	310	167	252	137	206
	18	239	359	211	317	180	270	147	220	123	185
	20	205	307	180	271	155	232	128	192	109	163
	22	174	261	154	232	133	200	111	167	95.6	144
	24	149	224	133	200	116	174	97.1	146	84.3	127
	26	129	194	115	173	101	152	85.2	128	74.4	112
	28	113	169	101	152	88.5	133	75.2	113	66.0	99.2
	30	99.1	149	88.8	133	78.2	118	66.6	100	58.7	88.3
	32	87.7	132	78.8	118	69.5	105	59.4	89.3	52.5	79.0
	34	78.2	118	70.3	106	62.2	93.4	53.2	80.0	47.2	70.9
	36	70.1	105	63.1	94.8						

Properties

	62	58	54	49.5	45
A_g, in.^{2}	18.2	17.1	15.9	14.5	13.2
r_x, in.	4.66	4.67	4.69	4.71	4.69
r_y, in.	2.23	2.19	2.15	2.10	2.09

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

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

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi

WT13.5

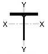
Shape		WT13.5×											
lb/ft		129		117.5		108.5		97[c]		89[c]		80.5[c]	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	1140	1710	1040	1560	958	1440	850	1280	778	1170	691	1040
	10	1070	1610	973	1460	896	1350	799	1200	732	1100	651	978
	12	1040	1560	945	1420	870	1310	777	1170	713	1070	634	953
	14	1000	1510	913	1370	840	1260	750	1130	691	1040	614	923
	16	965	1450	878	1320	807	1210	720	1080	664	997	592	890
	18	924	1390	839	1260	771	1160	687	1030	634	953	568	854
	20	879	1320	798	1200	732	1100	653	981	603	906	543	816
	22	832	1250	756	1140	692	1040	617	927	570	857	514	773
	24	784	1180	711	1070	651	978	579	871	536	805	483	726
	26	734	1100	666	1000	609	915	541	814	501	753	452	679
	28	684	1030	620	932	566	851	503	756	466	701	420	631
	30	635	954	575	864	524	787	465	699	432	649	388	583
	32	585	880	530	796	482	724	428	643	397	597	357	537
	34	537	807	486	730	441	663	391	588	364	547	327	491
	36	490	737	443	666	401	603	356	534	331	498	297	447
	40	402	604	362	544	327	492	290	435	270	406	242	364
Y-Y Axis	0	1140	1710	1040	1560	958	1440	850	1280	778	1170	691	1040
	10	1010	1520	911	1370	833	1250	730	1100	650	978	568	854
	12	975	1470	880	1320	806	1210	709	1070	634	953	557	837
	14	932	1400	841	1260	772	1160	680	1020	610	917	539	811
	16	883	1330	797	1200	731	1100	645	969	580	871	515	774
	18	829	1250	748	1120	687	1030	606	910	545	819	485	728
	20	773	1160	697	1050	639	961	564	847	507	762	451	678
	22	715	1080	644	968	591	888	520	782	467	702	416	626
	24	657	987	590	887	541	814	476	716	427	642	380	572
	26	598	899	537	807	492	740	432	650	387	582	344	518
	28	541	813	485	729	444	668	390	585	348	523	309	465
	30	486	730	434	653	398	598	348	523	310	466	275	414
	32	432	649	385	579	353	530	308	463	274	412	243	366
	34	383	576	342	514	313	471	274	411	244	366	217	326
	36	342	515	306	459	280	421	245	368	218	328	194	292
	40	278	418	248	373	227	342	199	299	178	267	158	238

Properties

	129	117.5	108.5	97[c]	89[c]	80.5[c]
A_g, in.^{2}	38.1	34.7	32.0	28.6	26.3	23.8
r_x, in.	4.02	4.00	3.96	3.94	3.97	3.95
r_y, in.	3.36	3.33	3.32	3.29	3.25	3.23

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.



WT13.5

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi

Shape		WT13.5×											
lb/ft		73[c]		64.5[c]		57[c]		51[c]		47[c]		42[c]	
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, L_c (ft), with respect to indicated axis — X-X Axis	0	616	926	535	804	467	702	406	610	366	551	322	484
	10	580	872	507	762	443	666	385	579	348	523	306	460
	12	565	850	495	744	433	651	376	566	340	511	300	450
	14	548	824	482	724	421	633	366	551	331	498	292	439
	16	529	794	466	701	408	614	355	533	321	482	283	425
	18	507	763	450	676	394	592	342	515	310	466	273	411
	20	485	729	431	649	378	569	329	494	298	448	263	395
	22	461	693	412	620	362	544	315	473	285	429	252	379
	24	436	655	392	590	345	518	300	450	272	409	240	361
	26	410	616	371	558	327	491	284	427	258	388	229	343
	28	381	573	349	524	308	464	268	403	244	367	216	325
	30	352	530	325	488	290	436	252	379	230	345	204	306
	32	324	487	301	452	269	404	236	355	215	323	191	287
	34	296	446	277	417	248	373	220	330	201	302	179	268
	36	270	405	254	382	228	342	203	304	186	280	166	250
	40	220	330	210	316	189	284	168	252	156	234	141	212
Y-Y Axis	0	616	926	535	804	467	702	406	610	366	551	322	484
	10	490	737	409	614	338	509	280	421	239	359	189	284
	12	481	724	380	572	317	476	264	396	225	339	179	269
	14	468	704	345	519	290	436	242	364	208	312	165	249
	16	450	676	305	458	257	386	218	327	187	281	149	225
	18	427	642	264	397	223	335	189	284	163	245	130	196
	20	400	601	225	338	189	283	160	240	138	208	112	168
	22	369	554	188	283	159	239	135	203	118	177	96.6	145
	24	337	506	160	240	135	204	116	174	101	152	83.7	126
	26	305	458	137	206	117	175	100	150	87.9	132	73.0	110
	28	273	411	119	179	101	152	87.1	131	76.8	115	64.1	96.4
	30	243	365	104	156	88.9	134	76.5	115	67.6	102	56.6	85.1
	32	212	323	91.8	138	78.6	118	67.7	102	59.9	90.0	50.3	75.7
	34	192	288	81.6	123	69.9	105	60.3	90.6	53.4	80.3	45.0	67.6
	36	172	258	72.9	110	62.6	94.0						
	40	140	211										

Properties

	73[c]	64.5[c]	57[c]	51[c]	47[c]	42[c]
A_g, in.^{2}	21.6	18.9	16.8	15.0	13.8	12.4
r_x, in.	3.95	4.13	4.15	4.14	4.16	4.18
r_y, in.	3.20	2.21	2.18	2.15	2.12	2.07

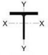
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

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

Concentrically Loaded WT-Shapes

F_y = 50 ksi



WT12

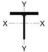
Shape		WT12×											
lb/ft		185[h]		167.5[h]		153[h]		139.5[h]		125		114.5	
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	1630	2450	1470	2210	1340	2020	1230	1850	1100	1660	1010	1510
	10	1520	2280	1360	2050	1240	1870	1130	1700	1020	1530	927	1390
	12	1470	2210	1320	1980	1200	1810	1100	1650	981	1470	894	1340
	14	1410	2120	1270	1900	1160	1740	1050	1580	940	1410	856	1290
	16	1350	2030	1210	1820	1100	1660	1000	1510	896	1350	815	1230
	18	1290	1930	1150	1730	1050	1570	950	1430	848	1270	771	1160
	20	1220	1830	1090	1630	987	1480	895	1340	798	1200	724	1090
	22	1140	1720	1020	1530	925	1390	837	1260	745	1120	676	1020
	24	1070	1600	951	1430	861	1290	779	1170	692	1040	627	942
	26	992	1490	881	1320	797	1200	719	1080	638	959	577	868
	28	916	1380	812	1220	733	1100	661	993	585	879	528	794
	30	841	1260	744	1120	670	1010	603	906	532	800	480	722
	32	767	1150	677	1020	609	915	546	821	482	724	434	652
	34	696	1050	613	921	550	827	492	740	433	651	389	584
	36	627	943	550	827	492	740	440	661	386	581	347	521
	40	508	764	446	670	399	599	356	536	313	470	281	422
Y-Y Axis	0	1630	2450	1470	2210	1340	2020	1230	1850	1100	1660	1010	1510
	10	1470	2210	1320	1980	1200	1810	1090	1640	976	1470	885	1330
	12	1410	2120	1260	1900	1150	1730	1040	1570	933	1400	846	1270
	14	1340	2010	1200	1800	1090	1640	990	1490	883	1330	801	1200
	16	1260	1900	1130	1700	1030	1540	930	1400	829	1250	751	1130
	18	1180	1770	1050	1580	956	1440	867	1300	771	1160	698	1050
	20	1090	1650	976	1470	885	1330	800	1200	711	1070	643	966
	22	1010	1510	896	1350	811	1220	733	1100	651	978	587	882
	24	921	1380	817	1230	738	1110	666	1000	590	886	531	798
	26	834	1250	739	1110	666	1000	600	901	530	797	476	716
	28	750	1130	662	996	596	896	536	805	472	710	424	637
	30	669	1010	589	886	529	795	474	712	417	626	373	560
	32	591	888	519	780	466	700	417	627	367	551	328	493
	34	524	787	460	692	413	620	370	555	325	489	291	437
	36	468	703	411	617	368	554	330	496	290	436	260	390
	40	379	570	333	500	299	449	268	402	235	354	211	317

Properties

	185	167.5	153	139.5	125	114.5
A_g, in.^{2}	54.5	49.1	44.9	41.0	36.8	33.6
r_x, in.	3.78	3.73	3.69	3.65	3.61	3.58
r_y, in.	3.27	3.23	3.20	3.17	3.14	3.11

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[h] Flange thickness is greater than 2 in. Special requirements may apply per AISC *Specification* Section A3.1c.



WT12

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

$F_y = 50$ ksi

Shape			WT12×									
lb/ft			103.5		96		88		81		73[c]	
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	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	907	1360	844	1270	772	1160	716	1080	637	957
		10	834	1250	776	1170	709	1070	657	987	589	886
		12	804	1210	748	1120	683	1030	632	950	569	855
		14	770	1160	715	1080	653	982	605	909	544	818
		16	733	1100	680	1020	621	933	574	863	517	776
		18	692	1040	642	965	586	880	542	814	487	732
		20	649	976	602	905	549	825	507	763	456	686
		22	605	910	561	843	511	768	472	709	425	638
		24	561	843	519	780	472	710	436	656	392	590
		26	516	775	477	717	433	652	400	602	360	541
		28	471	708	435	654	395	594	365	548	328	493
		30	428	643	395	593	358	538	330	496	297	446
		32	386	580	355	534	322	484	297	446	267	401
		34	345	518	317	477	287	431	264	397	238	357
		36	308	462	283	425	256	385	236	354	212	319
		40	249	374	229	345	207	312	191	287	172	258
	Y-Y Axis	0	907	1360	844	1270	772	1160	716	1080	637	957
		10	792	1190	732	1100	662	995	605	909	530	797
		12	758	1140	701	1050	635	955	582	875	512	770
		14	717	1080	664	998	602	904	553	831	488	733
		16	672	1010	622	935	563	847	519	780	458	688
		18	623	937	577	868	522	785	482	724	425	639
		20	573	862	531	798	479	721	443	666	390	586
		22	522	785	483	727	436	655	403	606	354	533
		24	472	709	436	656	393	590	364	547	319	479
		26	422	635	390	587	351	527	325	488	284	427
		28	375	563	346	520	310	466	288	432	251	377
		30	329	494	303	456	272	408	252	379	220	330
		32	290	435	267	402	239	360	222	334	194	291
		34	257	386	237	356	212	319	197	297	172	259
		36	229	345	212	318	190	285	176	265	154	231
		40	186	280	172	258	154	231	143	215	125	188

Properties

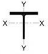
	103.5	96	88	81	73
A_g, in.^{2}	30.3	28.2	25.8	23.9	21.5
r_x, in.	3.55	3.53	3.51	3.50	3.50
r_y, in.	3.08	3.07	3.04	3.05	3.01

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

F_y = 50 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes



WT12

Shape		WT12×									
lb/ft		65.5[c]		58.5[c]		52[c]		51.5[c]		47[c]	
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	565	849	494	742	430	646	428	644	385	579
	10	523	787	457	688	399	599	400	601	360	541
	12	506	761	442	665	386	580	388	584	349	525
	14	486	731	425	639	371	557	375	563	337	507
	16	465	698	406	611	354	533	360	541	324	487
	18	439	659	386	580	337	506	344	516	309	465
	20	411	618	364	547	318	478	326	490	294	441
	22	383	576	341	512	298	448	308	463	277	417
	24	354	532	315	473	278	418	288	433	260	391
	26	325	489	289	434	257	386	267	401	243	365
	28	297	446	264	396	234	352	245	368	224	336
	30	269	404	239	359	212	319	224	336	204	307
	32	242	364	215	323	191	287	203	305	186	279
	34	216	325	191	288	170	256	183	275	167	252
	36	193	289	171	257	152	228	164	246	150	225
	40	156	234	138	208	123	185	133	199	121	182
Y-Y Axis	0	565	849	494	742	430	646	428	644	385	579
	10	457	687	384	577	316	476	315	474	276	415
	12	444	667	375	564	310	466	287	431	252	379
	14	424	638	362	544	301	452	251	378	223	336
	16	399	600	344	517	288	432	215	323	191	287
	18	371	558	320	481	271	408	180	270	160	240
	20	340	512	294	442	251	378	148	222	132	198
	22	309	464	267	402	228	343	124	186	110	166
	24	277	417	240	360	205	308	105	157	93.7	141
	26	247	371	213	320	182	274	89.6	135	80.4	121
	28	217	326	187	281	160	240	77.6	117	69.7	105
	30	190	286	164	247	141	212	67.8	102	61.0	91.7
	32	168	252	145	218	125	188	59.8	89.8	53.8	80.9
	34	149	224	129	194	111	167				
	36	134	201	116	174	100	150				
	40	109	164	94.5	142	81.7	123				

Properties

	65.5	58.5	52	51.5	47
A_g, in.^{2}	19.3	17.2	15.3	15.1	13.8
r_x, in.	3.52	3.51	3.51	3.67	3.67
r_y, in.	2.97	2.94	2.91	1.99	1.98

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

WT12

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

$F_y = 50$ ksi

Shape			WT12×									
lb/ft			42[c]		38[c]		34[c]		31[c]		27.5[c]	
Design			P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	338	508	299	449	261	393	236	355	203	306
		10	316	475	280	421	245	368	223	334	192	288
		12	307	461	272	408	238	358	217	326	187	281
		14	296	445	263	395	230	346	210	316	181	272
		16	285	428	252	379	221	333	203	304	175	263
		18	272	409	241	362	212	318	194	292	168	252
		20	258	388	229	345	202	303	186	279	160	241
		22	244	367	217	326	191	287	176	265	153	229
		24	229	345	204	306	180	270	167	251	144	217
		26	214	322	191	287	168	253	157	236	136	204
		28	199	299	177	266	157	236	147	221	128	192
		30	184	276	164	246	145	218	137	206	119	179
		32	167	251	151	227	134	201	127	191	110	166
		34	150	226	137	205	122	184	117	175	102	153
		36	135	202	122	184	110	166	105	158	93.3	140
		40	109	164	98.9	149	89.3	134	85.4	128	76.3	115
	Y-Y Axis	0	338	508	299	449	261	393	236	355	203	306
		10	231	347	192	289	152	229	114	171	85.7	129
		12	212	318	177	267	141	212	92.4	139	71.2	107
		14	189	285	159	239	127	190	74.2	112	58.5	87.9
		16	163	245	138	207	109	164	60.1	90.4	48.1	72.3
		18	136	204	115	172	92.2	139	49.3	74.1	39.9	59.9
		20	113	169	96.0	144	78.0	117	41.0	61.6	33.4	50.2
		22	94.6	142	81.2	122	66.5	100	34.5	51.9	28.3	42.5
		24	80.5	121	69.3	104	57.2	85.9				
		26	69.3	104	59.8	89.9	49.5	74.5				
		28	60.2	90.4	52.1	78.3	43.3	65.1				
		30	52.7	79.3	45.7	68.7	38.1	57.3				
		32	46.6	70.0	40.4	60.7						
Properties												
A_g, in.^{2}			12.4		11.2		10.0		9.11		8.10	
r_x, in.			3.67		3.68		3.70		3.79		3.80	
r_y, in.			1.95		1.92		1.87		1.38		1.34	

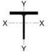
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

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

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi



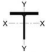
WT10.5

Shape			WT10.5×									
lb/ft			100.5		91		83		73.5		66		61
Design			P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	886	1330	802	1210	731	1100	647	972	581	873	536	806
		10	794	1190	718	1080	652	980	579	870	519	780	478	719
		12	757	1140	683	1030	620	932	551	828	494	742	455	684
		14	715	1070	645	969	584	878	520	782	466	700	429	644
		16	669	1010	603	906	546	820	487	732	436	655	400	602
		18	621	934	559	840	505	759	451	678	403	606	371	557
		20	572	859	513	771	463	696	415	624	370	557	340	511
		22	521	784	467	702	421	633	378	568	337	507	309	464
		24	471	709	422	634	379	570	341	513	304	457	278	418
		26	423	635	377	567	338	508	305	459	272	408	248	373
		28	375	564	334	502	299	449	271	407	241	362	219	330
		30	330	496	293	440	262	393	238	357	211	317	192	288
		32	290	436	257	387	230	345	209	314	185	278	169	253
		34	257	386	228	343	204	306	185	278	164	247	149	225
		36	229	344	203	306	182	273	165	248	146	220	133	200
		40	186	279	165	248	147	221	134	201	119	178	108	162
	Y-Y Axis	0	886	1330	802	1210	731	1100	647	972	581	873	536	806
		10	779	1170	701	1050	635	954	550	826	485	728	440	661
		12	742	1110	668	1000	606	910	526	791	466	700	424	637
		14	699	1050	630	946	571	858	497	746	440	662	402	604
		16	653	981	587	883	533	800	463	696	411	618	375	564
		18	604	908	543	816	492	739	427	642	379	570	346	520
		20	553	832	497	747	450	676	390	586	346	520	316	474
		22	502	755	450	677	408	613	353	530	313	470	285	428
		24	452	679	405	608	366	550	316	475	279	420	254	382
		26	402	605	360	541	325	489	280	421	247	372	225	338
		28	355	534	317	477	287	431	245	369	216	325	196	295
		30	310	467	277	416	250	376	214	322	189	284	172	258
		32	273	411	244	366	220	331	189	284	167	251	151	227
		34	242	364	216	325	195	293	168	252	148	222	134	202
		36	216	325	193	290	174	262	150	225	132	199	120	181
		40	175	263	156	235	141	213	121	183	107	161	97.6	147

Properties

	100.5	91	83	73.5	66	61
A_g, in.^{2}	29.6	26.8	24.4	21.6	19.4	17.9
r_x, in.	3.10	3.07	3.04	3.08	3.06	3.04
r_y, in.	3.02	3.00	2.99	2.95	2.93	2.91

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$



WT10.5

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

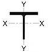
F_y = 50 ksi

Shape			WT10.5×											
lb/ft			55.5[c]		50.5[c]		46.5[c]		41.5[c]		36.5[c]		34[c]	
Design			P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	480	722	431	648	407	612	353	530	300	451	276	414
		10	433	651	389	584	371	558	323	485	275	413	252	379
		12	414	622	371	558	355	534	310	467	264	397	243	365
		14	390	586	352	528	337	507	296	445	252	379	232	348
		16	364	547	330	496	318	478	281	422	239	360	220	330
		18	337	506	306	460	297	446	263	395	225	338	207	311
		20	308	464	280	421	275	414	243	366	210	316	193	290
		22	280	421	254	382	253	381	223	336	195	293	179	269
		24	252	379	228	343	231	347	204	306	178	267	165	248
		26	225	338	203	306	209	314	184	276	161	241	149	225
		28	199	298	179	270	188	282	165	248	144	216	134	201
		30	174	261	157	235	167	251	146	220	128	192	119	178
		32	153	229	138	207	148	222	129	194	112	169	104	157
		34	135	203	122	183	131	196	114	172	99.6	150	92.5	139
		36	121	181	109	163	117	175	102	153	88.8	133	82.5	124
		40	97.6	147	88.1	132	94.4	142	82.5	124	71.9	108	66.8	100
	Y-Y Axis	0	480	722	431	648	407	612	353	530	300	451	276	414
		10	390	587	343	516	282	424	245	369	206	309	185	277
		12	378	568	335	503	248	372	216	324	183	275	166	249
		14	360	541	322	483	211	318	184	277	156	235	142	214
		16	337	506	303	455	176	264	153	230	130	195	118	177
		18	311	468	280	421	142	214	124	187	105	158	95.8	144
		20	284	427	256	385	117	175	102	153	86.4	130	79.0	119
		22	256	385	231	347	97.0	146	84.9	128	72.2	108	66.2	99.5
		24	229	344	206	310	81.9	123	71.8	108	61.1	91.9	56.1	84.4
		26	202	304	182	274	70.1	105	61.4	92.4	52.4	78.8	48.2	72.4
		28	176	265	159	239	60.6	91.1	53.2	79.9	45.4	68.2	41.8	62.8
		30	154	232	139	210	52.9	79.6	46.5	69.8	39.7	59.7	36.5	54.9
		32	136	205	123	185								
		34	121	182	109	165								
		36	108	163	97.9	147								
		40	88.1	132	79.7	120								
Properties														
A_g, in.^{2}			16.3		14.9		13.7		12.2		10.7		10.0	
r_x, in.			3.03		3.01		3.25		3.22		3.21		3.20	
r_y, in.			2.90		2.89		1.84		1.83		1.81		1.80	

ASD	LRFD	
$\Omega_c = 1.67$	$\phi_c = 0.90$	[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly. Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 50 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes



WT10.5

Shape		WT10.5×											
lb/ft		31[c]		27.5[c]		24[c]		28.5[c]		25[c]		22[c]	
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis													
X-X Axis	0	247	371	215	323	182	274	225	338	193	290	165	248
	10	226	340	197	296	168	252	207	312	178	268	153	229
	12	218	327	190	285	162	243	200	301	172	258	147	221
	14	208	313	182	273	155	233	192	288	165	248	141	213
	16	197	297	172	259	147	222	182	274	157	236	135	203
	18	186	279	163	244	139	209	173	259	149	223	128	192
	20	174	261	152	229	131	197	162	244	140	210	120	181
	22	161	243	142	213	122	183	151	227	131	196	113	169
	24	149	224	131	197	113	170	140	210	121	182	105	157
	26	136	204	120	180	104	156	129	194	112	168	96.5	145
	28	123	184	109	164	94.7	142	117	176	102	154	88.5	133
	30	109	164	97.8	147	85.8	129	104	157	92.3	139	80.5	121
	32	95.9	144	86.1	129	76.6	115	92.3	139	81.7	123	72.5	109
	34	84.9	128	76.3	115	67.8	102	81.8	123	72.4	109	64.2	96.5
	36	75.8	114	68.1	102	60.5	91.0	73.0	110	64.6	97.0	57.3	86.1
	40	61.4	92.2	55.1	82.9	49.0	73.7	59.1	88.8	52.3	78.6	46.4	69.7
Y-Y Axis	0	247	371	215	323	182	274	225	338	193	290	165	248
	10	158	237	124	187	90.4	136	120	180	91.0	137	67.9	102
	12	142	213	113	169	81.9	123	94.1	141	71.5	107	54.8	82.4
	14	123	185	97.8	147	70.6	106	72.5	109	56.2	84.5	44.1	66.2
	16	101	152	81.0	122	59.9	90.0	57.1	85.9	44.9	67.5	35.7	53.6
	18	82.9	125	67.2	101	50.7	76.1	46.0	69.2	36.5	54.8	29.3	44.0
	20	68.7	103	56.2	84.5	43.0	64.6	37.8	56.8	30.1	45.3	24.3	36.6
	22	57.7	86.7	47.6	71.5	36.7	55.2	31.5	47.4				
	24	49.0	73.7	40.6	61.1	31.6	47.5						
	26	42.2	63.4	35.1	52.7	27.4	41.2						
	28	36.6	55.0	30.5	45.9								

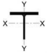
Properties

	31[c]	27.5[c]	24[c]	28.5[c]	25[c]	22[c]
A_g, in.^{2}	9.13	8.10	7.07	8.37	7.36	6.49
r_x, in.	3.21	3.23	3.26	3.29	3.30	3.31
r_y, in.	1.77	1.73	1.66	1.35	1.30	1.26

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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



WT9

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi

Shape			WT9×											
lb/ft			87.5		79		71.5		65		59.5		53	
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, L_c (ft), with respect to indicated axis	X-X Axis	0	769	1160	695	1040	629	945	575	864	527	792	467	702
		10	663	997	597	897	538	809	491	738	451	678	399	600
		12	621	933	558	839	502	755	458	688	421	633	373	560
		14	575	864	515	775	463	696	422	634	388	584	343	516
		16	526	790	470	707	422	634	383	576	354	532	313	470
		18	475	714	424	638	380	571	344	518	318	478	281	422
		20	424	638	378	568	337	507	305	459	283	425	249	375
		22	374	563	332	500	296	445	267	402	248	373	219	328
		24	327	491	289	434	256	385	231	347	215	323	189	284
		26	281	422	248	372	219	329	197	297	184	276	162	243
		28	242	364	214	321	189	284	170	256	158	238	139	209
		30	211	317	186	280	165	247	148	223	138	207	121	182
		32	185	279	164	246	145	217	130	196	121	182	107	160
		34	164	247	145	218	128	193	115	173	107	161	94.5	142
		36	146	220	129	194	114	172	103	155	95.8	144	84.3	127
		40	119	178	105	157	92.6	139	83.4	125	77.6	117	68.3	103
	Y-Y Axis	0	769	1160	695	1040	629	945	575	864	527	792	467	702
		10	664	999	597	898	538	809	489	735	443	666	387	581
		12	626	940	562	845	506	761	460	692	418	628	365	549
		14	583	876	523	786	471	708	427	642	389	584	340	511
		16	536	806	481	723	432	650	392	590	357	536	312	468
		18	488	734	437	657	393	590	356	535	323	486	282	424
		20	440	661	393	591	353	530	319	479	290	435	252	379
		22	392	589	350	525	313	470	283	425	256	385	223	335
		24	345	518	307	462	275	413	247	372	224	337	194	292
		26	300	451	267	401	238	357	214	321	194	291	167	251
		28	259	389	230	346	205	308	185	277	167	252	145	217
		30	226	340	201	302	179	269	161	242	146	220	126	190
		32	199	299	177	265	157	237	142	213	129	193	111	167
		34	176	265	157	235	140	210	126	189	114	171	98.6	148
		36	157	236	140	210	125	187	112	168	102	153	88.1	132
		40	127	191	113	170	101	152	90.9	137	82.6	124	71.5	107
Properties														
A_g, in.^{2}			25.7		23.2		21.0		19.2		17.6		15.6	
r_x, in.			2.66		2.63		2.60		2.58		2.60		2.59	
r_y, in.			2.76		2.74		2.72		2.70		2.69		2.66	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

F_y = 50 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

WT9

Shape		WT9×											
lb/ft		48.5		43[c]		38[c]		35.5[c]		32.5[c]		30[c]	
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, L_c (ft), with respect to indicated axis — X-X Axis	0	425	639	376	565	322	483	309	464	278	418	252	379
	10	362	544	323	486	278	417	271	407	245	368	222	334
	12	337	507	301	453	260	391	254	382	232	349	210	316
	14	310	466	277	416	241	362	237	356	216	325	197	296
	16	282	424	251	378	219	329	217	327	199	299	182	274
	18	253	380	225	338	196	294	198	297	180	271	166	249
	20	224	336	199	299	173	260	178	267	162	243	149	224
	22	195	294	174	261	151	227	158	237	144	216	132	198
	24	169	253	150	225	130	195	139	209	126	189	116	174
	26	144	216	128	192	111	166	121	181	109	164	100	150
	28	124	186	110	165	95.3	143	104	156	94.1	141	86.2	130
	30	108	162	95.8	144	83.1	125	90.6	136	81.9	123	75.1	113
	32	94.9	143	84.2	127	73.0	110	79.6	120	72.0	108	66.0	99.2
	34	84.0	126	74.6	112	64.7	97.2	70.5	106	63.8	95.9	58.5	87.9
	36	75.0	113	66.5	100	57.7	86.7	62.9	94.5	56.9	85.5	52.2	78.4
	40	60.7	91.2	53.9	81.0	46.7	70.2	50.9	76.6	46.1	69.3	42.3	63.5
Y-Y Axis	0	425	639	376	565	322	483	309	464	278	418	252	379
	10	348	523	302	454	252	379	205	308	186	279	168	253
	12	330	496	288	433	243	366	176	264	159	239	144	217
	14	307	461	269	405	230	345	146	219	132	198	119	179
	16	282	423	248	372	212	318	117	176	106	159	95.6	144
	18	255	383	224	337	192	288	93.5	140	84.4	127	76.6	115
	20	228	342	200	301	171	257	76.3	115	68.9	104	62.6	94.1
	22	201	302	176	265	151	227	63.3	95.2	57.3	86.1	52.1	78.3
	24	175	263	153	231	131	197	53.4	80.3	48.4	72.7	44.0	66.1
	26	151	226	132	198	113	169	45.7	68.6	41.3	62.1	37.6	56.6
	28	130	196	114	172	97.7	147	39.5	59.3	35.7	53.7	32.6	48.9
	30	114	171	99.8	150	85.4	128						
	32	100	151	88.0	132	75.4	113						
	34	89.0	134	78.1	117	66.9	101						
	36	79.5	119	69.8	105	59.9	90.0						
	40	64.5	96.9	56.7	85.2	48.7	73.1						

Properties

	48.5	43[c]	38[c]	35.5[c]	32.5[c]	30[c]
A_g, in.^{2}	14.2	12.7	11.1	10.4	9.55	8.82
r_x, in.	2.56	2.55	2.54	2.74	2.72	2.71
r_y, in.	2.65	2.63	2.61	1.70	1.69	1.68

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

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

$F_y = 50$ ksi

Concentrically Loaded WT-Shapes

Shape		WT9×									
lb/ft		27.5[c]		25[c]		23[c]		20[c]		17.5[c]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis											
X-X Axis	0	228	343	202	303	185	278	155	233	133	199
	10	201	302	178	267	165	247	138	207	118	178
	12	190	286	168	253	156	235	131	196	113	169
	14	178	268	158	237	147	221	123	185	106	160
	16	165	249	146	220	137	206	115	172	99.2	149
	18	152	228	134	202	126	190	106	159	91.8	138
	20	137	205	122	183	115	174	96.6	145	84.2	127
	22	121	182	109	164	104	157	87.4	131	76.5	115
	24	106	160	95.6	144	92.0	138	78.3	118	68.8	103
	26	91.9	138	82.6	124	80.2	120	69.2	104	61.2	92.0
	28	79.2	119	71.2	107	69.2	104	59.6	89.6	53.4	80.2
	30	69.0	104	62.1	93.3	60.2	90.5	51.9	78.1	46.5	69.9
	32	60.6	91.1	54.5	82.0	53.0	79.6	45.7	68.6	40.9	61.4
	34	53.7	80.7	48.3	72.6	46.9	70.5	40.4	60.8	36.2	54.4
	36	47.9	72.0	43.1	64.8	41.8	62.9	36.1	54.2	32.3	48.5
	40	38.8	58.3	34.9	52.5	33.9	50.9	29.2	43.9	26.2	39.3
Y-Y Axis	0	228	343	202	303	185	278	155	233	133	199
	10	150	225	128	193	95.9	144	77.1	116	57.3	86.1
	12	129	194	112	169	73.2	110	59.6	89.5	44.6	67.0
	14	107	161	93.1	140	55.5	83.5	45.7	68.7	35.0	52.6
	16	85.4	128	74.4	112	43.4	65.2	35.9	53.9	27.9	41.9
	18	68.7	103	60.1	90.3	34.7	52.2	28.8	43.4	22.6	34.0
	20	56.3	84.7	49.4	74.2	28.4	42.6	23.6	35.5	18.7	28.0
	22	47.0	70.6	41.2	62.0						
	24	39.7	59.7	34.9	52.5						
	26	34.0	51.1	29.9	45.0						
Properties											
A_g, in.^{2}		8.10		7.34		6.77		5.88		5.15	
r_x, in.		2.71		2.70		2.77		2.76		2.79	
r_y, in.		1.67		1.65		1.29		1.27		1.22	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

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

F_y = 50 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

WT8

Shape		WT8×											
lb/ft		50		44.5		38.5[c]		33.5[c]		28.5[c]		25[c]	
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, L_c (ft), with respect to indicated axis: X-X Axis	0	440	662	392	590	338	508	287	431	248	373	212	319
	10	359	540	320	481	274	412	236	355	210	315	181	271
	12	329	494	292	439	250	376	216	325	193	291	168	253
	14	296	445	263	395	224	337	193	290	176	265	154	232
	16	262	394	232	349	198	297	170	255	158	237	138	208
	18	228	343	202	304	171	258	147	221	140	210	122	183
	20	196	294	173	260	146	220	125	188	122	183	106	160
	22	165	248	146	219	122	184	104	157	104	157	91.1	137
	24	138	208	122	184	103	154	87.6	132	88.3	133	76.9	116
	26	118	177	104	157	87.5	132	74.7	112	75.2	113	65.5	98.5
	28	102	153	89.9	135	75.5	113	64.4	96.7	64.9	97.5	56.5	84.9
	30	88.6	133	78.3	118	65.8	98.8	56.1	84.3	56.5	84.9	49.2	74.0
	32	77.9	117	68.8	103	57.8	86.9	49.3	74.1	49.7	74.7	43.3	65.0
	34	69.0	104	61.0	91.6	51.2	76.9	43.7	65.6	44.0	66.1	38.3	57.6
	36	61.5	92.5	54.4	81.7	45.7	68.6	38.9	58.5	39.2	59.0	34.2	51.4
	40									31.8	47.8	27.7	41.6
Y-Y Axis	0	440	662	392	590	338	508	287	431	248	373	212	319
	10	365	548	321	483	272	408	229	344	159	238	136	205
	12	340	511	300	451	255	383	217	326	133	200	114	172
	14	312	470	276	414	234	352	200	301	108	162	92.4	139
	16	283	425	249	375	212	319	181	273	84.4	127	72.4	109
	18	253	380	222	334	189	284	162	243	67.2	101	57.9	87.0
	20	223	335	196	294	166	249	142	214	54.8	82.3	47.2	71.0
	22	194	291	170	255	144	216	123	185	45.5	68.3	39.2	59.0
	24	166	249	145	218	122	184	105	157	38.3	57.6	33.1	49.8
	26	141	213	124	186	105	157	89.6	135	32.7	49.2	28.3	42.5
	28	122	184	107	161	90.4	136	77.5	117				
	30	107	160	93.3	140	78.9	119	67.7	102				
	32	93.7	141	82.1	123	69.5	104	59.7	89.7				
	34	83.1	125	72.8	109	61.6	92.6	52.9	79.6				
	36	74.2	112	65.0	97.7	55.0	82.7	47.3	71.1				
	40	60.2	90.4	52.7	79.2	44.7	67.1	38.4	57.7				

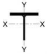
Properties

	50	44.5	38.5[c]	33.5[c]	28.5[c]	25[c]
A_g, in.^{2}	14.7	13.1	11.3	9.81	8.39	7.37
r_x, in.	2.28	2.27	2.24	2.22	2.41	2.40
r_y, in.	2.51	2.49	2.47	2.46	1.60	1.59

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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



WT8

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

F_y = 50 ksi

Concentrically Loaded WT-Shapes

Shape		WT8×									
lb/ft		22.5[c]		20[c]		18[c]		15.5[c]		13[c]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis											
X-X Axis	0	187	280	161	242	143	215	119	180	97.0	146
	10	159	239	137	206	122	184	103	155	83.9	126
	12	148	222	127	191	114	171	96.4	145	78.7	118
	14	136	204	117	176	105	158	89.2	134	73.0	110
	16	123	185	106	159	95.6	144	81.5	122	67.0	101
	18	109	164	94.6	142	85.9	129	73.6	111	60.7	91.2
	20	95.0	143	83.3	125	76.1	114	65.6	98.6	54.3	81.6
	22	81.3	122	71.2	107	65.9	99.0	57.7	86.8	48.0	72.2
	24	68.6	103	60.0	90.1	55.7	83.7	49.6	74.6	41.8	62.9
	26	58.5	87.9	51.1	76.8	47.4	71.3	42.3	63.5	36.2	54.4
	28	50.4	75.8	44.0	66.2	40.9	61.5	36.4	54.8	31.2	46.9
	30	43.9	66.0	38.4	57.7	35.6	53.6	31.7	47.7	27.2	40.8
	32	38.6	58.0	33.7	50.7	31.3	47.1	27.9	41.9	23.9	35.9
	34	34.2	51.4	29.9	44.9	27.7	41.7	24.7	37.1	21.2	31.8
	36	30.5	45.8	26.6	40.0	24.7	37.2	22.0	33.1	18.9	28.4
	40					20.0	30.1	17.9	26.8	15.3	23.0
Y-Y Axis	0	187	280	161	242	143	215	119	180	97.0	146
	10	119	178	99.7	150	81.8	123	53.4	80.3	36.6	55.1
	12	99.5	150	85.5	128	70.1	105	39.7	59.7	28.4	42.6
	14	80.2	120	69.1	104	56.2	84.5	30.3	45.6	22.2	33.3
	16	62.8	94.4	54.4	81.7	44.8	67.4	23.8	35.7	17.6	26.5
	18	50.3	75.7	43.7	65.7	36.3	54.6	19.1	28.7	14.3	21.5
	20	41.2	61.9	35.8	53.8	29.9	45.0				
	22	34.2	51.5	29.8	44.9	25.0	37.6				
	24	28.9	43.5	25.2	37.9	21.2	31.9				
	26	24.7	37.2	21.6	32.5						
Properties											
A_g, in.^{2}		6.63		5.89		5.29		4.56		3.84	
r_x, in.		2.39		2.37		2.41		2.45		2.47	
r_y, in.		1.57		1.56		1.52		1.17		1.12	

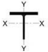
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi

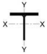


WT7

		Shape	WT7×											
		lb/ft	66		60		54.5		49.5		45		41	
		Design	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	581	873	530	797	479	720	437	657	395	594	359	540
		10	409	614	370	556	330	496	300	450	270	405	264	397
		12	350	526	316	474	280	421	254	381	228	343	231	347
		14	291	438	262	393	231	347	209	313	187	281	197	295
		16	236	355	211	317	184	277	166	250	148	223	163	246
		18	187	281	167	251	145	219	131	197	117	176	132	199
		20	152	228	135	203	118	177	106	160	94.9	143	107	161
		22	125	188	112	168	97.4	146	87.8	132	78.4	118	88.6	133
		24	105	158	93.8	141	81.8	123	73.8	111	65.9	99.1	74.4	112
		26	89.7	135	79.9	120	69.7	105	62.9	94.5	56.2	84.4	63.4	95.3
		28	77.3	116	68.9	104	60.1	90.4					54.7	82.2
		30											47.6	71.6
	Y-Y Axis	0	581	873	530	797	479	720	437	657	395	594	359	540
		10	519	781	485	699	412	619	366	549	320	481	298	446
		12	512	770	461	693	410	616	364	547	319	480	277	417
		14	497	747	450	676	403	605	360	541	317	476	254	382
		16	477	716	433	650	389	585	351	527	312	468	229	345
		18	454	682	412	619	371	558	336	505	301	452	204	307
		20	429	645	389	585	351	527	318	478	286	429	179	270
		22	403	606	366	550	330	495	299	449	269	404	155	234
		24	376	566	342	513	308	462	279	419	251	377	133	199
		26	350	525	317	476	285	429	258	388	233	349	113	170
		28	323	485	292	439	263	395	238	358	214	322	97.6	147
		30	296	445	268	402	241	362	218	328	196	295	85.1	128
		32	270	406	244	367	219	330	198	298	178	268	74.9	113
		34	245	368	221	332	199	299	179	269	161	242	66.4	99.7
		36	220	331	198	298	178	268	161	242	144	217	59.2	89.0
		40	178	268	161	242	145	217	130	196	117	176	48.0	72.1
Properties														
A_g, in.^{2}			19.4		17.7		16.0		14.6		13.2		12.0	
r_x, in.			1.73		1.71		1.68		1.67		1.66		1.85	
r_y, in.			3.76		3.74		3.73		3.71		3.70		2.48	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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



WT7

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

$F_y = 50$ ksi

Concentrically Loaded WT-Shapes

Shape			WT7×											
lb/ft			37		34		30.5[c]		26.5[c]		24[c]		21.5[c]	
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, L_c (ft), with respect to indicated axis	X-X Axis	0	326	491	299	450	267	402	232	349	207	312	182	273
		10	237	357	217	326	194	291	173	261	157	236	138	207
		12	206	310	188	283	168	253	152	229	138	207	122	183
		14	175	263	159	240	142	213	130	196	118	177	104	156
		16	145	217	132	198	117	175	109	164	98.7	148	86.7	130
		18	116	175	106	159	93.5	141	88.8	133	80.5	121	70.3	106
		20	94.2	142	85.5	128	75.8	114	71.9	108	65.2	98.0	57.0	85.6
		22	77.9	117	70.7	106	62.6	94.1	59.5	89.4	53.9	81.0	47.1	70.8
		24	65.4	98.3	59.4	89.2	52.6	79.1	50.0	75.1	45.3	68.1	39.6	59.5
		26	55.7	83.8	50.6	76.0	44.8	67.4	42.6	64.0	38.6	58.0	33.7	50.7
		28	48.1	72.2	43.6	65.6	38.7	58.1	36.7	55.2	33.3	50.0	29.1	43.7
		30	41.9	62.9	38.0	57.1	33.7	50.6	32.0	48.1	29.0	43.6	25.3	38.1
	Y-Y Axis	0	326	491	299	450	267	402	232	349	207	312	182	273
		10	270	405	245	369	217	326	171	257	153	230	133	200
		12	251	378	229	344	203	305	151	228	136	204	119	179
		14	230	346	210	315	186	280	131	196	117	176	102	154
		16	208	313	189	284	168	253	110	166	98.7	148	86.1	129
		18	185	279	168	253	149	224	90.8	136	81.1	122	70.4	106
		20	163	245	147	222	131	197	73.8	111	66.0	99.2	57.4	86.3
		22	141	212	127	191	113	170	61.2	92.0	54.8	82.3	47.7	71.7
		24	120	181	108	163	96.0	144	51.5	77.5	46.1	69.3	40.2	60.4
		26	103	154	92.5	139	82.0	123	44.0	66.1	39.4	59.2	34.3	51.6
		28	88.6	133	79.9	120	70.9	106	38.0	57.1	34.0	51.1	29.7	44.6
		30	77.3	116	69.7	105	61.8	92.9	33.1	49.8	29.7	44.6	25.9	38.9
		32	68.0	102	61.3	92.1	54.4	81.8	29.1	43.8				
		34	60.2	90.5	54.3	81.7	48.2	72.5						
		36	53.8	80.8	48.5	72.9	43.1	64.7						
		40	43.6	65.5	39.3	59.1	34.9	52.5						
Properties														
A_g, in.^{2}			10.9		10.0		8.96		7.80		7.07		6.31	
r_x, in.			1.82		1.81		1.80		1.88		1.88		1.86	
r_y, in.			2.48		2.46		2.45		1.92		1.91		1.89	

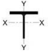
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

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

F_y = 50 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes



WT7

Shape			WT7×									
lb/ft			19ᶜ		17ᶜ		15ᶜ		13ᶜ		11ᶜ	
Design			P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	159	239	140	210	122	183	103	155	84.1	126
		10	127	191	112	168	98.1	147	84.3	127	69.2	104
		12	115	173	101	152	89.2	134	77.2	116	63.5	95.4
		14	102	153	90.1	135	79.8	120	69.5	104	57.4	86.2
		16	87.4	131	78.3	118	70.0	105	61.5	92.4	51.0	76.7
		18	73.6	111	66.0	99.1	59.7	89.7	53.5	80.4	44.6	67.0
		20	60.6	91.1	54.3	81.6	49.4	74.3	45.2	67.9	38.4	57.6
		22	50.1	75.3	44.9	67.4	40.8	61.4	37.3	56.1	32.1	48.2
		24	42.1	63.2	37.7	56.7	34.3	51.6	31.4	47.1	27.0	40.5
		26	35.9	53.9	32.1	48.3	29.2	44.0	26.7	40.2	23.0	34.5
		28	30.9	46.5	27.7	41.6	25.2	37.9	23.0	34.6	19.8	29.8
		30	26.9	40.5	24.1	36.3	22.0	33.0	20.1	30.2	17.3	25.9
		32	23.7	35.6	21.2	31.9	19.3	29.0	17.6	26.5	15.2	22.8
		34	21.0	31.5	18.8	28.2	17.1	25.7	15.6	23.5	13.4	20.2
	Y-Y Axis	0	159	239	140	210	122	183	103	155	84.1	126
		10	101	152	86.4	130	70.2	106	41.4	62.3	30.3	45.5
		12	83.9	126	72.3	109	58.8	88.4	30.0	45.1	22.5	33.8
		14	67.1	101	57.6	86.5	46.5	69.9	22.6	33.9	17.1	25.8
		16	52.3	78.6	45.0	67.7	36.8	55.3	17.5	26.4	13.4	20.2
		18	41.8	62.8	36.1	54.2	29.7	44.6	14.0	21.0		
		20	34.1	51.2	29.5	44.3	24.4	36.6				
		22	28.3	42.5	24.5	36.9	20.3	30.5				
		24	23.9	35.9	20.7	31.1	17.2	25.9				

Properties

	19ᶜ	17ᶜ	15ᶜ	13ᶜ	11ᶜ
A_g, in.^{2}	5.58	5.00	4.42	3.85	3.25
r_x, in.	2.04	2.04	2.07	2.12	2.14
r_y, in.	1.55	1.53	1.49	1.08	1.04

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

ᶜ Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi

WT6

Shape		WT6×											
lb/ft		29		26.5		25		22.5		20[c]		17.5[c]	
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, L_c (ft), with respect to indicated axis — X-X Axis	0	255	383	233	350	219	329	196	295	172	258	151	226
	4	237	356	216	325	205	308	184	276	161	242	143	215
	6	216	324	197	296	188	283	169	254	149	224	135	203
	8	189	284	173	261	168	252	150	226	133	200	124	186
	10	160	240	147	221	145	218	130	195	114	171	110	166
	12	130	195	120	180	121	182	108	162	94.5	142	94.9	143
	14	102	153	94.2	142	97.6	147	86.8	130	75.7	114	79.5	120
	16	78.2	117	72.3	109	76.2	115	67.6	102	58.7	88.2	64.8	97.5
	18	61.8	92.8	57.1	85.9	60.2	90.5	53.4	80.3	46.4	69.7	51.6	77.5
	20	50.0	75.2	46.3	69.6	48.8	73.3	43.3	65.0	37.6	56.5	41.8	62.8
	22	41.3	62.1	38.3	57.5	40.3	60.6	35.8	53.8	31.0	46.7	34.5	51.9
	24	34.7	52.2	32.1	48.3	33.9	50.9	30.1	45.2	26.1	39.2	29.0	43.6
	26					28.9	43.4	25.6	38.5	22.2	33.4	24.7	37.2
	28											21.3	32.0
Y-Y Axis	0	255	383	233	350	219	329	196	295	172	258	151	226
	4	222	334	197	296	194	291	170	255	147	220	127	191
	6	221	333	196	295	190	285	167	251	145	217	122	183
	8	219	329	194	292	179	269	159	239	139	209	111	167
	10	211	317	189	284	163	245	145	218	128	192	95.4	143
	12	197	297	178	267	145	218	129	194	114	171	78.8	118
	14	182	273	164	246	126	189	112	168	98.8	149	62.7	94.2
	16	165	247	148	222	107	161	95.0	143	83.7	126	48.6	73.1
	18	147	221	132	198	88.8	133	78.8	118	69.3	104	38.7	58.1
	20	130	195	116	174	72.3	109	64.2	96.5	56.4	84.8	31.4	47.3
	22	113	169	100	151	59.9	90.1	53.2	79.9	46.8	70.3	26.1	39.2
	24	96.4	145	85.7	129	50.4	75.8	44.8	67.3	39.4	59.2	22.0	33.0
	26	82.3	124	73.1	110	43.0	64.7	38.2	57.4	33.6	50.5		
	28	71.0	107	63.2	94.9	37.1	55.8	33.0	49.6	29.0	43.6		
	30	61.9	93.1	55.1	82.8	32.4	48.6	28.8	43.2	25.3	38.0		
	32	54.5	81.8	48.5	72.8	28.5	42.8	25.3	38.0	22.3	33.5		

Properties

	29	26.5	25	22.5	20	17.5
A_g, in.^{2}	8.52	7.78	7.30	6.56	5.84	5.17
r_x, in.	1.50	1.51	1.60	1.59	1.57	1.76
r_y, in.	2.51	2.48	1.96	1.95	1.94	1.54

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

$F_y = 50$ ksi

WT6

Shape		WT6×											
lb/ft		15[c]		13[c]		11[c]		9.5[c]		8[c]		7[c]	
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, L_c (ft), with respect to indicated axis — X-X Axis	0	125	187	105	158	89.8	135	75.0	113	61.6	92.6	52.4	78.7
	4	119	178	100	151	86.3	130	72.1	108	59.3	89.1	50.4	75.8
	6	112	168	94.4	142	82.2	123	68.6	103	56.6	85.1	48.1	72.4
	8	102	154	86.6	130	76.6	115	64.1	96.3	53.0	79.6	45.1	67.8
	10	91.6	138	77.6	117	70.0	105	58.6	88.1	48.7	73.2	41.5	62.3
	12	79.9	120	67.8	102	62.7	94.3	52.6	79.1	43.9	65.9	37.4	56.2
	14	67.2	101	57.7	86.8	54.8	82.3	46.2	69.5	38.7	58.2	33.1	49.8
	16	54.6	82.1	47.4	71.3	46.0	69.1	39.6	59.5	33.5	50.4	28.7	43.2
	18	43.4	65.2	37.7	56.6	37.7	56.6	32.4	48.8	28.0	42.1	24.4	36.7
	20	35.2	52.9	30.5	45.9	30.5	45.9	26.3	39.5	22.7	34.1	20.0	30.1
	22	29.1	43.7	25.2	37.9	25.2	37.9	21.7	32.6	18.8	28.2	16.5	24.9
	24	24.4	36.7	21.2	31.9	21.2	31.9	18.3	27.4	15.8	23.7	13.9	20.9
	26	20.8	31.3	18.1	27.2	18.1	27.1	15.6	23.4	13.4	20.2	11.8	17.8
	28	17.9	27.0	15.6	23.4	15.6	23.4	13.4	20.2	11.6	17.4	10.2	15.3
	30					13.6	20.4	11.7	17.6	10.1	15.2	8.89	13.4
	32									8.87	13.3	7.82	11.7
Y-Y Axis	0	125	187	105	158	89.8	135	75.0	113	61.6	92.6	52.4	78.7
	4	99.7	150	79.0	119	64.4	96.7	49.1	73.9	33.5	50.4	24.6	36.9
	6	96.5	145	76.9	116	50.9	76.6	39.5	59.3	26.2	39.4	19.5	29.3
	8	89.2	134	72.1	108	34.2	51.5	26.4	39.8	18.2	27.3	14.2	21.3
	10	78.2	118	64.0	96.2	22.8	34.3	17.9	27.0	12.7	19.2	10.2	15.3
	12	64.7	97.3	54.1	81.3	16.2	24.3	12.8	19.3	9.28	14.0	7.54	11.3
	14	51.3	77.1	43.0	64.6	12.0	18.0						
	16	39.8	59.9	33.6	50.5								
	18	31.8	47.8	26.9	40.5								
	20	25.9	38.9	22.0	33.1								
	22	21.5	32.3	18.3	27.5								
	24	18.1	27.2	15.4	23.2								

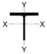
Properties

Property	15	13	11	9.5	8	7
A_g, in.^{2}	4.40	3.82	3.24	2.79	2.36	2.08
r_x, in.	1.75	1.75	1.90	1.90	1.92	1.92
r_y, in.	1.52	1.51	0.847	0.821	0.773	0.753

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

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



WT5

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

$F_y = 50$ ksi

Shape			WT5×									
lb/ft			22.5		19.5		16.5		15		13[c]	
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	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	199	298	172	258	145	218	132	199	112	168
		4	178	267	154	231	131	196	122	184	104	156
		6	155	233	134	202	114	172	111	166	94.9	143
		8	128	192	111	166	95.0	143	96.0	144	82.4	124
		10	100	150	86.5	130	74.8	112	80.2	121	68.7	103
		12	73.9	111	63.9	96.0	55.8	83.9	64.3	96.7	54.9	82.5
		14	54.3	81.6	46.9	70.5	41.0	61.6	49.5	74.4	42.1	63.2
		16	41.6	62.5	35.9	54.0	31.4	47.2	37.9	57.0	32.2	48.4
		18	32.8	49.4	28.4	42.7	24.8	37.3	29.9	45.0	25.5	38.3
		20	26.6	40.0	23.0	34.6	20.1	30.2	24.3	36.4	20.6	31.0
		22							20.0	30.1	17.0	25.6
		24							16.8	25.3	14.3	21.5
	Y-Y Axis	0	199	298	172	258	145	218	132	199	112	168
		4	179	270	150	226	121	182	114	171	94.5	142
		6	176	265	148	223	120	180	104	157	88.1	132
		8	166	250	141	212	116	174	90.0	135	76.3	115
		10	152	228	129	194	107	160	73.8	111	62.5	93.9
		12	135	203	115	173	95.0	143	57.7	86.8	48.8	73.3
		14	118	178	100	151	82.4	124	43.4	65.2	36.6	55.0
		16	101	152	85.4	128	69.8	105	33.4	50.1	28.2	42.4
		18	84.8	127	71.2	107	57.7	86.8	26.4	39.7	22.4	33.6
		20	69.5	104	58.1	87.4	47.0	70.6	21.5	32.3	18.2	27.3
		22	57.5	86.4	48.1	72.3	38.9	58.5	17.8	26.7	15.1	22.6
		24	48.3	72.7	40.5	60.8	32.8	49.3				
		26	41.2	61.9	34.5	51.9	28.0	42.0				
		28	35.6	53.4	29.8	44.8	24.1	36.3				
		30	31.0	46.6	26.0	39.0	21.1	31.6				
		32	27.2	40.9	22.8	34.3	18.5	27.8				
Properties												
A_g, in.^{2}			6.63		5.73		4.85		4.42		3.81	
r_x, in.			1.24		1.24		1.26		1.45		1.44	
r_y, in.			2.01		1.98		1.94		1.37		1.36	

ASD	LRFD	
$\Omega_c = 1.67$	$\phi_c = 0.90$	[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly. Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 50 ksi

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

WT5

Shape		WT5×									
lb/ft		11[c]		9.5[c]		8.5[c]		7.5[c]		6[c]	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	93.8	141	81.5	123	71.8	108	62.7	94.3	47.3	71.1
	4	87.4	131	76.6	115	67.6	102	59.2	89.0	44.7	67.2
	6	80.0	120	70.9	107	62.8	94.4	55.1	82.7	41.6	62.5
	8	70.7	106	63.3	95.2	56.5	84.9	49.7	74.7	37.6	56.6
	10	59.2	89.0	54.0	81.1	48.6	73.0	43.2	64.9	33.1	49.7
	12	47.6	71.6	44.4	66.7	40.1	60.3	35.8	53.8	28.2	42.4
	14	36.8	55.3	35.2	53.0	32.1	48.2	28.6	43.1	22.9	34.5
	16	28.2	42.3	27.2	40.8	24.8	37.3	22.2	33.4	17.8	26.7
	18	22.2	33.4	21.5	32.3	19.6	29.5	17.5	26.4	14.1	21.1
	20	18.0	27.1	17.4	26.1	15.9	23.9	14.2	21.4	11.4	17.1
	22	14.9	22.4	14.4	21.6	13.1	19.7	11.7	17.7	9.41	14.1
	24	12.5	18.8	12.1	18.2	11.0	16.6	9.87	14.8	7.91	11.9
	26					9.39	14.1	8.41	12.6	6.74	10.1
Y-Y Axis	0	93.8	141	81.5	123	71.8	108	62.7	94.3	47.3	71.1
	4	74.3	112	61.3	92.1	50.7	76.1	40.1	60.3	26.4	39.6
	6	70.5	106	47.7	71.7	39.3	59.0	31.0	46.5	20.8	31.2
	8	61.7	92.7	32.7	49.1	26.3	39.6	20.6	30.9	14.3	21.5
	10	50.5	75.9	21.5	32.3	17.5	26.3	13.9	20.9	9.99	15.0
	12	39.1	58.8	15.1	22.7	12.4	18.6	9.93	14.9	7.25	10.9
	14	29.3	44.1	11.2	16.8	9.21	13.8				
	16	22.7	34.1								
	18	18.0	27.1								
	20	14.7	22.1								
	22	12.2	18.3								
Properties											
A_g, in.^{2}		3.24		2.81		2.50		2.21		1.77	
r_x, in.		1.46		1.54		1.56		1.57		1.57	
r_y, in.		1.33		0.874		0.844		0.810		0.785	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c] Shape is slender for compression with F_y = 50 ksi; tabulated values have been adjusted accordingly.

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

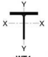


Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi

Shape			WT4×									
lb/ft			33.5		29		24		20		17.5	
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	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	295	443	256	384	211	317	176	264	154	231
		4	253	380	218	328	177	267	148	222	129	193
		6	209	314	179	269	143	215	119	179	103	154
		8	160	240	135	204	106	159	88.1	132	75.0	113
		10	113	170	94.6	142	71.5	108	59.8	89.9	50.3	75.6
		12	78.6	118	65.7	98.7	49.7	74.7	41.5	62.4	34.9	52.5
		14	57.8	86.8	48.2	72.5	36.5	54.9	30.5	45.9	25.6	38.6
		16	44.2	66.5	36.9	55.5	27.9	42.0	23.4	35.1	19.6	29.5
	Y-Y Axis	0	295	443	256	384	211	317	176	264	154	231
		4	281	422	241	362	196	294	158	237	135	202
		6	270	406	233	351	192	288	156	234	134	201
		8	253	380	219	329	180	270	148	222	129	193
		10	233	350	201	302	165	248	136	204	118	177
		12	210	315	181	272	148	223	121	182	106	159
		14	186	279	160	240	131	196	106	160	92.7	139
		16	161	243	138	208	113	170	91.5	138	79.5	120
		18	138	207	118	177	95.7	144	77.1	116	66.9	100
		20	115	173	98.0	147	79.4	119	63.5	95.4	55.0	82.6
		22	95.2	143	81.1	122	65.6	98.6	52.5	78.9	45.5	68.4
		24	80.0	120	68.1	102	55.2	82.9	44.1	66.3	38.2	57.5
		26	68.2	103	58.1	87.3	47.0	70.7	37.6	56.5	32.6	49.0
		28	58.8	88.4	50.1	75.3	40.6	61.0	32.5	48.8	28.1	42.3
		30	51.3	77.0	43.6	65.6	35.3	53.1	28.3	42.5	24.5	36.8
		32	45.0	67.7	38.4	57.6	31.1	46.7	24.9	37.4	21.5	32.4

Properties

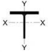
Property	33.5	29	24	20	17.5
A_g, in.^{2}	9.84	8.54	7.05	5.87	5.14
r_x, in.	1.05	1.03	0.986	0.988	0.968
r_y, in.	2.12	2.10	2.08	2.04	2.03

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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

Table 4-7 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded WT-Shapes

F_y = 50 ksi



WT4

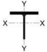
Shape		WT4×							
lb/ft		15.5		14		12		10.5	
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	137	205	123	185	106	159	92.2	139
	4	114	171	105	157	89.5	135	80.6	121
	6	91.2	137	85.1	128	72.5	109	68.2	102
	8	66.6	100	63.7	95.8	54.0	81.1	53.9	81.0
	10	44.7	67.2	43.9	65.9	36.9	55.4	39.8	59.9
	12	31.0	46.6	30.5	45.8	25.6	38.5	28.0	42.1
	14	22.8	34.3	22.4	33.6	18.8	28.3	20.6	30.9
	16	17.5	26.2	17.1	25.8	14.4	21.7	15.8	23.7
	18							12.4	18.7
Y-Y Axis	0	137	205	123	185	106	159	92.2	139
	4	115	173	109	164	90.9	137	78.4	118
	6	115	173	105	157	88.2	133	70.6	106
	8	112	168	94.3	142	80.2	121	59.0	88.7
	10	104	156	81.8	123	69.6	105	46.6	70.0
	12	93.1	140	68.6	103	58.3	87.7	34.8	52.3
	14	81.6	123	55.7	83.7	47.3	71.0	25.7	38.6
	16	69.9	105	43.7	65.7	37.0	55.7	19.7	29.7
	18	58.7	88.2	34.6	52.0	29.3	44.1	15.6	23.5
	20	48.2	72.4	28.1	42.2	23.8	35.8	12.7	19.1
	22	39.9	60.0	23.2	34.9	19.7	29.6		
	24	33.6	50.4	19.5	29.4	16.6	24.9		
	26	28.6	43.0	16.6	25.0	14.1	21.2		
	28	24.7	37.1						
	30	21.5	32.3						
	32	18.9	28.4						

Properties

	15.5	14	12	10.5
A_g, in.^{2}	4.56	4.12	3.54	3.08
r_x, in.	0.969	1.01	0.999	1.12
r_y, in.	2.02	1.62	1.61	1.26

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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



WT4

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

Concentrically Loaded WT-Shapes

$F_y = 50$ ksi

Shape		WT4×							
lb/ft		9		7.5		6.5		5[c]	
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	78.7	118	66.5	99.9	57.5	86.4	41.5	62.4
	4	69.2	104	59.4	89.2	51.4	77.3	37.5	56.4
	6	58.8	88.4	51.5	77.4	44.7	67.3	33.1	49.7
	8	46.9	70.5	42.3	63.5	36.8	55.3	27.6	41.6
	10	35.0	52.6	32.8	49.2	28.7	43.1	21.3	32.1
	12	24.8	37.2	24.0	36.0	21.1	31.6	15.4	23.2
	14	18.2	27.4	17.6	26.4	15.5	23.3	11.3	17.1
	16	13.9	20.9	13.5	20.2	11.8	17.8	8.69	13.1
	18	11.0	16.5	10.6	16.0	9.36	14.1	6.87	10.3
	20			8.62	13.0	7.58	11.4	5.56	8.36
Y-Y Axis	0	78.7	118	66.5	99.9	57.5	86.4	41.5	62.4
	4	63.6	95.6	49.3	74.0	39.7	59.7	27.5	41.4
	6	58.1	87.3	38.3	57.5	30.7	46.1	22.1	33.2
	8	48.5	73.0	26.3	39.5	20.5	30.8	15.0	22.6
	10	38.0	57.1	17.2	25.8	13.5	20.4	10.1	15.2
	12	28.0	42.1	12.1	18.1	9.56	14.4	7.21	10.8
	14	20.8	31.2	8.92	13.4	7.09	10.7	5.37	8.07
	16	16.0	24.0						
	18	12.7	19.0						
	20	10.3	15.5						

Properties

	9	7.5	6.5	5[c]
A_g, in.^{2}	2.63	2.22	1.92	1.48
r_x, in.	1.14	1.22	1.23	1.20
r_y, in.	1.23	0.876	0.843	0.840

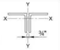
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 50$ ksi; tabulated values have been adjusted accordingly.

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

Table 4-8
Available Strength in Axial Compression, kips
Double Angles—Equal Legs

F_y = 36 ksi



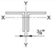
2L12

Shape			2L12×12× 1 3/8		2L12×12× 1 1/4		2L12×12× 1 1/8		2L12×12× 1		No. of connectors[a]
lb/ft			210		193		174		156		
Design			P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	1340	2020	1220	1840	1110	1670	992	1490	
		2	1340	2010	1220	1840	1110	1670	989	1490	
		4	1330	2000	1210	1820	1100	1660	983	1480	
		6	1310	1970	1200	1800	1090	1640	972	1460	
		8	1290	1940	1180	1770	1070	1610	957	1440	
		10	1270	1900	1160	1740	1050	1580	938	1410	
		12	1230	1860	1130	1700	1030	1540	916	1380	
		14	1200	1800	1100	1650	997	1500	890	1340	
		16	1160	1740	1060	1590	964	1450	861	1290	
		18	1110	1670	1020	1530	928	1390	829	1250	
		20	1070	1600	976	1470	889	1340	795	1190	b
		22	1020	1530	931	1400	848	1280	758	1140	
		24	964	1450	884	1330	806	1210	721	1080	
		26	911	1370	835	1260	762	1150	682	1030	
		28	856	1290	786	1180	717	1080	642	966	
		30	801	1200	736	1110	672	1010	602	905	
		32	746	1120	686	1030	627	942	562	845	
		34	692	1040	637	957	582	875	523	786	
		36	639	960	588	884	538	809	484	727	
		38	587	882	541	813	496	745	446	670	
		40	537	807	495	744	454	683	409	614	
	Y-Y Axis	0	1340	2020	1220	1840	1110	1670	992	1490	
		6	1210	1810	1080	1620	951	1430	814	1220	
		9	1200	1810	1070	1610	949	1430	812	1220	
		12	1200	1800	1070	1610	945	1420	809	1220	
		15	1190	1790	1060	1600	939	1410	804	1210	
		18	1170	1760	1050	1580	930	1400	797	1200	
		21	1150	1720	1030	1550	915	1380	786	1180	
		24	1110	1670	1000	1510	894	1340	760	1140	
		27	1070	1610	968	1460	866	1300	735	1100	2
		30	1030	1540	928	1400	832	1250	703	1060	
		33	956	1440	864	1300	777	1170	667	1000	
		36	901	1350	815	1220	733	1100	628	944	
		39	845	1270	764	1150	687	1030	587	882	
		42	788	1180	712	1070	641	963	545	820	
		45	731	1100	660	992	594	893	504	757	
		48	674	1010	608	914	548	824	462	694	
		51	619	930	558	839	503	756	421	633	
		54	565	849	509	765	459	689	401	603	
		57	512	770	461	693	415	624	363	546	
		60	463	696	417	627	376	565	329	495	3
		63	421	632	379	570	342	514	300	450	
Properties of 2 angles—3/4 in. back to back											
A_g, in.^{2}			62.2		56.8		51.6		46.0		
r_x, in.			3.64		3.66		3.68		3.70		
r_y, in.			5.32		5.29		5.28		5.25		
Properties of single angle											
r_z, in.			2.30		2.31		2.33		2.34		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.

[b] For required number of intermediate connectors, see the discussion of Table 4-8.



2L10

Table 4-8 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Double Angles—Equal Legs

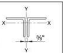
Shape		2L10×10×												No. of connectors[a]
		$1^3/_8$		$1^1/_4$		$1^1/_8$		1		$^7/_8$		$^3/_4$[c]		
lb/ft		174		160		145		129		114		98.2		
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	1100	1660	1010	1520	918	1380	819	1230	724	1090	611	919	b
	2	1100	1650	1010	1510	915	1380	816	1230	722	1090	610	917	
	4	1090	1640	996	1500	906	1360	809	1220	715	1070	606	911	
	6	1070	1610	979	1470	891	1340	795	1200	704	1060	599	900	
	8	1050	1570	957	1440	871	1310	778	1170	688	1030	590	886	
	10	1010	1520	928	1400	846	1270	755	1130	668	1000	577	868	
	12	978	1470	895	1350	815	1230	728	1090	645	970	558	839	
	14	936	1410	857	1290	781	1170	698	1050	619	930	536	805	
	16	890	1340	815	1230	743	1120	665	999	590	886	511	768	
	18	840	1260	771	1160	703	1060	629	945	558	839	484	728	
	20	788	1180	724	1090	660	992	591	889	525	789	456	685	
	22	734	1100	675	1010	616	926	552	830	491	738	427	641	
	24	679	1020	625	939	571	858	512	770	456	685	397	597	
	26	625	939	575	865	526	790	472	710	421	632	367	551	
	28	570	857	526	790	481	722	432	650	386	579	337	506	
	30	517	777	477	718	437	656	393	591	351	528	307	462	
	32	466	700	431	647	394	593	356	534	318	478	279	419	
	34	416	625	385	579	353	531	319	480	286	430	251	377	
	36	371	558	344	517	315	473	285	428	255	383	224	337	
	38	333	501	309	464	283	425	256	384	229	344	201	303	
	40	301	452	278	419	255	383	231	347	207	311	182	273	
Y-Y Axis	0	1100	1660	1010	1520	918	1380	819	1230	724	1090	611	919	2
	6	1020	1540	921	1380	823	1240	712	1070	605	909	490	736	
	9	1020	1530	917	1380	819	1230	710	1070	603	906	488	734	
	12	1010	1520	909	1370	813	1220	705	1060	599	901	485	730	
	15	990	1490	894	1340	801	1200	696	1050	593	892	481	723	
	18	960	1440	869	1310	781	1170	682	1020	583	876	475	713	
	21	922	1390	835	1260	752	1130	660	992	567	853	459	689	
	24	879	1320	796	1200	718	1080	632	949	545	820	441	662	
	27	812	1220	736	1110	664	997	585	880	508	763	418	628	
	30	758	1140	687	1030	619	931	547	822	475	714	391	587	
	33	703	1060	636	956	573	862	506	761	440	662	362	544	
	36	647	973	585	879	527	792	465	699	404	608	331	498	
	39	592	889	534	802	480	722	424	638	369	554	301	452	
	42	537	807	483	726	435	653	384	577	333	501	271	407	
	45	483	726	434	653	390	587	345	518	299	449	253	381	3
	48	432	649	387	582	347	522	306	461	266	399	225	339	
	51	383	576	344	517	308	463	272	409	236	355	201	302	
	54	342	514	307	462	276	414	244	366	212	318	180	271	
	57	308	462	276	415	248	372	219	329	190	286	162	244	
	70	278	418	249	375	224	336	198	298	172	259	147	221	
	63	252	379	226	340	203	306	180	271	157	235	134	201	
Properties of 2 angles —$^3/_4$ in. back to back														
A_g, in.^{2}		51.2		46.8		42.6		38.0		33.6		29.0		
r_x, in.		3.00		3.02		3.03		3.05		3.07		3.10		
r_y, in.		4.53		4.49		4.46		4.45		4.42		4.41		
Properties of single angle														
r_z, in.		1.91		1.91		1.92		1.92		1.93		1.96		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

F_y = 36 ksi

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Double Angles—Equal Legs

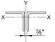


2L8

Shape		2L8×8×													
		1 1/8		1		7/8		3/4		5/8		9/16[c]			No. of connectors[a]
lb/ft		114		102		90.0		77.8		65.4		59.2			
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, L_c (ft), with respect to indicated axis — X-X Axis	0	724	1090	651	978	573	862	496	745	418	628	355	534		
	2	721	1080	648	973	571	857	493	741	416	625	354	532		
	4	709	1070	638	959	562	845	486	730	410	616	350	527		
	6	691	1040	622	934	548	824	474	712	400	601	344	518		
	8	666	1000	600	901	529	795	458	688	386	581	336	505		
	10	636	955	573	861	505	760	437	657	370	556	326	490		
	12	600	902	541	813	478	719	414	622	350	526	313	471		
	14	561	843	506	761	448	673	388	583	328	494	297	446		
	16	519	779	469	704	415	624	360	541	305	458	276	415		
	18	475	713	429	646	381	572	330	497	281	422	254	382		
	20	430	646	390	586	346	520	300	451	255	384	231	348		b
	22	385	579	350	526	311	468	270	406	230	346	209	314		
	24	342	513	311	467	277	416	241	362	206	309	187	280		
	26	300	451	273	411	244	367	213	320	182	273	165	248		
	28	260	391	237	357	213	320	185	279	159	239	144	217		
	30	226	340	207	311	185	278	161	243	138	208	126	189		
	32	199	299	182	273	163	245	142	213	122	183	111	166		
	34	176	265	161	242	144	217	126	189	108	162	98.0	147		
	36	157	236	144	216	129	193	112	168	96.1	144	87.4	131		
	38	141	212	129	194	115	173	101	151	86.2	130	78.4	118		
	40	127	191	116	175	104	157	90.8	136	77.8	117	70.8	106		
Y-Y Axis	0	724	1090	651	978	573	862	496	745	418	628	355	534		
	6	673	1010	594	893	510	767	424	637	335	503	288	433		
	9	666	1000	589	885	506	761	421	633	333	500	286	431		
	12	649	975	576	866	497	747	415	624	329	494	283	426		
	15	621	934	553	832	480	721	403	606	322	484	278	418		
	18	587	882	523	786	444	667	376	565	304	457	265	398		2
	21	536	805	478	718	410	616	348	523	284	427	249	375		
	24	491	738	438	658	373	561	317	477	260	391	229	345		
	27	444	668	396	595	336	505	285	428	234	352	207	312		
	30	397	597	354	532	298	448	253	380	208	313	184	277		
	33	351	528	312	469	261	392	221	332	182	274	161	242		
	36	307	461	272	409	237	356	200	301	165	247	146	219		
	39	264	397	234	352	203	306	172	258	142	213	126	189		
	42	228	343	203	304	176	264	149	224	123	185	109	164		
	45	199	299	177	266	154	231	130	195	108	162	95.8	144		
	48	175	263	156	234	135	203	115	172	94.9	143	84.6	127		3
	51	155	234	138	207	120	180	102	153	84.3	127	75.2	113		
	54	139	208	123	185	107	161	90.9	137	75.4	113	67.3	101		
	57	125	187	111	166	96.3	145	81.7	123	67.8	102	60.6	91.1		
Properties of 2 angles—3/8 in. back to back															
A_g, in.^{2}		33.6		30.2		26.6		23.0		19.4		17.5			
r_x, in.		2.41		2.43		2.45		2.46		2.48		2.49			
r_y, in.		3.54		3.52		3.50		3.47		3.45		3.44			
Properties of single angle															
r_z, in.		1.56		1.56		1.57		1.57		1.58		1.58			

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.



2L8–2L6

Table 4-8 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Double Angles—Equal Legs

Shape		2L8×8× 1/2[c]		No. of connectors[a]	2L6×6× 1		2L6×6× 7/8		2L6×6× 3/4		2L6×6× 5/8		No. of connectors[a]
lb/ft		52.8			74.8		66.2		57.4		48.4		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	296	445		474	713	420	632	364	548	308	463	
	2	295	443		470	706	416	626	361	543	306	459	
	4	292	439		457	686	405	609	351	528	297	447	
	6	287	432		436	655	387	581	335	504	284	427	
	8	281	422		408	613	362	545	315	473	267	401	
	10	272	409		374	563	334	501	290	436	246	370	
	12	262	394		337	507	301	453	262	394	223	336	
	14	251	377		298	448	267	401	233	350	199	299	
	16	238	358		259	389	232	349	203	305	174	261	
	18	224	337		220	331	199	299	174	261	149	224	
	20	208	312	b	184	276	167	250	146	219	126	189	b
	22	187	281		152	228	138	207	121	181	104	157	
	24	167	252		128	192	116	174	101	152	87.7	132	
	26	148	223		109	164	98.6	148	86.4	130	74.8	112	
	28	130	195		93.8	141	85.1	128	74.5	112	64.5	96.9	
	30	113	170				74.1	111	64.9	97.6	56.1	84.4	
	32	99.2	149										
	34	87.9	132										
	36	78.4	118										
	38	70.4	106										
	40	63.5	95.4										
Y-Y Axis	0	296	445		474	713	420	632	364	548	308	463	
	6	234	352		446	670	390	586	331	497	270	406	
	9	233	350		431	647	378	569	323	485	265	398	
	12	231	348		405	609	357	536	305	459	253	380	
	15	229	344		373	561	328	494	281	423	234	352	
	18	222	334		328	493	288	434	247	371	206	309	
	21	213	320	2	288	433	253	380	216	325	180	270	
	24	198	298		248	373	217	327	185	278	154	231	3
	27	180	271		209	315	183	275	155	233	129	194	
	30	161	241		173	260	151	226	127	191	106	159	
	33	141	212		143	215	125	187	106	159	87.6	132	
	36	127	192		120	181	105	158	88.9	134	73.8	111	
	39	110	166		103	154	89.5	135	75.8	114	63.0	94.8	
	42	96.2	145		88.5	133	77.3	116	65.5	98.4	54.5	81.8	
	45	84.5	127		77.1	116	67.3	101					
	48	74.8	112	3									
	51	66.6	100										
	54	59.7	89.7										
	57	53.8	80.8										
Properties of 2 angles—3/8 in. back to back													
A_g, in.^{2}		15.7			22.0		19.5		16.9		14.3		
r_x, in.		2.49			1.79		1.81		1.82		1.84		
r_y, in.		3.43			2.72		2.70		2.67		2.65		
Properties of single angle													
r_z, in.		1.59			1.17		1.17		1.17		1.17		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

$F_y = 36$ ksi

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Double Angles—Equal Legs

2L6 (3/8")

Shape		2L6×6× 9/16		2L6×6× 1/2		2L6×6× 7/16[c]		2L6×6× 3/8[c]		2L6×6× 5/16[c]		No. of connectors[a]
lb/ft		43.8		39.2		34.4		29.8		24.8		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	278	418	248	373	211	318	165	248	122	183	b
	2	276	414	246	369	210	316	164	246	121	182	
	4	268	403	239	360	206	310	161	242	119	179	
	6	257	386	229	344	200	300	156	235	116	174	
	8	241	363	215	324	191	287	150	226	111	167	
	10	223	335	199	299	177	265	142	214	106	159	
	12	202	304	181	272	160	241	133	200	99.6	150	
	14	180	271	161	243	143	215	123	184	92.5	139	
	16	158	237	141	213	125	189	108	163	84.7	127	
	18	136	204	122	183	108	162	93.6	141	76.4	115	
	20	115	172	103	155	91.5	138	79.3	119	67.1	101	
	22	95.2	143	85.8	129	76.1	114	66.1	99.3	55.9	84.1	
	24	80.0	120	72.1	108	63.9	96.1	55.5	83.4	47.0	70.7	
	26	68.2	102	61.4	92.3	54.5	81.9	47.3	71.1	40.1	60.2	
	28	58.8	88.3	53.0	79.6	47.0	70.6	40.8	61.3	34.5	51.9	
	30	51.2	77.0	46.1	69.4	40.9	61.5	35.5	53.4	30.1	45.2	
Y-Y Axis	0	278	418	248	373	211	318	165	248	122	183	
	6	237	356	203	305	170	255	130	196	88.9	134	
	9	233	350	200	301	168	252	129	194	88.2	133	
	12	220	331	191	287	162	243	126	190	86.7	130	
	15	202	304	176	265	151	227	121	183	84.2	127	2
	18	180	270	158	237	136	205	111	167	80.2	121	
	21	156	234	137	206	119	178	97.9	147	74.3	112	
	24	132	199	116	175	101	152	83.5	126	65.7	98.7	
	27	115	173	101	152	87.6	132	72.4	109	54.9	82.5	
	30	94.2	142	82.8	124	72.0	108	59.9	90.0	48.0	72.2	
	33	78.2	118	68.8	103	60.0	90.3	50.2	75.4	40.6	61.0	
	36	66.0	99.2	58.1	87.4	50.8	76.3	42.6	64.0	34.6	52.1	3
	39	56.4	84.7	49.7	74.7	43.5	65.4	36.5	54.9	29.9	44.9	
	42	48.7	73.2	43.0	64.6	37.6	56.6	31.7	47.6	26.0	39.0	
Properties of 2 angles—3/8 in. back to back												
A_g, in.^{2}		12.9		11.5		10.2		8.76		7.34		
r_x, in.		1.85		1.86		1.86		1.87		1.88		
r_y, in.		2.64		2.63		2.62		2.60		2.59		
Properties of single angle												
r_z, in.		1.18		1.18		1.18		1.19		1.19		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.

Table 4-8 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

Double Angles—Equal Legs

2L5

Shape		2L5×5×														
		7/8		3/4		5/8		1/2		7/16		3/8[c]		5/16[c]		No. of connectors[a]
lb/ft		54.4		47.2		40.0		32.4		28.6		24.6		20.6		
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	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	345	518	302	454	254	382	207	310	182	273	154	231	116	174	b
	2	340	511	298	448	251	377	204	306	180	270	153	229	115	172	
	4	327	491	286	430	241	363	196	295	173	260	148	223	112	168	
	6	305	458	267	402	226	340	184	276	162	244	140	211	107	161	
	8	277	417	243	366	206	310	168	252	148	223	129	193	101	152	
	10	245	368	215	324	183	275	149	225	132	199	115	173	93.3	140	
	12	211	317	186	279	159	238	130	195	115	173	99.9	150	84.5	127	
	14	177	265	156	234	134	201	109	165	97.2	146	84.8	127	71.9	108	
	16	144	216	127	191	110	165	90.1	135	80.3	121	70.2	105	59.6	89.6	
	18	114	172	101	153	87.8	132	72.2	109	64.5	96.9	56.5	84.9	48.1	72.4	
	20	92.7	139	82.2	124	71.1	107	58.5	88.0	52.2	78.5	45.8	68.8	39.0	58.6	
	22	76.6	115	67.9	102	58.8	88.4	48.4	72.7	43.2	64.9	37.8	56.8	32.2	48.4	
	24	64.4	96.7	57.1	85.8	49.4	74.3	40.6	61.1	36.3	54.5	31.8	47.8	27.1	40.7	
	26													23.1	34.7	
Y-Y Axis	0	345	518	302	454	254	382	207	310	182	273	154	231	116	174	2
	2	329	495	283	426	233	350	181	271	153	230	125	187	92.0	138	
	4	328	493	282	424	232	349	180	270	152	229	124	187	91.7	138	
	6	322	485	279	419	230	345	178	268	151	227	123	185	91.3	137	
	8	311	468	270	406	224	336	175	263	149	224	122	183	90.6	136	
	10	296	445	257	386	214	322	169	254	142	214	118	177	88.9	134	
	12	278	418	241	363	201	302	159	240	134	201	112	168	86.4	130	
	14	252	379	218	328	182	273	145	217	123	185	103	155	81.9	123	
	16	230	345	198	298	165	248	131	197	111	167	93.9	141	75.2	113	
	18	207	311	178	268	148	223	117	176	98.9	149	83.7	126	67.5	101	
	20	184	276	158	237	131	197	104	156	86.6	130	73.3	110	59.4	89.3	
	22	161	242	138	207	114	172	90.2	136	74.7	112	63.3	95.1	51.4	77.2	
	24	140	210	119	179	98.4	148	77.3	116	67.0	101	56.7	85.2	46.1	69.3	3
	26	119	179	102	153	84.1	126	66.1	99.4	57.4	86.2	48.7	73.2	39.8	59.8	
	28	103	155	87.8	132	72.6	109	57.2	85.9	49.7	74.7	42.2	63.5	34.7	52.1	
	30	89.8	135	76.6	115	63.3	95.2	49.9	75.0	43.4	65.3	37.0	55.6	30.4	45.7	
	32	79.0	119	67.4	101	55.7	83.8	44.0	66.1	38.3	57.5	32.6	49.0	26.9	40.4	
	34	70.0	105	59.7	89.8	49.4	74.3	39.0	58.6	34.0	51.1	29.0	43.6	23.9	36.0	
	36	62.5	93.9	53.3	80.1	44.1	66.3	34.8	52.4	30.4	45.6	25.9	39.0	21.4	32.2	
	38	56.1	84.3													

Properties of 2 angles —3/8 in. back to back

	7/8	3/4	5/8	1/2	7/16	3/8	5/16
A_g, in.^{2}	16.0	14.0	11.8	9.58	8.44	7.30	6.14
r_x, in.	1.49	1.50	1.52	1.53	1.54	1.55	1.56
r_y, in.	2.30	2.27	2.25	2.22	2.21	2.20	2.19

Properties of single angle

	7/8	3/4	5/8	1/2	7/16	3/8	5/16
r_z, in.	0.971	0.972	0.975	0.980	0.983	0.986	0.990

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

$F_y = 36$ ksi

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Double Angles—Equal Legs

2L4

Shape		2L4×4×														No. of connectors[a]
		3/4		5/8		1/2		7/16		3/8		5/16		1/4[c]		
lb/ft		37.0		31.4		25.6		22.6		19.6		16.4		13.2		
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	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	235	353	199	299	162	243	142	214	123	185	103	155	72.6	109	
	2	230	346	195	293	158	238	139	210	121	182	101	152	71.6	108	
	4	215	324	183	275	149	224	131	197	114	171	95.6	144	68.9	104	
	6	193	290	164	247	134	202	118	178	103	155	86.6	130	64.5	96.9	
	8	166	249	142	213	116	174	103	154	89.5	134	75.5	113	58.7	88.2	
	10	136	205	117	176	96.3	145	85.5	128	74.7	112	63.2	95.0	51.2	77.0	b
	12	107	161	93.1	140	76.7	115	68.3	103	59.9	90.1	50.9	76.5	41.4	62.2	
	14	80.8	121	70.7	106	58.5	87.9	52.3	78.6	46.1	69.3	39.3	59.1	32.1	48.3	
	16	61.9	93.0	54.1	81.4	44.8	67.3	40.1	60.2	35.3	53.0	30.1	45.2	24.6	37.0	
	18	48.9	73.5	42.8	64.3	35.4	53.2	31.6	47.6	27.9	41.9	23.8	35.7	19.4	29.2	
	20			34.6	52.1	28.7	43.1	25.6	38.5	22.6	33.9	19.3	28.9	15.7	23.7	
Y-Y Axis	0	235	353	199	299	162	243	142	214	123	185	103	155	72.6	109	
	2	225	338	187	281	148	222	127	190	105	159	83.1	125	57.7	86.7	
	4	223	335	186	279	147	221	126	189	105	158	82.6	124	57.4	86.3	
	6	215	324	180	271	144	216	124	186	103	155	81.6	123	57.0	85.7	
	8	203	306	170	256	137	205	118	178	99.7	150	79.4	119	56.2	84.4	
	10	188	283	158	237	126	190	110	165	93.2	140	75.2	113	54.7	82.2	
	12	167	250	139	209	112	168	96.8	146	82.6	124	67.3	101	50.7	76.2	
	14	148	222	123	184	98.2	148	85.1	128	72.6	109	59.5	89.4	45.4	68.2	
	16	128	193	106	160	84.8	127	73.3	110	62.5	94.0	51.3	77.0	39.4	59.2	3
	18	109	164	90.1	135	71.8	108	61.8	92.9	52.7	79.2	43.2	64.9	33.3	50.1	
	20	91.5	137	74.9	113	59.4	89.3	51.0	76.7	43.4	65.3	35.6	53.5	27.6	41.5	
	22	75.7	114	62.0	93.2	49.2	74.0	42.3	63.6	36.1	54.2	29.7	44.6	23.1	34.8	
	24	63.6	95.7	52.2	78.4	41.5	62.3	35.7	53.6	30.4	45.8	25.1	37.7	19.6	29.5	
	26	54.3	81.6	44.5	66.9	35.4	53.2	30.4	45.8	26.0	39.1	21.5	32.3	16.9	25.3	
	28	46.8	70.4	38.4	57.7	30.5	45.9	26.3	39.5	22.5	33.8	18.6	27.9	14.6	22.0	
	30	40.8	61.3	33.5	50.3	26.6	40.0	22.9	34.5	19.6	29.5					

Properties of 2 angles — 3/8 in. back to back

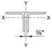
	3/4	5/8	1/2	7/16	3/8	5/16	1/4
A_g, in.^{2}	10.9	9.22	7.50	6.60	5.72	4.80	3.86
r_x, in.	1.18	1.20	1.21	1.22	1.23	1.24	1.25
r_y, in.	1.88	1.85	1.83	1.81	1.80	1.79	1.78

Properties of single angle

	3/4	5/8	1/2	7/16	3/8	5/16	1/4
r_z, in.	0.774	0.774	0.776	0.777	0.779	0.781	0.783

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L3 1/2

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Double Angles—Equal Legs

$F_y = 36$ ksi

Shape		2L3 1/2×3 1/2×										No. of connectors[a]
		1/2		7/16		3/8		5/16		1/4[c]		
lb/ft		22.2		19.6		17.0		14.4		11.6		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	140	211	125	187	108	162	90.5	136	69.6	105	
	1	139	209	124	186	107	161	90.0	135	69.3	104	
	2	136	205	121	182	105	158	88.2	133	68.4	103	
	3	132	198	117	176	102	153	85.4	128	66.8	100	
	4	126	189	112	168	96.9	146	81.6	123	64.7	97.3	
	5	118	177	105	158	91.3	137	77.0	116	62.1	93.3	
	6	109	164	97.7	147	84.9	128	71.7	108	58.3	87.6	
	7	100	150	89.5	135	77.9	117	65.8	99.0	53.6	80.6	
	8	90.2	136	80.9	122	70.6	106	59.7	89.8	48.7	73.2	
	9	80.3	121	72.1	108	63.0	94.8	53.5	80.4	43.7	65.7	b
	10	70.4	106	63.5	95.4	55.6	83.6	47.3	71.0	38.7	58.2	
	11	61.0	91.6	55.1	82.8	48.4	72.7	41.2	62.0	33.9	50.9	
	12	51.9	78.1	47.1	70.8	41.5	62.4	35.5	53.4	29.2	44.0	
	13	44.3	66.5	40.1	60.3	35.4	53.1	30.3	45.5	24.9	37.5	
	14	38.2	57.4	34.6	52.0	30.5	45.8	26.1	39.2	21.5	32.3	
	15	33.2	50.0	30.1	45.3	26.6	39.9	22.7	34.2	18.7	28.2	
	16	29.2	43.9	26.5	39.8	23.3	35.1	20.0	30.0	16.5	24.8	
	17	25.9	38.9	23.5	35.3	20.7	31.1	17.7	26.6	14.6	21.9	
	18							15.8	23.7	13.0	19.6	
Y-Y Axis	0	140	211	125	187	108	162	90.5	136	69.6	105	
	2	131	196	114	171	95.5	143	76.3	115	56.6	85.1	
	4	129	194	113	169	94.7	142	75.7	114	56.2	84.5	
	6	124	186	109	164	92.1	138	74.2	111	55.3	83.1	
	8	115	173	101	152	86.3	130	70.4	106	53.2	79.9	
	10	101	152	89.1	134	76.2	114	62.7	94.2	48.3	72.6	
	12	88.5	133	77.6	117	66.3	99.7	54.7	82.2	42.5	63.8	3
	14	75.3	113	65.8	98.9	56.2	84.4	46.3	69.6	36.0	54.2	
	16	62.5	94.0	54.4	81.8	46.4	69.7	38.2	57.4	29.7	44.6	
	18	50.5	75.9	43.8	65.8	37.3	56.0	30.7	46.1	23.9	35.9	
	20	41.0	61.6	35.6	53.5	30.3	45.5	25.0	37.6	19.5	29.3	
	22	33.9	51.0	29.5	44.3	25.1	37.7	20.7	31.2	16.2	24.4	
	24	28.5	42.9	24.8	37.2	21.1	31.8	17.5	26.3	13.7	20.6	
	26	24.3	36.6	21.1	31.8	18.0	27.1	14.9	22.4	11.7	17.6	

Properties of 2 angles—3/8 in. back to back

	1/2	7/16	3/8	5/16	1/4
A_g, in.^{2}	6.50	5.78	5.00	4.20	3.40
r_x, in.	1.05	1.06	1.07	1.08	1.09
r_y, in.	1.63	1.61	1.60	1.59	1.57

Properties of single angle

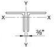
	1/2	7/16	3/8	5/16	1/4
r_z, in.	0.679	0.681	0.683	0.685	0.688

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Double Angles—Equal Legs

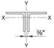


2L3

Shape		2L3×3× 1/2		7/16		3/8		5/16		1/4		3/16[c]		No. of connectors[a]
lb/ft		18.8		16.6		14.4		12.2		9.80		7.42		
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, L_c (ft), with respect to indicated axis — X-X Axis	0	119	179	105	157	91.0	137	76.7	115	62.1	93.3	41.0	61.6	b
	1	118	177	104	156	90.1	135	76.1	114	61.5	92.5	40.7	61.2	
	2	115	172	101	152	87.7	132	74.0	111	59.9	90.1	40.0	60.2	
	3	109	164	96.4	145	83.8	126	70.8	106	57.3	86.2	38.9	58.5	
	4	102	154	90.3	136	78.6	118	66.5	99.9	53.9	81.0	37.3	56.1	
	5	93.9	141	83.0	125	72.4	109	61.3	92.1	49.8	74.8	35.4	53.1	
	6	84.6	127	75.0	113	65.4	98.3	55.5	83.4	45.2	67.9	33.1	49.7	
	7	74.8	112	66.4	99.8	58.1	87.3	49.4	74.2	40.3	60.5	30.5	45.8	
	8	64.9	97.6	57.8	86.9	50.6	76.1	43.2	64.9	35.3	53.0	26.9	40.5	
	9	55.3	83.1	49.3	74.2	43.3	65.1	37.0	55.7	30.3	45.6	23.2	34.9	
	10	46.2	69.4	41.3	62.1	36.4	54.7	31.2	46.9	25.6	38.5	19.7	29.6	
	11	38.1	57.3	34.2	51.4	30.1	45.3	25.9	38.9	21.3	32.0	16.4	24.6	
	12	32.1	48.2	28.7	43.2	25.3	38.1	21.7	32.7	17.9	26.9	13.8	20.7	
	13	27.3	41.0	24.5	36.8	21.6	32.4	18.5	27.9	15.3	22.9	11.7	17.6	
	14	23.5	35.4	21.1	31.7	18.6	28.0	16.0	24.0	13.2	19.8	10.1	15.2	
	15			18.4	27.6	16.2	24.4	13.9	20.9	11.5	17.2	8.80	13.2	
Y-Y Axis	0	119	179	105	157	91.0	137	76.7	115	62.1	93.3	41.0	61.6	3
	2	112	169	97.5	147	82.8	124	67.1	101	50.6	76.0	32.2	48.3	
	4	110	165	95.8	144	81.6	123	66.3	99.6	50.0	75.2	31.9	48.0	
	6	103	155	90.0	135	77.3	116	63.5	95.4	48.5	72.9	31.5	47.3	
	8	90.9	137	79.5	120	68.4	103	56.6	85.0	44.2	66.4	30.1	45.2	
	10	78.6	118	68.7	103	59.0	88.7	48.8	73.3	38.4	57.7	27.0	40.5	
	12	65.8	98.9	57.3	86.2	49.2	73.9	40.5	60.9	31.9	48.0	22.8	34.2	
	14	53.3	80.1	46.3	69.6	39.6	59.6	32.5	48.8	25.6	38.4	18.4	27.6	
	16	41.7	62.7	36.2	54.4	30.9	46.4	25.2	37.9	19.9	29.9	14.4	21.7	
	18	33.0	49.6	28.6	43.1	24.5	36.8	20.0	30.1	15.9	23.8	11.6	17.4	
	20	26.8	40.2	23.2	34.9	19.9	29.9	16.3	24.5	12.9	19.4	9.48	14.3	
	22	22.1	33.3	19.2	28.9	16.5	24.7	13.5	20.3	10.7	16.1	7.89	11.9	
Properties of 2 angles — 3/8 in. back to back														
A_g, in.^{2}		5.52		4.86		4.22		3.56		2.88		2.18		
r_x, in.		0.895		0.903		0.910		0.918		0.926		0.933		
r_y, in.		1.43		1.42		1.41		1.39		1.38		1.37		
Properties of single angle														
r_z, in.		0.580		0.580		0.581		0.583		0.585		0.586		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L2½

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Double Angles—Equal Legs

F_y = 36 ksi

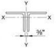
Shape		2L2½×2½×										No. of connectors[a]
		½		3/8		5/16		¼		3/16[c]		
lb/ft		15.4		11.8		10.0		8.20		6.14		
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis												
X-X Axis	0	97.4	146	74.6	112	62.9	94.6	51.3	77.1	37.9	57.0	b
	1	96.1	144	73.6	111	62.1	93.4	50.6	76.1	37.6	56.5	
	2	92.1	138	70.7	106	59.7	89.7	48.7	73.2	36.6	55.0	
	3	85.9	129	66.0	99.3	55.9	84.0	45.6	68.6	34.6	52.0	
	4	77.8	117	60.1	90.3	50.9	76.5	41.7	62.6	31.6	47.6	
	5	68.6	103	53.2	80.0	45.2	67.9	37.1	55.7	28.2	42.4	
	6	58.8	88.4	45.9	68.9	39.0	58.7	32.1	48.3	24.5	36.8	
	7	49.0	73.6	38.5	57.8	32.9	49.4	27.2	40.8	20.8	31.2	
	8	39.7	59.7	31.4	47.2	26.9	40.5	22.3	33.6	17.2	25.8	
	9	31.5	47.3	25.0	37.6	21.5	32.3	17.9	26.9	13.8	20.7	
	10	25.5	38.3	20.3	30.5	17.4	26.2	14.5	21.8	11.2	16.8	
	11	21.1	31.7	16.7	25.2	14.4	21.6	12.0	18.0	9.23	13.9	
	12	17.7	26.6	14.1	21.1	12.1	18.2	10.1	15.1	7.76	11.7	
Y-Y Axis	0	97.4	146	74.6	112	62.9	94.6	51.3	77.1	37.9	57.0	3
	1	93.7	141	69.8	105	57.3	86.1	44.5	66.9	30.3	45.6	
	2	93.4	140	69.6	105	57.1	85.9	44.4	66.7	30.2	45.5	
	3	92.0	138	68.9	104	56.7	85.2	44.1	66.3	30.1	45.2	
	4	89.2	134	67.3	101	55.6	83.6	43.5	65.4	29.8	44.8	
	5	85.4	128	64.6	97.0	53.6	80.6	42.3	63.6	29.3	44.0	
	6	80.9	122	61.1	91.9	50.8	76.4	40.4	60.8	28.4	42.7	
	7	73.9	111	55.8	83.9	46.4	69.7	37.1	55.7	26.6	39.9	
	8	68.1	102	51.3	77.1	42.5	63.9	34.0	51.1	24.6	37.0	
	9	62.0	93.1	46.6	70.0	38.5	57.9	30.8	46.3	22.4	33.6	
	10	55.8	83.9	41.8	62.8	34.5	51.8	27.6	41.4	20.1	30.2	
	11	49.7	74.7	37.1	55.8	30.5	45.8	24.3	36.6	17.7	26.7	
	12	43.8	65.8	32.6	48.9	26.7	40.1	21.2	31.9	15.5	23.3	
	13	38.1	57.3	28.2	42.4	23.0	34.5	18.3	27.5	13.3	20.0	
	14	32.9	49.4	24.3	36.6	19.9	29.8	15.8	23.8	11.6	17.4	
	15	28.7	43.1	21.2	31.9	17.3	26.0	13.8	20.8	10.1	15.2	
	16	25.2	37.9	18.7	28.1	15.2	22.9	12.2	18.3	8.95	13.5	
	17	22.3	33.6	16.6	24.9	13.5	20.3	10.8	16.2	7.96	12.0	
	18	19.9	30.0	14.8	22.2	12.1	18.1	9.65	14.5	7.12	10.7	
	19	17.9	26.9	13.3	19.9	10.8	16.3	8.67	13.0	6.40	9.62	
	20	16.2	24.3	12.0	18.0							
Properties of 2 angles —3/8 in. back to back												
A_g, in.^{2}		4.52		3.46		2.92		2.38		1.80		
r_x, in.		0.735		0.749		0.756		0.764		0.771		
r_y, in.		1.23		1.21		1.19		1.18		1.17		
Properties of single angle												
r_z, in.		0.481		0.481		0.481		0.482		0.482		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-8 (continued)
Available Strength in Axial Compression, kips
Double Angles—Equal Legs

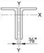


2L2

Shape		2L2×2×										No. of connectors[a]
		3/8		5/16		1/4		3/16		1/8[c]		
lb/ft		9.40		7.84		6.38		4.88		3.30		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	59.1	88.8	50.0	75.2	40.7	61.2	31.0	46.7	18.5	27.8	b
	1	57.8	86.9	49.0	73.6	39.9	60.0	30.4	45.7	18.3	27.4	
	2	54.2	81.4	45.9	69.1	37.5	56.4	28.6	43.0	17.5	26.4	
	3	48.6	73.0	41.3	62.1	33.8	50.8	25.9	38.9	16.4	24.6	
	4	41.7	62.7	35.6	53.5	29.3	44.0	22.5	33.7	14.9	22.4	
	5	34.3	51.6	29.4	44.2	24.3	36.5	18.7	28.1	12.9	19.4	
	6	27.0	40.6	23.3	35.0	19.3	29.1	15.0	22.5	10.4	15.6	
	7	20.4	30.6	17.7	26.6	14.7	22.1	11.5	17.3	8.04	12.1	
	8	15.6	23.5	13.5	20.3	11.3	17.0	8.80	13.2	6.16	9.25	
	9	12.3	18.5	10.7	16.1	8.91	13.4	6.95	10.4	4.86	7.31	
	10					7.22	10.9	5.63	8.46	3.94	5.92	
Y-Y Axis	0	59.1	88.8	50.0	75.2	40.7	61.2	31.0	46.7	18.5	27.8	3
	1	56.5	84.9	47.0	70.6	37.1	55.7	26.4	39.6	14.6	21.9	
	2	56.1	84.3	46.7	70.2	36.9	55.4	26.3	39.5	14.6	21.9	
	3	54.6	82.1	45.7	68.7	36.3	54.6	26.0	39.1	14.5	21.7	
	4	52.0	78.2	43.7	65.6	35.0	52.5	25.3	38.1	14.3	21.5	
	5	48.7	73.2	40.9	61.4	32.8	49.3	24.1	36.2	14.0	21.1	
	6	43.6	65.6	36.5	54.9	29.3	44.1	21.7	32.6	13.3	20.0	
	7	39.2	59.0	32.8	49.3	26.2	39.4	19.4	29.2	12.2	18.3	
	8	34.7	52.1	28.9	43.4	23.1	34.7	17.1	25.6	10.8	16.2	
	9	30.2	45.3	25.0	37.6	19.9	29.9	14.7	22.1	9.33	14.0	
	10	25.8	38.8	21.3	32.1	16.9	25.4	12.4	18.7	7.87	11.8	
	11	21.7	32.6	17.8	26.8	14.1	21.2	10.3	15.5	6.62	9.94	
	12	18.2	27.4	15.0	22.6	11.9	17.8	8.72	13.1	5.62	8.45	
	13	15.5	23.3	12.8	19.2	10.1	15.2	7.46	11.2	4.83	7.26	
	14	13.4	20.1	11.0	16.6	8.75	13.1	6.45	9.69	4.19	6.30	
	15	11.7	17.6	9.63	14.5	7.63	11.5	5.63	8.46	3.67	5.51	
	16	10.3	15.4	8.47	12.7	6.71	10.1	4.95	7.44			
Properties of 2 angles—3/8 in. back to back												
A_g, in.^{2}		2.74		2.32		1.89		1.44		0.982		
r_x, in.		0.591		0.598		0.605		0.612		0.620		
r_y, in.		1.01		0.996		0.982		0.967		0.951		
Properties of single angle												
r_z, in.		0.386		0.386		0.387		0.389		0.391		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L8 LLBB

Table 4-9 Available Strength in Axial Compression, kips

Double Angles—LLBB

F_y = 36 ksi

Shape		2L8×6×														
		1		7/8		3/4		5/8		9/16[c]		1/2[c]		7/16[c]		No. of connectors[a]
lb/ft		88.4		78.2		67.6		57.0		51.4		46.0		40.4		
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	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
X-X Axis	0	565	849	496	745	431	648	362	544	317	476	272	409	224	337	
	4	554	832	486	731	423	636	355	534	312	469	268	402	222	333	
	6	540	812	475	713	413	621	347	522	306	460	263	395	218	328	
	8	522	785	459	690	399	600	336	505	298	447	256	384	213	321	
	10	500	751	439	660	383	575	322	484	287	432	247	371	207	312	
	12	474	712	416	626	363	546	306	460	275	414	237	356	199	300	
	14	444	668	391	588	341	513	288	432	261	392	225	338	190	285	
	16	413	621	363	546	318	477	268	403	243	365	212	319	179	270	
	18	380	571	335	503	293	440	247	372	225	338	199	299	168	253	
	20	346	521	305	459	267	402	226	340	206	309	184	276	156	235	
	22	313	470	276	414	242	364	205	308	186	280	167	251	144	217	b
	24	279	420	247	371	217	326	184	277	167	252	150	225	132	198	
	26	247	371	218	328	192	289	164	246	149	224	133	200	118	178	
	28	216	325	191	288	169	254	144	217	131	197	118	177	104	157	
	30	188	283	167	251	147	221	126	189	115	172	103	154	91.2	137	
	32	166	249	147	220	129	195	110	166	101	151	90.1	135	80.2	120	
	34	147	220	130	195	115	172	97.9	147	89.2	134	79.9	120	71.0	107	
	36	131	197	116	174	102	154	87.3	131	79.6	120	71.2	107	63.3	95.2	
	38	117	176	104	156	91.8	138	78.3	118	71.4	107	63.9	96.1	56.8	85.4	
	40	106	159	93.8	141	82.9	125	70.7	106	64.5	96.9	57.7	86.7	51.3	77.1	
	42					75.2	113	64.1	96.4	58.5	87.9	52.3	78.6	46.5	69.9	
Y-Y Axis	0	565	849	496	745	431	648	362	544	317	476	272	409	224	337	
	4	524	787	451	677	379	570	302	454	263	395	216	325	170	256	
	6	517	778	446	670	376	564	300	450	260	391	215	323	169	254	
	8	506	760	436	656	369	554	295	443	256	385	212	319	167	251	
	10	487	732	422	634	357	537	287	431	250	376	208	313	165	247	
	12	464	697	402	604	342	513	276	415	241	363	203	305	161	242	
	14	426	640	369	555	315	473	256	384	225	338	192	289	153	230	
	16	394	592	341	513	291	437	237	356	209	314	180	271	146	219	
	18	360	542	312	469	266	399	216	325	191	288	165	249	136	205	
	20	326	490	282	424	240	360	195	294	173	260	150	225	126	189	
	22	292	439	252	379	214	321	174	262	154	232	134	201	113	170	2
	24	258	389	223	335	189	284	154	231	136	205	118	178	99.8	150	
	26	227	340	195	293	164	247	134	201	118	178	103	155	87.3	131	
	28	196	295	169	254	143	214	116	175	103	155	90.0	135	76.8	115	
	30	171	258	148	222	125	188	102	153	90.7	136	79.3	119	68.0	102	
	32	151	227	130	195	110	165	90.1	135	80.3	121	70.4	106	60.5	90.9	
	34	134	201	115	174	97.8	147	80.1	120	71.5	107	62.8	94.4	54.1	81.3	
	36	120	180	103	155	87.5	131	71.7	108	64.1	96.3	56.3	84.7	48.7	73.2	
	38	108	162	92.7	139	78.7	118	64.6	97.1	57.7	86.8	50.8	76.4	44.0	66.1	
	40	97.1	146	83.8	126	71.1	107	58.4	87.8	52.3	78.6	46.1	69.2	39.9	60.0	
	42	88.2	133													

Effective length, L_c (ft), with respect to indicated axis

Properties of 2 angles —3/8 in. back to back

	1	7/8	3/4	5/8	9/16	1/2	7/16
A_g, in.^{2}	26.2	23.0	20.0	16.8	15.2	13.6	12.0
r_x, in.	2.49	2.50	2.52	2.54	2.55	2.55	2.56
r_y, in.	2.52	2.50	2.47	2.45	2.44	2.43	2.42

Properties of single angle

	1	7/8	3/4	5/8	9/16	1/2	7/16
r_z, in.	1.28	1.28	1.29	1.29	1.30	1.30	1.31

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB

2L8 LLBB

Shape		2L8×4× 1		7/8		3/4		5/8		9/16[c]		1/2[c]		7/16[c]		No. of connectors[a]
lb/ft		74.8		66.2		57.4		48.4		43.8		39.2		34.4		
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	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	479	719	423	635	366	551	308	463	269	405	229	344	190	285	
	4	469	706	415	623	360	541	303	455	265	399	225	339	187	281	
	6	458	689	405	609	351	528	296	444	260	391	221	333	184	276	
	8	443	666	392	589	340	511	286	430	254	381	216	325	179	270	
	10	424	638	375	564	326	490	275	413	245	369	209	314	174	261	
	12	402	605	356	535	310	466	261	392	236	354	201	302	167	251	
	14	378	568	335	503	292	438	246	369	224	336	192	288	160	240	
	16	352	529	312	469	272	409	229	345	209	314	181	273	151	227	
	18	324	487	288	433	251	378	212	319	193	290	170	256	142	214	
	20	296	444	263	395	230	346	194	292	177	266	159	238	133	200	
	22	267	402	238	358	208	313	176	265	161	242	144	217	123	185	b
	24	239	360	214	321	187	281	158	238	145	217	130	195	113	170	
	26	212	319	190	285	167	250	141	212	129	194	116	174	102	154	
	28	186	280	167	251	147	221	124	187	114	171	102	154	90.7	136	
	30	162	244	146	219	128	193	109	163	99.6	150	89.6	135	79.4	119	
	32	143	214	128	192	113	169	95.5	144	87.5	132	78.7	118	69.7	105	
	34	126	190	113	170	99.8	150	84.6	127	77.5	117	69.7	105	61.8	92.9	
	36	113	169	101	152	89.0	134	75.5	113	69.2	104	62.2	93.5	55.1	82.8	
	38	101	152	90.7	136	79.9	120	67.7	102	62.1	93.3	55.8	83.9	49.5	74.3	
	40	91.2	137	81.8	123	72.1	108	61.1	91.9	56.0	84.2	50.4	75.7	44.6	67.1	
	42			74.2	112	65.4	98.3	55.5	83.3	50.8	76.4	45.7	68.7	40.5	60.9	
Y-Y Axis	0	479	719	423	635	366	551	308	463	269	405	229	344	190	285	
	4	437	657	379	570	320	480	257	386	225	338	185	278	145	218	
	6	415	624	360	542	305	458	245	369	216	324	179	269	141	212	
	8	384	577	333	500	282	423	227	342	200	301	169	254	134	201	
	10	336	504	290	436	246	369	198	298	175	264	150	226	121	182	
	12	291	438	251	377	212	318	170	256	151	227	130	195	108	162	
	14	246	370	210	316	177	266	142	213	126	189	108	162	90.0	135	2
	16	202	304	172	259	144	217	115	172	101	152	87.0	131	72.9	110	
	18	162	244	138	207	115	173	92.1	138	81.6	123	70.6	106	59.7	89.7	
	20	132	199	112	169	94.2	142	75.5	113	67.1	101	58.3	87.6	49.5	74.4	
	22	110	165	93.1	140	78.4	118	63.0	94.6	56.1	84.3	48.8	73.4	41.7	62.6	
	24	92.3	139	78.5	118	66.2	99.4	53.2	80.0	47.5	71.4	41.4	62.3	35.5	53.3	
	26	78.8	118	67.1	101											

Properties of 2 angles — 3/8 in. back to back

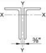
	1	7/8	3/4	5/8	9/16	1/2	7/16
A_g, in.^{2}	22.2	19.6	17.0	14.3	13.0	11.6	10.2
r_x, in.	2.51	2.53	2.55	2.56	2.57	2.58	2.59
r_y, in.	1.60	1.57	1.55	1.52	1.51	1.50	1.49

Properties of single angle

	1	7/8	3/4	5/8	9/16	1/2	7/16
r_z, in.	0.844	0.846	0.850	0.856	0.859	0.863	0.867

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L7 LLBB

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB

F_y = 36 ksi

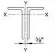
Shape		2L7×4× 3/4		2L7×4× 5/8		2L7×4× 1/2[c]		2L7×4× 7/16[c]		2L7×4× 3/8[c]		No. of connectors[a]
lb/ft		52.4		44.2		35.8		31.4		27.2		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	334	502	280	421	219	329	183	275	148	223	b
	4	326	490	273	411	215	323	180	270	146	219	
	6	316	475	265	399	210	315	176	264	142	214	
	8	303	455	254	382	203	304	170	255	138	207	
	10	286	430	241	362	194	291	163	245	132	199	
	12	267	402	225	338	182	274	154	232	126	189	
	14	246	370	208	312	169	254	145	218	118	178	
	16	225	338	190	285	154	232	135	203	110	166	
	18	202	304	171	257	139	209	123	185	102	153	
	20	180	270	152	229	124	187	110	166	92.8	140	
	22	158	237	134	201	110	165	97.3	146	83.9	126	
	24	137	205	116	175	95.5	144	84.9	128	73.9	111	
	26	117	176	99.8	150	82.1	123	73.0	110	63.7	95.7	
	28	101	151	86.1	129	70.8	106	63.0	94.6	54.9	82.5	
	30	87.8	132	75.0	113	61.6	92.7	54.9	82.4	47.8	71.9	
	32	77.2	116	65.9	99.0	54.2	81.4	48.2	72.5	42.0	63.2	
	34	68.4	103	58.4	87.7	48.0	72.1	42.7	64.2	37.2	55.9	
	36	61.0	91.6	52.1	78.3	42.8	64.3	38.1	57.3	33.2	49.9	
Y-Y Axis	0	334	502	280	421	219	329	183	275	148	223	2
	4	300	450	243	365	183	276	148	222	112	169	
	6	286	430	233	350	177	266	144	216	109	164	
	8	266	399	216	325	165	249	137	206	105	157	
	10	233	351	190	285	146	220	123	186	95.8	144	
	12	203	305	165	247	127	191	108	162	86.0	129	
	14	172	258	139	209	107	161	90.7	136	73.9	111	
	16	142	213	114	171	87.4	131	74.0	111	60.5	90.9	
	18	114	172	91.4	137	70.4	106	60.1	90.3	49.6	74.5	
	20	93.0	140	74.7	112	57.8	86.9	49.6	74.5	41.2	62.0	
	22	77.2	116	62.1	93.4	48.3	72.6	41.5	62.4	34.7	52.2	
	24	65.1	97.9	52.5	78.8	40.9	61.5	35.2	53.0	29.6	44.4	
	26	55.6	83.6	44.9	67.4	35.0	52.7					
Properties of 2 angles—3/8 in. back to back												
A_g, in.^{2}		15.5		13.0		10.5		9.26		8.00		
r_x, in.		2.21		2.23		2.25		2.26		2.27		
r_y, in.		1.61		1.58		1.56		1.55		1.54		
Properties of single angle												
r_z, in.		0.855		0.860		0.866		0.869		0.873		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB



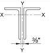
2L6 LLBB

Shape		2L6×4×								No. of connectors[a]
		7/8		3/4		5/8		9/16		
lb/ft		54.4		47.2		40.0		36.2		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	345	518	300	450	252	379	229	343	b
	4	333	501	290	435	244	366	221	332	
	6	319	479	277	417	234	351	212	318	
	8	300	451	261	393	220	331	200	300	
	10	277	416	242	363	204	307	185	278	
	12	252	378	220	331	186	279	169	254	
	14	224	337	197	296	166	250	151	228	
	16	197	296	173	260	146	220	133	201	
	18	170	255	150	225	127	191	116	174	
	20	144	216	127	191	108	162	98.6	148	
	22	119	179	106	159	90.1	135	82.5	124	
	24	100	151	89.0	134	75.7	114	69.3	104	
	26	85.5	128	75.9	114	64.5	97.0	59.1	88.8	
	28	73.7	111	65.4	98.3	55.6	83.6	50.9	76.6	
	30	64.2	96.5	57.0	85.6	48.5	72.9	44.4	66.7	
Y-Y Axis	0	345	518	300	450	252	379	229	343	2
	4	321	483	275	413	225	338	200	300	
	6	308	462	264	396	217	326	193	290	
	8	287	431	246	369	203	305	181	272	
	10	254	382	217	327	179	270	160	241	
	12	224	337	191	287	157	236	141	211	
	14	193	290	164	246	135	202	120	180	
	16	162	244	137	206	112	169	100	150	
	18	133	200	112	168	91.2	137	81.1	122	
	20	108	163	90.8	137	74.3	112	66.2	99.5	
	22	89.8	135	75.3	113	61.7	92.7	55.0	82.7	
	24	75.6	114	63.4	95.3	52.0	78.2	46.4	69.8	
	26	64.5	96.9	54.2	81.4	44.4	66.8	39.7	59.7	
	28	55.7	83.7	46.8	70.3					

Properties of 2 angles—3/8 in. back to back	7/8	3/4	5/8	9/16
A_g, in.^{2}	16.0	13.9	11.7	10.6
r_x, in.	1.86	1.88	1.89	1.90
r_y, in.	1.71	1.68	1.66	1.65
Properties of single angle				
r_z, in.	0.854	0.856	0.859	0.861

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L6 LLBB

Table 4-9 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Double Angles—LLBB

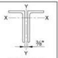
Shape		2L6×4×								
		1/2		7/16[c]		3/8[c]		5/16[c]		No. of connectors[a]
lb/ft		32.4		28.6		24.6		20.6		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	205	308	176	265	144	216	112	169	b
	4	198	298	171	257	140	210	109	164	
	6	190	286	166	249	135	203	106	159	
	8	179	269	158	237	129	194	101	152	
	10	166	250	147	221	122	183	95.6	144	
	12	152	228	134	201	113	170	89.0	134	
	14	136	205	120	181	104	156	81.7	123	
	16	120	181	106	160	92.4	139	74.1	111	
	18	104	157	92.6	139	80.5	121	66.2	99.5	
	20	89.2	134	79.2	119	69.0	104	58.3	87.6	
	22	74.7	112	66.5	99.9	58.0	87.2	49.2	73.9	
	24	62.8	94.4	55.8	83.9	48.7	73.2	41.3	62.1	
	26	53.5	80.4	47.6	71.5	41.5	62.4	35.2	52.9	
	28	46.1	69.4	41.0	61.7	35.8	53.8	30.4	45.6	
	30	40.2	60.4	35.7	53.7	31.2	46.9	26.5	39.8	
	32			31.4	47.2	27.4	41.2	23.2	34.9	
Y-Y Axis	0	205	308	176	265	144	216	112	169	2
	4	174	261	146	220	115	173	82.5	124	
	6	168	253	142	213	112	169	80.8	121	
	8	158	238	134	202	108	162	78.0	117	
	10	141	212	120	180	98.8	148	72.4	109	
	12	124	186	105	158	87.1	131	65.9	99.1	
	14	106	159	89.8	135	74.5	112	58.2	87.5	
	16	87.8	132	74.5	112	61.9	93.0	48.5	72.9	
	18	71.2	107	60.3	90.7	50.3	75.6	40.0	60.1	
	20	58.2	87.5	49.5	74.4	41.5	62.4	33.3	50.1	
	22	48.5	72.9	41.3	62.1	34.8	52.3	28.1	42.2	
	24	41.0	61.6	35.0	52.6	29.5	44.3	24.0	36.0	
	26	35.0	52.7	30.0	45.0	25.3	38.1	20.7	31.0	
Properties of 2 angles—3/8 in. back to back										
A_g, in.^{2}		9.50		8.36		7.22		6.06		
r_x, in.		1.91		1.92		1.93		1.94		
r_y, in.		1.64		1.62		1.61		1.60		
Properties of single angle										
r_z, in.		0.864		0.867		0.870		0.874		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB

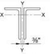


2L6 LLBB

Shape			2L6×3½×						No. of connectors[a]
			½		3/8[c]		5/16[c]		
lb/ft			30.6		23.4		19.6		
Design			P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
			ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	194	292	136	205	106	160	b
		2	192	289	135	204	106	159	
		4	188	282	133	200	104	156	
		6	180	271	129	193	100	151	
		8	170	256	123	185	96.0	144	
		10	158	237	116	174	90.6	136	
		12	144	217	108	162	84.5	127	
		14	130	195	98.6	148	77.7	117	
		16	115	172	88.1	132	70.5	106	
		18	99.6	150	76.7	115	63.1	94.8	
		20	85.2	128	65.7	98.8	55.6	83.5	
		22	71.6	108	55.3	83.1	46.9	70.5	
		24	60.1	90.4	46.4	69.8	39.4	59.2	
		28	44.2	66.4	34.1	51.3	29.0	43.5	
		30	38.5	57.8	29.7	44.7	25.2	37.9	
		32	33.8	50.8	26.1	39.3	22.2	33.3	
	Y-Y Axis	0	194	292	136	205	106	160	2
		2	168	252	111	167	79.9	120	
		4	164	246	109	164	78.6	118	
		6	155	233	105	158	75.9	114	
		8	138	207	96.6	145	70.6	106	
		10	119	179	84.5	127	63.6	95.6	
		12	99.3	149	70.6	106	55.1	82.9	
		14	79.8	120	56.6	85.1	44.4	66.7	
		16	62.4	93.8	44.7	67.2	35.6	53.5	
		18	49.9	75.0	36.1	54.2	29.0	43.5	
		20	40.7	61.2	29.6	44.5	24.0	36.0	
		22	33.8	50.9	24.7	37.2	20.1	30.2	
Properties of 2 angles —3/8 in. back to back									
A_g, in.^{2}			9.00		6.88		5.78		
r_x, in.			1.92		1.93		1.94		
r_y, in.			1.40		1.38		1.37		
Properties of single angle									
r_z, in.			0.756		0.763		0.767		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.



2L5 LLBB

Table 4-9 (continued) Available Strength in Axial Compression, kips

Double Angles—LLBB

F_y = 36 ksi

Shape			2L5×3½×									No. of connectors[a]
			3/4		5/8		1/2		3/8[c]		5/16[c]		
lb/ft			39.6		33.6		27.2		20.8		17.4		
Design			P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	252	379	213	319	172	259	130	195	102	153	
		2	249	374	210	316	170	256	128	193	101	152	
		4	240	360	202	304	164	247	125	187	98.2	148	
		6	225	338	190	286	155	232	118	177	93.5	141	
		8	206	310	174	262	142	213	109	163	87.4	131	
		10	184	276	156	234	127	191	97.4	146	80.0	120	
		12	160	241	136	204	111	167	85.4	128	71.8	108	b
		14	136	204	115	173	95.1	143	73.1	110	61.8	92.8	
		16	112	169	95.7	144	79.3	119	61.0	91.7	51.7	77.7	
		18	90.6	136	77.3	116	64.3	96.7	49.7	74.7	42.2	63.5	
		20	73.4	110	62.6	94.1	52.1	78.3	40.2	60.5	34.2	51.4	
		22	60.6	91.1	51.7	77.8	43.1	64.7	33.3	50.0	28.3	42.5	
		24	50.9	76.6	43.5	65.4	36.2	54.4	27.9	42.0	23.8	35.7	
	Y-Y Axis	0	252	379	213	319	172	259	130	195	102	153	
		2	239	360	198	297	155	232	109	164	82.2	124	
		4	234	351	194	291	152	228	107	161	81.1	122	
		6	220	331	183	275	144	217	103	155	78.7	118	
		8	197	296	163	245	129	195	93.7	141	73.4	110	
		10	173	260	143	215	113	170	82.4	124	65.5	98.4	
		12	148	222	121	182	95.8	144	69.8	105	55.6	83.6	2
		14	122	184	99.9	150	78.6	118	57.1	85.8	45.5	68.3	
		16	98.5	148	79.6	120	62.4	93.7	45.2	68.0	36.1	54.2	
		18	81.7	123	63.2	95.0	49.6	74.6	36.2	54.5	29.1	43.7	
		20	66.4	99.8	51.4	77.2	40.4	60.7	29.6	44.5	23.9	35.9	
		22	55.0	82.6	42.5	63.9	33.5	50.4	24.6	37.0	19.9	30.0	
		24	46.2	69.5	37.5	56.3	28.2	42.5	20.8	31.3	16.9	25.4	
													3

Properties of 2 angles—3/8 in. back to back

	3/4	5/8	1/2	3/8	5/16
A_g, in.^{2}	11.7	9.86	8.00	6.10	5.12
r_x, in.	1.55	1.56	1.58	1.59	1.60
r_y, in.	1.53	1.50	1.48	1.46	1.44

Properties of single angle

	3/4	5/8	1/2	3/8	5/16
r_z, in.	0.744	0.746	0.750	0.755	0.758

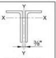
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-9 (continued) Available Strength in Axial Compression, kips

Double Angles—LLBB

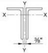


2L5 LLBB

Shape		2L5×3×										No. of connectors[a]
		1/2		7/16		3/8[c]		5/16[c]		1/4[c]		
lb/ft		25.6		22.6		19.6		16.4		13.2		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	162	243	143	214	122	183	95.6	144	70.2	106	
	2	160	240	141	212	120	181	94.7	142	69.6	105	
	4	154	231	136	204	117	176	92.1	138	67.7	102	
	6	145	218	128	193	111	167	87.8	132	64.7	97.2	
	8	133	200	118	177	102	153	82.2	124	60.7	91.2	
	10	119	179	106	159	91.7	138	75.4	113	55.9	84.0	
	12	104	157	92.7	139	80.5	121	67.9	102	50.5	75.9	
	14	89.2	134	79.3	119	69.0	104	58.6	88.0	44.7	67.2	b
	16	74.3	112	66.2	99.5	57.8	86.8	49.1	73.9	38.9	58.4	
	18	60.3	90.7	53.9	81.0	47.2	70.9	40.3	60.5	32.8	49.3	
	20	48.9	73.4	43.7	65.6	38.2	57.4	32.6	49.0	26.6	39.9	
	22	40.4	60.7	36.1	54.2	31.6	47.5	26.9	40.5	22.0	33.0	
	24	33.9	51.0	30.3	45.6	26.5	39.9	22.6	34.0	18.5	27.7	
Y-Y Axis	0	162	243	143	214	122	183	95.6	144	70.2	106	
	2	145	218	125	187	103	155	77.8	117	51.7	77.7	
	4	140	211	121	181	99.9	150	76.0	114	50.6	76.0	
	6	129	194	111	167	92.8	140	72.0	108	48.2	72.5	
	8	109	165	94.7	142	79.4	119	63.4	95.2	43.4	65.3	
	10	90.2	136	78.0	117	65.4	98.3	52.4	78.8	37.5	56.3	
	12	71.1	107	61.3	92.1	51.3	77.1	41.2	61.9	30.1	45.2	2
	14	53.8	80.8	46.3	69.6	38.8	58.4	31.4	47.2	23.4	35.1	
	16	41.5	62.4	35.9	53.9	30.2	45.4	24.6	36.9	18.5	27.8	
	18	33.0	49.6	28.5	42.9	24.1	36.2	19.7	29.6	15.0	22.5	
	20	26.8	40.3	23.2	34.9	19.6	29.5	16.1	24.2			
Properties of 2 angles—3/8 in. back to back												
A_g, in.^{2}		7.50		6.62		5.72		4.82		3.88		
r_x, in.		1.58		1.59		1.60		1.61		1.62		
r_y, in.		1.24		1.23		1.22		1.21		1.19		
Properties of single angle												
r_z, in.		0.642		0.644		0.646		0.649		0.652		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L4 LLBB

Table 4-9 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Double Angles—LLBB

Shape		2L4×3½×								
		½		3/8		5/16[c]		¼[c]		No. of connectors[a]
lb/ft		23.8		18.2		15.4		12.4		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	151	227	116	174	96.9	146	71.3	107	
	2	148	222	113	170	95.1	143	70.4	106	
	4	139	209	107	161	89.8	135	67.6	102	
	6	126	189	97.0	146	81.5	122	63.2	95.1	
	8	109	165	84.7	127	71.1	107	56.6	85.0	
	10	91.4	137	71.1	107	59.7	89.8	48.7	73.2	
	12	73.3	110	57.5	86.4	48.2	72.5	39.5	59.3	b
	14	56.4	84.8	44.6	67.0	37.4	56.3	30.8	46.3	
	16	43.2	64.9	34.1	51.3	28.7	43.1	23.6	35.4	
	18	34.1	51.3	27.0	40.6	22.7	34.0	18.6	28.0	
	20	27.6	41.5	21.9	32.8	18.3	27.6	15.1	22.7	
Y-Y Axis	0	151	227	116	174	96.9	146	71.3	107	
	2	139	209	101	151	79.8	120	57.1	85.8	
	4	137	206	99.5	149	79.0	119	56.6	85.0	
	6	131	197	96.3	145	76.9	116	55.5	83.5	
	8	118	178	87.9	132	71.0	107	52.8	79.3	2
	10	105	157	77.9	117	63.3	95.2	48.3	72.6	
	12	89.8	135	66.8	100	54.4	81.7	41.9	62.9	
	14	74.9	113	55.6	83.6	45.2	67.9	35.0	52.6	
	16	60.8	91.4	45.0	67.6	36.3	54.6	28.2	42.3	
	18	50.9	76.5	37.6	56.5	30.5	45.8	23.8	35.7	
	20	41.4	62.2	30.6	46.1	24.9	37.4	19.5	29.3	
	22	34.3	51.5	25.4	38.2	20.7	31.1	16.3	24.5	3
	24	28.8	43.3	21.4	32.2	17.5	26.2	13.8	20.7	
	26	24.6	37.0							
Properties of 2 angles —3/8 in. back to back										
A_g, in.^{2}		7.00		5.36		4.50		3.64		
r_x, in.		1.23		1.25		1.25		1.26		
r_y, in.		1.57		1.55		1.53		1.52		
Properties of single angle										
r_z, in.		0.716		0.719		0.721		0.723		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

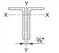
Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB

2L4 LLBB

Shape		2L4×3×										No. of connectors[a]
		5/8		1/2		3/8		5/16[c]		1/4[c]		
lb/ft		27.2		22.2		17.0		14.4		11.6		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	172	259	140	211	107	161	90.0	135	67.5	102	
	2	169	253	137	206	105	158	88.4	133	66.5	100	
	4	159	239	129	195	99.5	149	83.6	126	63.5	95.4	
	6	144	216	117	176	90.4	136	76.1	114	58.8	88.3	
	8	125	188	102	154	79.1	119	66.7	100	52.7	79.2	
	10	104	157	85.6	129	66.6	100	56.3	84.6	45.5	68.4	
	12	83.6	126	68.9	104	54.0	81.1	45.8	68.8	37.0	55.7	b
	14	64.3	96.6	53.2	80.0	42.1	63.3	35.9	53.9	29.0	43.6	
	16	49.2	74.0	40.8	61.2	32.2	48.5	27.5	41.3	22.2	33.4	
	18	38.9	58.5	32.2	48.4	25.5	38.3	21.7	32.6	17.6	26.4	
	20	31.5	47.4	26.1	39.2	20.6	31.0	17.6	26.4	14.2	21.4	
Y-Y Axis	0	172	259	140	211	107	161	90.0	135	67.5	102	
	2	164	246	130	195	94.6	142	75.5	114	54.1	81.4	
	4	158	237	126	190	92.4	139	73.9	111	53.3	80.1	
	6	146	219	117	176	86.5	130	69.9	105	51.2	76.9	
	8	126	189	100	151	74.7	112	60.9	91.5	46.2	69.4	
	10	106	160	84.4	127	62.6	94.1	51.2	76.9	39.0	58.7	2
	12	86.5	130	68.1	102	50.3	75.7	41.1	61.8	31.4	47.2	
	14	67.8	102	52.8	79.3	38.8	58.3	31.6	47.5	24.1	36.3	
	16	54.8	82.3	42.6	64.0	31.3	47.1	24.5	36.9	18.9	28.4	
	18	43.4	65.2	33.8	50.7	24.9	37.4	19.5	29.4	15.1	22.7	
	20	35.2	52.9	27.4	41.2	20.3	30.5	15.9	23.9	12.4	18.6	
	22	29.1	43.8	22.7	34.1							3
Properties of 2 angles —3/8 in. back to back												
A_g, in.^{2}		7.98		6.50		4.98		4.18		3.38		
r_x, in.		1.23		1.24		1.26		1.27		1.27		
r_y, in.		1.35		1.32		1.30		1.29		1.27		
Properties of single angle												
r_z, in.		0.631		0.633		0.636		0.638		0.639		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L3½ LLBB

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB

F_y = 36 ksi

Shape			2L3½×3× ½		7/16		3/8		5/16		¼[c]		No. of connectors[a]
lb/ft			20.4		18.2		15.8		13.2		10.8		
Design			P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	130	196	115	173	100	150	84.1	126	66.3	99.6	b
		2	127	191	112	169	97.5	147	82.0	123	64.9	97.5	
		4	117	176	104	156	90.3	136	75.9	114	60.9	91.5	
		6	103	154	91.1	137	79.5	119	66.8	100	54.4	81.7	
		8	85.2	128	75.9	114	66.5	99.9	55.9	84.0	45.6	68.6	
		10	67.2	101	60.1	90.3	52.8	79.4	44.4	66.8	36.4	54.7	
		12	50.1	75.3	45.2	67.9	39.9	60.0	33.5	50.4	27.6	41.5	
		14	36.8	55.4	33.2	49.9	29.4	44.1	24.7	37.1	20.4	30.6	
		16	28.2	42.4	25.4	38.2	22.5	33.8	18.9	28.4	15.6	23.4	
		18			20.1	30.2	17.8	26.7	14.9	22.4	12.3	18.5	
	Y-Y Axis	0	130	196	115	173	100	150	84.1	126	66.3	99.6	
		2	122	184	106	160	89.9	135	72.4	109	54.3	81.7	
		4	119	179	104	156	88.1	132	71.2	107	53.5	80.4	
		6	111	166	97.0	146	82.9	125	67.6	102	51.4	77.3	2
		8	95.7	144	83.9	126	72.0	108	59.0	88.7	45.8	68.8	
		10	81.2	122	71.1	107	60.9	91.6	49.9	75.0	39.0	58.6	
		12	66.4	99.8	58.0	87.1	49.6	74.6	40.5	60.8	31.7	47.7	
		14	54.8	82.4	47.7	71.7	40.7	61.2	33.0	49.6	25.8	38.8	
		16	42.5	63.8	36.9	55.5	31.5	47.3	25.5	38.4	20.1	30.2	
		18	33.6	50.5	29.3	44.0	25.0	37.6	20.3	30.5	16.0	24.1	
		20	27.3	41.0	23.8	35.7	20.3	30.5	16.5	24.8	13.1	19.7	
		22	22.6	33.9	19.7	29.6	16.8	25.3	13.7	20.6	10.9	16.3	3

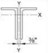
Properties of 2 angles—3/8 in. back to back					
A_g, in.²	6.04	5.34	4.64	3.90	3.16
r_x, in.	1.07	1.08	1.09	1.09	1.10
r_y, in.	1.37	1.36	1.35	1.33	1.32
Properties of single angle					
r_z, in.	0.618	0.620	0.622	0.624	0.628

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB



2L3½ LLBB

Shape		2L3½×2½×								No. of connectors[a]
		½		⅜		5/16		¼[c]		
lb/ft		18.8		14.4		12.2		9.80		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	119	179	91.4	137	77.2	116	60.7	91.2	
	1	119	178	90.8	137	76.7	115	60.4	90.7	
	2	116	175	89.1	134	75.3	113	59.5	89.4	
	3	113	169	86.4	130	73.0	110	58.0	87.2	
	4	108	162	82.7	124	69.9	105	56.0	84.1	
	5	102	153	78.2	117	66.2	99.5	53.5	80.4	
	6	94.5	142	72.9	110	61.8	92.9	50.3	75.6	
	7	86.9	131	67.2	101	57.1	85.8	46.5	69.9	
	8	78.8	118	61.2	92.0	52.1	78.2	42.5	63.8	
	9	70.5	106	55.0	82.7	46.9	70.5	38.3	57.6	b
	10	62.3	93.7	48.8	73.4	41.7	62.7	34.2	51.3	
	11	54.4	81.8	42.8	64.4	36.7	55.1	30.1	45.2	
	12	46.8	70.4	37.1	55.7	31.8	47.8	26.2	39.4	
	13	39.9	60.0	31.7	47.6	27.2	40.9	22.5	33.8	
	14	34.4	51.7	27.3	41.1	23.5	35.3	19.4	29.1	
	15	30.0	45.1	23.8	35.8	20.5	30.8	16.9	25.4	
	16	26.3	39.6	20.9	31.4	18.0	27.0	14.8	22.3	
	17	23.3	35.1	18.5	27.9	15.9	23.9	13.1	19.7	
	18	20.8	31.3	16.5	24.8	14.2	21.4	11.7	17.6	
Y-Y Axis	0	119	179	91.4	137	77.2	116	60.7	91.2	
	1	113	170	83.2	125	67.5	101	50.9	76.6	
	2	112	169	82.6	124	67.1	101	50.6	76.1	
	3	110	166	81.4	122	66.2	99.4	50.0	75.2	
	4	106	160	79.0	119	64.4	96.9	48.9	73.5	
	5	101	152	75.4	113	61.7	92.7	47.2	70.9	
	6	92.3	139	69.0	104	56.6	85.1	43.8	65.8	
	7	84.7	127	63.2	95.0	51.9	78.0	40.3	60.5	
	8	76.7	115	57.1	85.8	46.8	70.3	36.4	54.7	
	9	68.5	103	50.8	76.4	41.5	62.4	32.4	48.6	2
	10	60.3	90.6	44.6	67.1	36.3	54.6	28.3	42.5	
	11	52.4	78.8	38.6	58.1	31.3	47.1	24.4	36.7	
	12	47.1	70.8	34.5	51.8	26.6	40.0	20.8	31.2	
	13	40.3	60.5	29.5	44.4	22.8	34.3	17.9	26.8	
	14	34.8	52.3	25.5	38.4	19.8	29.7	15.5	23.3	
	15	30.3	45.6	22.3	33.5	17.3	26.0	13.6	20.4	
	16	26.7	40.1	19.6	29.5	15.9	24.0	12.0	18.1	
	17	23.7	35.6	17.4	26.2	14.2	21.3	10.7	16.1	
	18	21.1	31.8	15.6	23.4	12.7	19.0	9.56	14.4	
										3

Properties of 2 angles—⅜ in. back to back

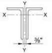
	½	⅜	5/16	¼
A_g, in.²	5.54	4.24	3.58	2.90
r_x, in.	1.08	1.10	1.11	1.12
r_y, in.	1.13	1.11	1.09	1.08

Properties of single angle

	½	⅜	5/16	¼
r_z, in.	0.532	0.535	0.538	0.541

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L3 LLBB

Table 4-9 (continued) Available Strength in Axial Compression, kips

Double Angles—LLBB

$F_y = 36$ ksi

Shape		2L3×2½×												No. of connectors[a]
		1/2		7/16		3/8		5/16		1/4		3/16[c]		
lb/ft		17.0		15.2		13.2		11.2		9.00		6.78		
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, L_c (ft), with respect to indicated axis — X-X Axis	0	108	162	95.7	144	83.2	125	70.3	106	56.9	85.5	39.7	59.6	
	1	107	161	94.9	143	82.5	124	69.7	105	56.4	84.8	39.4	59.3	
	2	104	156	92.3	139	80.3	121	67.9	102	55.0	82.7	38.8	58.3	
	3	99.3	149	88.3	133	76.8	115	65.0	97.6	52.7	79.2	37.6	56.6	
	4	93.1	140	82.9	125	72.2	109	61.1	91.9	49.6	74.6	35.8	53.9	
	5	85.7	129	76.4	115	66.6	100	56.5	84.9	45.9	69.0	33.6	50.6	
	6	77.5	117	69.2	104	60.4	90.8	51.3	77.1	41.8	62.8	31.1	46.8	
	7	68.8	103	61.5	92.5	53.9	80.9	45.8	68.9	37.4	56.2	28.3	42.6	
	8	60.0	90.2	53.8	80.8	47.1	70.8	40.2	60.4	32.9	49.4	25.1	37.7	b
	9	51.3	77.2	46.1	69.3	40.5	60.9	34.7	52.1	28.4	42.7	21.7	32.7	
	10	43.2	64.9	38.9	58.4	34.2	51.5	29.4	44.1	24.1	36.3	18.5	27.8	
	11	35.7	53.7	32.2	48.4	28.4	42.7	24.4	36.7	20.1	30.2	15.5	23.3	
	12	30.0	45.1	27.1	40.7	23.9	35.9	20.5	30.9	16.9	25.4	13.0	19.5	
	13	25.6	38.4	23.1	34.7	20.4	30.6	17.5	26.3	14.4	21.7	11.1	16.7	
	14	22.1	33.1	19.9	29.9	17.6	26.4	15.1	22.7	12.4	18.7	9.55	14.4	
	15	19.2	28.9	17.3	26.0	15.3	23.0	13.1	19.7	10.8	16.3	8.32	12.5	
Y-Y Axis	0	108	162	95.7	144	83.2	125	70.3	106	56.9	85.5	39.7	59.6	
	1	103	155	90.4	136	77.0	116	63.0	94.7	48.2	72.4	31.7	47.6	
	2	103	154	89.9	135	76.7	115	62.7	94.3	48.0	72.1	31.5	47.4	
	3	101	151	88.5	133	75.7	114	62.0	93.2	47.5	71.4	31.3	47.1	
	4	97.5	147	85.8	129	73.6	111	60.6	91.1	46.6	70.1	30.9	46.5	
	5	93.0	140	81.8	123	70.3	106	58.2	87.5	45.1	67.8	30.3	45.6	
	6	87.7	132	74.9	113	64.4	96.9	53.5	80.5	41.8	62.9	28.9	43.4	2
	7	80.0	120	68.9	104	59.3	89.1	49.3	74.1	38.6	58.0	27.2	40.9	
	8	73.2	110	62.6	94.1	53.8	80.9	44.7	67.2	35.0	52.6	24.9	37.5	
	9	66.3	99.6	56.2	84.4	48.2	72.4	40.0	60.1	31.3	47.0	22.4	33.7	
	10	59.3	89.1	49.7	74.7	42.6	64.0	35.3	53.1	27.5	41.4	19.8	29.7	
	11	52.4	78.7	43.5	65.3	37.2	55.9	30.7	46.2	23.9	35.9	17.2	25.8	
	12	45.7	68.7	39.4	59.2	33.6	50.5	27.8	41.7	21.4	32.2	15.4	23.1	
	13	39.4	59.2	33.8	50.8	28.8	43.3	23.8	35.7	18.4	27.6	13.3	20.0	
	14	34.0	51.1	29.2	43.9	24.9	37.4	20.6	30.9	15.9	24.0	11.6	17.4	
	15	29.7	44.6	25.5	38.3	21.7	32.6	18.0	27.0	13.9	21.0	10.2	15.3	
	16	26.1	39.2	22.4	33.7	19.1	28.7	15.8	23.8	12.3	18.5	9.00	13.5	3
	17	23.1	34.8	19.9	29.9	17.0	25.5	14.0	21.1	10.9	16.4	8.01	12.0	
	18	20.6	31.0	17.7	26.7	15.1	22.8	12.5	18.8	9.77	14.7	7.18	10.8	
	19	18.5	27.9	15.9	23.9	13.6	20.4	11.3	16.9					

Properties of 2 angles—3/8 in. back to back

	1/2	7/16	3/8	5/16	1/4	3/16
A_g, in.²	5.00	4.44	3.86	3.26	2.64	2.00
r_x, in.	0.910	0.917	0.924	0.932	0.940	0.947
r_y, in.	1.18	1.16	1.15	1.14	1.12	1.11

Properties of single angle

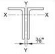
	1/2	7/16	3/8	5/16	1/4	3/16
r_z, in.	0.516	0.516	0.517	0.518	0.520	0.521

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB



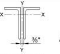
2L3 LLBB

Shape		2L3×2×										No. of connectors[a]
		1/2		3/8		5/16		1/4		3/16[c]		
lb/ft		15.4		11.8		10.0		8.20		6.14		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
X-X Axis	0	97.4	146	75.4	113	63.8	95.9	51.7	77.8	36.4	54.8	b
	1	96.6	145	74.8	112	63.3	95.1	51.3	77.1	36.2	54.4	
	2	94.0	141	72.9	110	61.7	92.7	50.0	75.2	35.5	53.3	
	3	89.9	135	69.8	105	59.1	88.8	48.0	72.1	34.3	51.6	
	4	84.5	127	65.7	98.8	55.7	83.7	45.3	68.0	32.7	49.2	
	5	78.0	117	60.8	91.4	51.6	77.6	42.0	63.1	30.8	46.3	
	6	70.7	106	55.3	83.1	47.0	70.7	38.3	57.6	28.6	43.0	
	7	62.9	94.6	49.4	74.3	42.1	63.3	34.4	51.7	26.2	39.3	
	8	55.1	82.8	43.4	65.3	37.1	55.7	30.3	45.6	23.3	35.1	
	9	47.3	71.1	37.5	56.3	32.1	48.2	26.3	39.5	20.3	30.5	
	10	39.9	60.0	31.8	47.8	27.3	41.0	22.5	33.7	17.4	26.1	
	11	33.1	49.8	26.5	39.8	22.8	34.3	18.8	28.3	14.6	21.9	
	12	27.9	41.9	22.3	33.5	19.2	28.8	15.8	23.7	12.3	18.4	
	13	23.7	35.7	19.0	28.5	16.3	24.5	13.5	20.2	10.4	15.7	
	14	20.5	30.8	16.4	24.6	14.1	21.2	11.6	17.4	9.00	13.5	
	15	17.8	26.8	14.3	21.4	12.3	18.4	10.1	15.2	7.84	11.8	
	16									6.89	10.4	
Y-Y Axis	0	97.4	146	75.4	113	63.8	95.9	51.7	77.8	36.4	54.8	2
	1	93.5	141	70.4	106	57.9	86.9	44.6	67.0	29.7	44.6	
	2	92.2	139	69.5	104	57.2	85.9	44.1	66.3	29.4	44.2	
	3	88.8	134	67.3	101	55.5	83.4	43.0	64.6	28.9	43.4	
	4	83.8	126	63.5	95.4	52.6	79.0	41.0	61.6	28.0	42.0	
	5	75.5	113	57.0	85.7	47.2	71.0	37.0	55.7	26.0	39.1	
	6	67.8	102	50.9	76.6	42.2	63.4	33.1	49.7	23.6	35.4	
	7	59.8	89.8	44.6	67.0	36.8	55.3	28.8	43.3	20.6	31.0	
	8	51.6	77.6	38.2	57.5	31.4	47.3	24.5	36.9	17.5	26.4	
	9	43.8	65.8	32.1	48.3	26.3	39.5	20.4	30.7	14.6	21.9	
	10	38.3	57.5	27.7	41.7	22.6	33.9	16.7	25.2	12.0	18.1	
	11	31.7	47.6	23.0	34.6	18.8	28.2	14.6	21.9	10.1	15.2	3
	12	26.7	40.1	19.4	29.1	15.8	23.8	12.3	18.5	8.57	12.9	
	13	22.8	34.2	16.5	24.9	13.5	20.3	10.6	15.9	7.36	11.1	
	14	19.6	29.5	14.3	21.5	11.7	17.6	9.14	13.7	6.39	9.60	
	15	17.1	25.7	12.5	18.7							
Properties of 2 angles—3/8 in. back to back												
A_g, in.²		4.52		3.50		2.96		2.40		1.83		
r_x, in.		0.922		0.937		0.945		0.953		0.961		
r_y, in.		0.940		0.911		0.897		0.883		0.869		
Properties of single angle												
r_z, in.		0.425		0.426		0.428		0.431		0.435		

Effective length, L_c (ft), with respect to indicated axis

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L2½ LLBB

Table 4-9 (continued)
Available Strength in Axial Compression, kips
Double Angles—LLBB

F_y = 36 ksi

Shape		2L2½×2× 3/8		2L2½×2× 5/16		2L2½×2× 1/4		2L2½×2× 3/16[c]		2L2½×1½× 1/4		2L2½×1½× 3/16[c]		No. of connectors[a]
lb/ft		10.6		9.00		7.24		5.50		6.38		4.88		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	66.8	100	56.9	85.5	46.1	69.3	34.9	52.5	40.7	61.2	30.8	46.3	
	1	66.0	99.2	56.2	84.5	45.6	68.5	34.6	52.0	40.3	60.5	30.5	45.9	
	2	63.5	95.4	54.1	81.3	43.9	66.0	33.5	50.4	38.8	58.3	29.6	44.6	
	3	59.5	89.4	50.8	76.3	41.3	62.0	31.7	47.6	36.5	54.9	28.1	42.2	
	4	54.3	81.7	46.5	69.9	37.8	56.9	29.1	43.8	33.5	50.4	25.9	38.9	
	5	48.4	72.7	41.5	62.3	33.8	50.9	26.1	39.2	30.1	45.2	23.2	34.9	
	6	42.0	63.1	36.1	54.2	29.5	44.4	22.8	34.3	26.3	39.5	20.4	30.7	b
	7	35.5	53.3	30.6	46.0	25.1	37.8	19.5	29.3	22.5	33.8	17.5	26.3	
	8	29.2	43.9	25.3	38.1	20.9	31.4	16.2	24.4	18.7	28.1	14.6	22.0	
	9	23.4	35.2	20.4	30.6	16.9	25.3	13.2	19.8	15.2	22.8	12.0	18.0	
	10	19.0	28.5	16.5	24.8	13.7	20.5	10.7	16.1	12.3	18.5	9.69	14.6	
	11	15.7	23.6	13.6	20.5	11.3	17.0	8.83	13.3	10.2	15.3	8.01	12.0	
	12	13.2	19.8	11.5	17.2	9.49	14.3	7.42	11.2	8.55	12.9	6.73	10.1	
	13					8.08	12.1	6.32	9.50	7.29	10.9	5.73	8.61	
Y-Y Axis	0	66.8	100	56.9	85.5	46.1	69.3	34.9	52.5	40.7	61.2	30.8	46.3	
	1	63.2	95.0	52.6	79.1	41.0	61.6	28.8	43.2	36.7	55.1	26.1	39.2	
	2	62.6	94.1	52.2	78.4	40.6	61.1	28.6	42.9	35.7	53.7	25.5	38.3	
	3	60.8	91.3	50.9	76.5	39.8	59.9	28.1	42.2	33.6	50.5	24.2	36.3	2
	4	57.6	86.6	48.4	72.7	38.1	57.3	27.2	40.9	29.3	44.1	21.3	32.0	
	5	53.6	80.5	43.7	65.7	34.6	52.0	25.1	37.8	25.1	37.7	18.2	27.4	
	6	47.8	71.8	39.3	59.1	31.2	46.8	22.8	34.2	20.6	31.0	14.9	22.5	
	7	42.6	64.0	34.7	52.1	27.5	41.3	20.1	30.2	16.3	24.6	11.8	17.7	
	8	37.2	55.9	30.0	45.1	23.7	35.6	17.3	26.1	13.3	20.0	9.59	14.4	
	9	32.0	48.1	25.4	38.2	20.0	30.1	14.6	22.0	10.6	15.9	7.67	11.5	
	10	27.0	40.5	22.3	33.5	17.4	26.2	12.7	19.0	8.61	12.9	6.27	9.42	
	11	22.4	33.7	18.5	27.8	14.5	21.8	10.6	15.9	7.14	10.7	5.21	7.84	3
	12	18.9	28.3	15.6	23.4	12.2	18.4	8.97	13.5					
	13	16.1	24.2	13.3	20.0	10.4	15.7	7.68	11.5					
	14	13.9	20.9	11.5	17.3	9.03	13.6	6.66	10.0					
	15	12.1	18.2	10.0	15.0	7.88	11.8	5.82	8.75					
Properties of 2 angles —3/8 in. back to back														
A_g, in.²		3.10		2.64		2.14		1.64		1.89		1.45		
r_x, in.		0.766		0.774		0.782		0.790		0.790		0.800		
r_y, in.		0.957		0.943		0.930		0.916		0.691		0.677		
Properties of single angle														
r_z, in.		0.419		0.420		0.423		0.426		0.321		0.324		

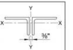
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-10 Available Strength in Axial Compression, kips

Double Angles—SLBB

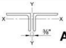


2L8 SLBB

Shape		2L8×6×1		2L8×6×7/8		2L8×6×3/4		2L8×6×5/8		2L8×6×9/16[c]		2L8×6×1/2[c]		2L8×6×7/16[c]		No. of connectors[a]
lb/ft		88.4		78.2		67.6		57.0		51.4		46.0		40.4		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	565	849	496	745	431	648	362	544	317	476	272	409	224	337	
	4	542	815	476	716	414	623	348	524	307	461	264	396	219	329	
	6	515	774	453	681	394	593	332	499	295	443	253	381	212	318	
	8	479	720	422	635	368	553	310	466	279	419	240	361	202	304	
	10	437	657	386	580	337	506	284	427	258	388	224	336	189	284	
	12	391	587	346	520	302	454	256	384	232	349	205	308	173	261	
	14	342	514	304	456	265	399	225	339	205	308	184	277	157	236	
	16	293	441	261	393	229	344	195	293	178	267	160	240	139	210	b
	18	246	370	220	331	193	291	165	249	151	227	136	205	121	182	
	20	202	304	182	273	160	240	137	206	126	189	114	171	101	152	
	22	167	251	150	226	132	199	114	171	104	156	94.0	141	83.8	126	
	24	140	211	126	190	111	167	95.4	143	87.3	131	79.0	119	70.5	106	
	26	120	180	108	162	94.6	142	81.3	122	74.4	112	67.3	101	60.0	90.2	
	28	103	155	92.7	139	81.5	123	70.1	105	64.1	96.4	58.0	87.2	51.8	77.8	
	30													45.1	67.8	
Y-Y Axis	0	565	849	496	745	431	648	362	544	317	476	272	409	224	337	
	4	524	787	450	676	378	569	301	453	261	392	215	323	169	254	
	6	523	786	450	676	378	568	301	452	261	392	215	323	169	253	
	8	522	784	449	674	377	567	300	451	260	391	214	322	168	253	
	10	519	780	447	672	376	565	300	450	260	390	214	322	168	253	
	12	513	771	443	666	374	562	298	448	259	389	213	321	168	252	
	16	488	733	425	638	363	545	293	440	255	383	211	318	166	250	3
	20	440	661	384	577	331	497	272	409	241	362	204	307	162	244	
	24	396	595	345	519	297	447	246	370	220	330	191	287	155	233	
	28	349	525	304	457	262	394	217	326	194	292	171	257	143	214	
	32	302	454	263	395	226	340	187	281	168	252	148	223	127	191	
	36	256	385	223	335	191	287	158	238	142	213	125	188	108	162	
	40	222	334	193	290	165	248	136	205	122	183	108	162	92.9	140	
	44	184	276	160	240	136	205	113	170	101	152	89.7	135	77.6	117	
	48	155	232	134	202	115	173	95.1	143	85.5	128	75.7	114	65.7	98.7	4
	52	132	198	114	172	98.0	147	81.2	122	73.0	110	64.7	97.3	56.3	84.6	
	56	114	171	98.7	148	84.6	127	70.1	105	63.1	94.8	56.0	84.1	48.7	73.2	
	60	99.1	149	86.1	129	73.7	111	61.2	91.9	55.0	82.7	48.9	73.4	42.5	63.9	
Properties of 2 angles—3/8 in. back to back																
A_g, in.^{2}		26.2		23.0		20.0		16.8		15.2		13.6		12.0		
r_x, in.		1.72		1.74		1.75		1.77		1.78		1.79		1.80		
r_y, in.		3.77		3.75		3.72		3.70		3.69		3.68		3.66		
Properties of single angle																
r_z, in.		1.28		1.28		1.29		1.29		1.30		1.30		1.31		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L8 SLBB

Table 4-10 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Double Angles—SLBB

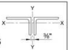
Shape			2L8×4× 1		7/8		3/4		5/8		9/16[c]		1/2[c]		7/16[c]		No. of connectors[a]
lb/ft			74.8		66.2		57.4		48.4		43.8		39.2		34.4		
Design			P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	479	719	423	635	366	551	308	463	269	405	229	344	190	285	
		4	427	642	378	568	328	493	277	416	247	372	211	317	175	263	
		6	370	556	328	493	286	430	242	363	221	332	190	286	159	238	
		8	303	455	270	405	236	355	200	301	183	276	164	246	138	207	
		10	234	352	210	315	184	277	157	236	145	217	131	196	114	172	b
		12	171	257	154	231	136	204	116	175	108	162	98.1	147	87.7	132	
		14	125	189	113	170	99.8	150	85.6	129	79.3	119	72.1	108	64.5	97.0	
		16	96.0	144	86.4	130	76.4	115	65.5	98.5	60.7	91.2	55.2	82.9	49.4	74.3	
		18											43.6	65.5	39.0	58.7	
	Y-Y Axis	0	479	719	423	635	366	551	308	463	269	405	229	344	190	285	
		4	445	668	385	578	323	486	258	388	226	339	185	277	145	217	
		6	445	668	385	578	323	486	258	388	226	339	185	277	144	217	
		8	444	668	384	578	323	486	258	388	226	339	185	277	144	217	
		10	444	667	384	577	323	485	258	388	226	339	184	277	144	217	
		12	442	665	383	576	322	485	258	388	225	339	184	277	144	217	
		16	425	638	373	561	319	479	257	386	225	338	184	276	144	217	
		20	390	586	343	515	296	445	246	370	222	333	183	275	143	216	
		24	356	535	313	471	270	407	226	339	204	307	175	263	141	212	
		28	320	482	282	424	243	365	203	305	184	276	162	243	133	200	6
		32	284	426	249	374	214	322	179	269	162	243	143	215	121	182	
		36	247	371	217	326	186	280	155	233	140	211	124	187	108	162	
		40	211	318	185	279	159	239	132	199	120	180	106	159	92.3	139	
		44	182	274	160	240	136	205	111	166	100	150	88.3	133	77.1	116	
		48	153	230	134	202	115	172	93.0	140	84.1	126	74.3	112	64.9	97.6	
		52	131	196	114	172	97.8	147	79.2	119	71.7	108	63.4	95.3	55.4	83.3	
		56	113	169	98.5	148	84.3	127	68.4	103	61.9	93.0	54.7	82.2	47.8	71.9	
		60	98.1	147	85.9	129	73.5	110	61.0	91.7	53.9	81.0	47.7	71.7	41.7	62.7	
		64	86.2	130	75.5	113	64.6	97.1	53.6	80.6	47.4	71.3	41.9	63.0	36.7	55.1	
		68	76.4	115													7
Properties of 2 angles—3/8 in. back to back																	
A_g, in.^{2}			22.2		19.6		17.0		14.3		13.0		11.6		10.2		
r_x, in.			1.03		1.04		1.05		1.06		1.07		1.08		1.09		
r_y, in.			4.08		4.06		4.03		4.00		3.99		3.97		3.96		
Properties of single angle																	
r_z, in.			0.844		0.846		0.850		0.856		0.859		0.863		0.867		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

$F_y = 36$ ksi

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB



2L7 SLBB

Shape		2L7×4× 3/4		2L7×4× 5/8		2L7×4× 1/2[c]		2L7×4× 7/16[c]		2L7×4× 3/8[c]		No. of connectors[a]
lb/ft		52.4		44.2		35.8		31.4		27.2		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	334	502	280	421	219	329	183	275	148	223	b
	4	301	453	254	381	202	304	170	255	138	207	
	6	264	397	224	336	181	273	154	231	125	188	
	8	220	331	188	282	153	229	134	202	109	164	
	10	174	262	150	225	122	184	109	164	91.6	138	
	12	131	197	114	171	93.3	140	83.6	126	72.2	109	
	14	96.3	145	83.8	126	68.9	104	61.9	93.0	53.4	80.3	
	16	73.7	111	64.1	96.4	52.7	79.3	47.4	71.2	40.9	61.5	
	18	58.2	87.5	50.7	76.2	41.7	62.6	37.4	56.2	32.3	48.6	
Y-Y Axis	0	334	502	280	421	219	329	183	275	148	223	5
	4	303	456	244	367	184	276	148	222	111	167	
	6	303	455	244	367	184	276	148	222	111	167	
	8	303	455	244	367	184	276	147	222	111	167	
	10	302	454	244	366	183	276	147	221	111	167	
	12	299	450	243	365	183	275	147	221	111	167	
	16	283	425	234	352	181	272	146	220	111	166	
	20	252	378	210	315	167	251	141	211	108	163	
	24	223	335	186	279	148	223	129	194	102	154	
	28	193	290	160	241	128	192	112	168	92.1	138	
	32	163	245	136	204	108	162	94.4	142	80.3	121	
	36	135	203	112	168	88.9	134	77.7	117	66.0	99.2	
	40	113	169	93.4	140	72.2	108	63.2	94.9	53.8	80.8	6
	44	93.1	140	77.2	116	59.7	89.8	52.3	78.6	44.6	67.0	
	48	78.3	118	64.9	97.6	50.2	75.5	44.0	66.2	37.6	56.4	
	52	66.7	100	55.4	83.2	42.8	64.4	37.6	56.4	32.1	48.2	
	56	57.5	86.5	47.7	71.8	37.0	55.5	32.4	48.7	27.7	41.6	

Properties of 2 angles —3/8 in. back to back

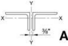
	3/4	5/8	1/2	7/16	3/8
A_g, in.^{2}	15.5	13.0	10.5	9.26	8.00
r_x, in.	1.08	1.10	1.11	1.12	1.12
r_y, in.	3.48	3.46	3.43	3.42	3.40

Properties of single angle

	3/4	5/8	1/2	7/16	3/8
r_z, in.	0.855	0.860	0.866	0.869	0.873

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L6 SLBB

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB

$F_y = 36$ ksi

Shape			2L6×4× $^7/_8$		2L6×4× $^3/_4$		2L6×4× $^5/_8$		2L6×4× $^9/_{16}$		No. of connectors[a]
lb/ft			54.4		47.2		40.0		36.2		
Design			P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	345	518	300	450	252	379	229	343	b
		4	312	469	272	409	229	345	208	313	
		6	275	414	241	362	204	306	185	278	
		8	231	347	204	306	172	259	157	236	
		10	184	277	164	246	139	209	128	192	
		12	140	210	126	189	107	161	98.6	148	
		14	103	155	92.9	140	79.6	120	73.4	110	
		16	78.9	119	71.1	107	60.9	91.6	56.2	84.4	
		18	62.4	93.7	56.2	84.4	48.1	72.3	44.4	66.7	
	Y-Y Axis	0	345	518	300	450	252	379	229	343	4
		4	326	490	278	418	227	341	201	302	
		6	325	489	278	417	227	341	201	302	
		8	323	485	276	415	226	339	200	301	
		10	315	473	271	408	224	336	199	299	
		12	303	456	262	394	218	328	195	293	
		16	268	403	232	349	194	291	175	262	
		20	233	351	202	303	168	253	152	228	
		24	197	296	170	255	141	212	127	191	
		28	161	242	138	208	115	172	103	155	
		32	132	198	113	169	93.0	140	83.6	126	5
		36	104	156	89.2	134	73.6	111	66.2	99.5	
		40	84.3	127	72.3	109	59.6	89.7	53.7	80.7	
		44	69.7	105	59.8	89.8	49.3	74.1	44.4	66.7	
		48	58.6	88.0	50.2	75.5	41.5	62.3	37.3	56.1	

Properties of 2 angles—$^3/_8$ in. back to back

	$^7/_8$	$^3/_4$	$^5/_8$	$^9/_{16}$
A_g, in.^{2}	16.0	13.9	11.7	10.6
r_x, in.	1.10	1.12	1.13	1.14
r_y, in.	2.96	2.94	2.91	2.90

Properties of single angle

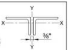
	$^7/_8$	$^3/_4$	$^5/_8$	$^9/_{16}$
r_z, in.	0.854	0.856	0.859	0.861

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
Note: Heavy line indicates L_c/r equal to or greater than 200.

$F_y = 36$ ksi

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB

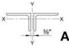


2L6 SLBB

Shape		2L6×4×								No. of connectors[a]
		1/2		7/16[c]		3/8[c]		5/16[c]		
lb/ft		32.4		28.6		24.6		20.6		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	205	308	176	265	144	216	112	169	
	4	187	280	163	245	134	201	105	157	
	6	166	249	147	220	122	183	95.7	144	
	8	141	212	125	188	107	161	84.5	127	
	10	114	172	102	153	88.6	133	71.8	108	
	12	88.4	133	78.9	119	69.2	104	58.7	88.2	b
	14	65.7	98.8	58.9	88.5	51.7	77.8	44.2	66.4	
	16	50.3	75.7	45.1	67.8	39.6	59.5	33.8	50.8	
	18	39.8	59.8	35.6	53.5	31.3	47.0	26.7	40.2	
Y-Y Axis	0	205	308	176	265	144	216	112	169	
	4	174	262	146	220	114	172	81.8	123	
	6	174	262	146	220	114	172	81.7	123	
	8	174	261	146	219	114	172	81.6	123	
	10	173	260	145	218	114	171	81.4	122	
	12	171	257	144	217	113	170	81.1	122	
	16	155	233	134	202	109	164	79.5	119	
	20	135	203	118	177	99.4	149	75.1	113	4
	24	113	170	98.8	148	83.9	126	66.5	100	
	28	91.9	138	80.1	120	68.0	102	55.9	84.0	
	32	72.1	108	62.8	94.4	53.3	80.1	44.0	66.1	
	36	57.1	85.8	49.8	74.8	42.3	63.6	35.0	52.7	
	40	46.3	69.6	40.4	60.8	34.4	51.7	28.5	42.9	
	44	39.5	59.4	33.5	50.3	28.5	42.8	23.7	35.6	
	48	33.2	49.9	28.1	42.3					
										5
Properties of 2 angles—3/8 in. back to back										
A_g, in.²		9.50		8.36		7.22		6.06		
r_x, in.		1.14		1.15		1.16		1.17		
r_y, in.		2.89		2.88		2.86		2.85		
Properties of single angle										
r_z, in.		0.864		0.867		0.870		0.874		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L6 SLBB

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB

F_y = 36 ksi

		Shape	2L6×3½×						
			½		3/8[c]		5/16[c]		No. of connectors[a]
		lb/ft	30.6		23.4		19.6		
		Design	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis	X-X Axis	0	194	292	136	205	106	160	b
		1	192	289	135	204	106	159	
		2	188	282	133	200	104	156	
		3	180	271	129	194	101	151	
		4	170	256	123	185	96.4	145	
		5	158	238	116	175	91.2	137	
		6	145	218	109	163	85.3	128	
		7	131	196	99.9	150	78.7	118	
		8	116	174	89.9	135	71.7	108	
		9	101	151	78.7	118	64.5	96.9	
		10	86.4	130	67.8	102	57.2	85.9	
		11	72.7	109	57.5	86.4	49.0	73.6	
		12	61.1	91.9	48.3	72.6	41.1	61.8	
		13	52.1	78.3	41.1	61.8	35.1	52.7	
		14	44.9	67.5	35.5	53.3	30.2	45.4	
		15	39.1	58.8	30.9	46.4	26.3	39.6	
		16	34.4	51.7	27.2	40.8	23.1	34.8	
	Y-Y Axis	0	194	292	136	205	106	160	5
		6	166	249	109	164	78.1	117	
		8	165	248	109	164	78.0	117	
		10	165	248	109	164	77.9	117	
		12	163	246	109	163	77.7	117	
		14	160	240	108	162	77.5	116	
		16	150	225	106	159	76.8	115	
		18	141	212	103	154	75.7	114	
		20	131	197	97.5	146	73.5	111	
		22	121	182	90.9	137	70.1	105	
		24	111	167	83.5	125	65.8	98.9	
		26	101	152	75.9	114	61.1	91.8	
		28	91.0	137	68.5	103	56.1	84.4	
		30	81.5	122	61.2	92.1	50.4	75.8	
		32	72.2	109	54.2	81.5	44.7	67.1	
		34	64.0	96.2	48.1	72.4	39.7	59.7	
		38	51.3	77.1	38.6	58.1	31.9	48.0	
		42	42.0	63.2	31.7	47.6	26.2	39.4	
		46	35.1	52.7	26.5	39.8	21.9	32.9	
		48	32.2	48.4	24.3	36.5	20.1	30.3	

Properties of 2 angles—3/8 in. back to back

	½	3/8	5/16
A_g, in.²	9.00	6.88	5.78
r_x, in.	0.968	0.984	0.991
r_y, in.	2.96	2.94	2.92

Properties of single angle

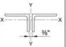
	½	3/8	5/16
r_z, in.	0.756	0.763	0.767

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

$F_y = 36$ ksi

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB



2L5 SLBB

Shape		2L5×3½×										No. of connectors[a]
		3/4		5/8		1/2		3/8[c]		5/16[c]		
lb/ft		39.6		33.6		27.2		20.8		17.4		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	252	379	213	319	172	259	130	195	102	153	
	1	250	376	211	317	171	257	129	194	101	152	
	2	244	367	206	310	167	251	127	190	99.6	150	
	3	235	353	198	298	161	242	123	185	96.7	145	
	4	222	334	188	282	153	230	117	176	92.8	139	
	5	207	310	175	263	143	214	110	165	87.9	132	
	6	189	284	161	241	131	197	101	152	82.3	124	
	7	170	256	145	218	119	179	92.0	138	76.1	114	
	8	151	227	129	194	106	160	82.5	124	69.2	104	b
	9	132	198	113	170	93.3	140	72.9	110	61.2	91.9	
	10	113	170	97.6	147	80.8	121	63.5	95.4	53.3	80.1	
	11	95.7	144	82.9	125	68.9	104	54.5	81.8	45.7	68.7	
	12	80.5	121	69.6	105	58.0	87.2	46.0	69.1	38.6	58.0	
	13	68.6	103	59.3	89.2	49.4	74.3	39.2	58.9	32.9	49.4	
	14	59.1	88.8	51.2	76.9	42.6	64.0	33.8	50.8	28.4	42.6	
	15	51.5	77.4	44.6	67.0	37.1	55.8	29.4	44.3	24.7	37.1	
	16	45.3	68.0	39.2	58.9	32.6	49.0	25.9	38.9	21.7	32.6	
	17							22.9	34.5	19.2	28.9	
Y-Y Axis	0	252	379	213	319	172	259	130	195	102	153	
	6	237	357	196	295	153	230	107	162	80.9	122	
	8	231	348	193	290	152	228	107	161	80.6	121	
	10	222	333	186	279	148	223	106	159	80.1	120	
	12	210	316	176	265	141	212	103	155	79.2	119	
	14	192	288	161	242	129	194	95.9	144	76.2	114	
	16	177	265	148	222	119	178	88.4	133	72.0	108	
	18	161	242	134	202	108	162	80.3	121	66.1	99.4	
	20	145	218	121	182	96.6	145	72.0	108	59.4	89.3	4
	22	129	194	107	162	85.7	129	63.8	95.9	52.7	79.2	
	24	114	171	94.5	142	75.1	113	55.8	83.9	46.1	69.4	
	26	99.0	149	82.1	123	65.0	97.7	48.2	72.4	39.8	59.8	
	28	85.4	128	70.8	106	56.1	84.4	41.6	62.6	34.5	51.8	
	30	74.4	112	61.7	92.8	48.9	73.6	36.3	54.6	30.1	45.3	
	32	65.4	98.3	54.3	81.6	43.0	64.7	32.0	48.1	26.5	39.9	
	34	58.0	87.1	48.1	72.3	38.2	57.3	28.4	42.6	23.5	35.4	
	38	46.4	69.8	38.5	57.9	30.6	45.9	22.7	34.2	18.9	28.4	
Properties of 2 angles—3/8 in. back to back												
A_g, in.²		11.7		9.86		8.00		6.10		5.12		
r_x, in.		0.974		0.987		1.00		1.02		1.02		
r_y, in.		2.47		2.45		2.42		2.39		2.38		
Properties of single angle												
r_z, in.		0.744		0.746		0.750		0.755		0.758		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

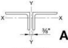


Table 4-10 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

2L5 SLBB

Double Angles—SLBB

Shape		2L5×3×										No. of connectors[a]
		1/2		7/16		3/8[c]		5/16[c]		1/4[c]		
lb/ft		25.6		22.6		19.6		16.4		13.2		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	162	243	143	214	122	183	95.6	144	70.2	106	
	1	160	240	141	212	121	181	94.8	142	69.6	105	
	2	155	232	137	205	117	176	92.4	139	67.9	102	
	3	146	220	129	194	112	168	88.5	133	65.2	98.0	
	4	135	203	120	180	104	156	83.4	125	61.5	92.5	
	5	122	184	108	163	94.1	141	77.2	116	57.1	85.9	
	6	108	163	96.1	144	83.6	126	70.1	105	52.2	78.4	
	7	93.6	141	83.3	125	72.7	109	61.8	92.9	46.8	70.3	b
	8	79.1	119	70.7	106	61.8	92.9	52.8	79.3	41.2	62.0	
	9	65.4	98.4	58.7	88.2	51.4	77.3	44.1	66.2	35.6	53.6	
	10	53.2	79.9	47.7	71.7	41.9	63.0	36.0	54.1	29.5	44.3	
	11	43.9	66.0	39.4	59.3	34.7	52.1	29.8	44.7	24.4	36.6	
	12	36.9	55.5	33.1	49.8	29.1	43.8	25.0	37.6	20.5	30.8	
	13	31.5	47.3	28.2	42.4	24.8	37.3	21.3	32.0	17.4	26.2	
	14					21.4	32.2	18.4	27.6	15.0	22.6	
Y-Y Axis	0	162	243	143	214	122	183	95.6	144	70.2	106	
	6	144	217	123	185	101	152	76.5	115	50.4	75.8	
	8	143	216	123	185	101	152	76.3	115	50.3	75.7	
	10	141	211	121	183	101	151	76.1	114	50.2	75.5	
	12	135	202	117	176	98.7	148	75.6	114	49.9	75.0	
	14	124	186	108	163	92.4	139	73.5	110	49.4	74.2	4
	16	114	171	99.9	150	85.6	129	69.9	105	48.2	72.4	
	18	104	157	91.2	137	78.2	118	64.9	97.6	45.9	69.0	
	20	94.1	141	82.3	124	70.6	106	58.7	88.3	42.6	64.1	
	22	84.1	126	73.4	110	62.9	94.6	52.4	78.8	38.9	58.5	
	24	74.4	112	64.8	97.4	55.5	83.5	46.3	69.5	35.0	52.6	
	26	65.0	97.8	56.6	85.0	48.4	72.8	40.3	60.6	31.6	47.5	
	28	56.2	84.5	48.9	73.5	41.8	62.9	34.9	52.4	27.4	41.2	
	30	49.0	73.7	42.6	64.0	36.5	54.9	30.4	45.7	24.0	36.0	
	32	43.1	64.8	37.5	56.3	32.1	48.3	26.8	40.3	21.1	31.8	5
	34	38.2	57.4	33.2	49.9	28.5	42.8	23.8	35.7	18.8	28.2	
	38	30.6	46.0	26.6	40.0	22.8	34.3	19.1	28.6	15.1	22.6	

Properties of 2 angles —3/8 in. back to back

	1/2	7/16	3/8	5/16	1/4
A_g, in.^{2}	7.50	6.62	5.72	4.82	3.88
r_x, in.	0.824	0.831	0.838	0.846	0.853
r_y, in.	2.50	2.48	2.47	2.46	2.44

Properties of single angle

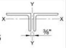
	1/2	7/16	3/8	5/16	1/4
r_z, in.	0.642	0.644	0.646	0.649	0.652

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB



2L4 SLBB

Shape		2L4×3½×								No. of connectors[a]
		½		3/8		5/16		¼[c]		
lb/ft		23.8		18.2		15.4		12.4		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	151	227	116	174	96.9	146	71.3	107	b
	1	150	225	115	172	96.4	145	71.0	107	
	2	147	221	112	169	94.4	142	70.0	105	
	3	142	213	109	163	91.3	137	68.4	103	
	4	135	203	104	156	87.1	131	66.3	99.6	
	5	127	190	97.3	146	81.9	123	63.5	92.5	
	6	117	176	90.2	136	76.1	114	59.9	90.0	
	7	107	161	82.5	124	69.7	105	55.7	83.7	
	8	96.4	145	74.4	112	63.0	94.7	51.2	76.9	
	9	85.5	129	66.2	99.5	56.2	84.4	45.9	69.0	
	10	74.9	113	58.1	87.3	49.4	74.3	40.5	60.8	
	11	64.6	97.1	50.3	75.6	42.9	64.4	35.2	52.9	
	12	54.9	82.5	42.8	64.4	36.7	55.1	30.2	45.4	
	13	46.8	70.3	36.5	54.9	31.2	46.9	25.7	38.7	
	14	40.3	60.6	31.5	47.3	26.9	40.5	22.2	33.4	
	15	35.1	52.8	27.4	41.2	23.5	35.3	19.3	29.1	
	16	30.9	46.4	24.1	36.2	20.6	31.0	17.0	25.5	
	17	27.3	41.1	21.3	32.1	18.3	27.4	15.1	22.6	
Y-Y Axis	0	151	227	116	174	96.9	146	71.3	107	3
	6	136	204	98.8	148	78.5	118	56.1	84.3	
	8	130	195	95.8	144	76.8	115	55.4	83.2	
	10	118	177	88.1	132	71.9	108	53.4	80.2	
	12	106	160	79.6	120	65.5	98.4	50.1	75.4	
	14	94.2	142	70.4	106	58.1	87.3	45.0	67.6	
	16	81.8	123	61.0	91.6	50.3	75.6	39.1	58.8	
	18	69.7	105	51.8	77.8	42.7	64.2	33.3	50.0	
	20	58.3	87.6	43.0	64.6	35.4	53.3	27.6	41.5	
	22	48.2	72.5	35.7	53.6	29.5	44.3	23.0	34.6	
	24	40.6	61.0	30.0	45.2	24.8	37.3	19.5	29.3	
	26	34.6	52.0	25.7	38.6	21.2	31.9	16.7	25.1	
	28	29.9	44.9	22.2	33.3	18.4	27.6	14.4	21.7	
	30	26.0	39.1	19.3	29.0	16.0	24.1	12.6	19.0	
Properties of 2 angles—3/8 in. back to back										
A_g, in.^{2}		7.00		5.36		4.50		3.64		
r_x, in.		1.04		1.05		1.06		1.07		
r_y, in.		1.89		1.86		1.85		1.83		
Properties of single angle										
r_z, in.		0.716		0.719		0.721		0.723		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

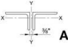


Table 4-10 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

2L4 SLBB

Double Angles—SLBB

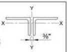
Shape		2L4×3×										
		5/8		1/2		3/8		5/16		1/4[c]		No. of connectors[a]
lb/ft		27.2		22.2		17.0		14.4		11.6		
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	172	259	140	211	107	161	90.0	135	67.5	102	
	1	170	256	139	208	106	160	89.2	134	67.0	101	
	2	165	248	134	202	103	155	86.6	130	65.4	98.3	
	3	156	235	128	192	98.2	148	82.5	124	62.9	94.5	
	4	145	218	119	179	91.6	138	77.0	116	59.5	89.4	
	5	132	198	108	163	83.7	126	70.5	106	55.4	83.2	
	6	117	176	96.7	145	75.0	113	63.3	95.2	50.7	76.2	
	7	102	154	84.6	127	65.9	99.1	55.8	83.8	45.4	68.3	b
	8	87.2	131	72.5	109	56.8	85.4	48.2	72.4	39.3	59.1	
	9	72.8	109	60.8	91.5	48.0	72.1	40.8	61.3	33.4	50.2	
	10	59.5	89.4	49.9	75.1	39.6	59.5	33.8	50.8	27.8	41.7	
	11	49.2	73.9	41.3	62.0	32.7	49.2	27.9	42.0	22.9	34.5	
	12	41.3	62.1	34.7	52.1	27.5	41.3	23.5	35.3	19.3	29.0	
	13	35.2	52.9	29.6	44.4	23.4	35.2	20.0	30.0	16.4	24.7	
	14	30.3	45.6	25.5	38.3	20.2	30.4	17.2	25.9	14.2	21.3	
Y-Y Axis	0	172	259	140	211	107	161	90.0	135	67.5	102	
	6	159	239	128	192	93.1	140	74.3	112	53.3	80.0	
	8	151	227	122	183	90.9	137	73.1	110	52.8	79.4	
	10	141	212	114	171	85.8	129	68.6	103	51.2	77.0	3
	12	126	190	102	153	76.8	115	62.4	93.9	48.3	72.6	
	14	113	170	90.8	136	68.5	103	55.5	83.4	43.7	65.7	
	16	99.5	150	79.7	120	60.0	90.3	48.2	72.5	38.1	57.3	
	18	86.2	129	68.7	103	51.7	77.6	41.1	61.8	32.6	48.9	
	20	73.3	110	58.2	87.5	43.6	65.6	35.8	53.8	28.3	42.6	
	22	61.2	92.0	48.4	72.8	36.3	54.5	29.7	44.7	23.6	35.5	
	24	51.5	77.4	40.7	61.2	30.5	45.9	25.1	37.7	19.9	29.9	
	26	43.9	65.9	34.7	52.2	26.0	39.2	21.4	32.2	17.0	25.6	4
	28	37.8	56.9	30.0	45.0	22.5	33.8	18.5	27.8	14.7	22.1	
	30	33.0	49.6	26.1	39.2	19.6	29.5	16.1	24.2	12.9	19.3	
	32	29.0	43.6	23.0	34.5	17.2	25.9					
Properties of 2 angles —3/8 in. back to back												
A_g, in.^{2}		7.98		6.50		4.98		4.18		3.38		
r_x, in.		0.845		0.858		0.873		0.880		0.887		
r_y, in.		1.98		1.95		1.93		1.91		1.90		
Properties of single angle												
r_z, in.		0.631		0.633		0.636		0.638		0.639		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

$F_y = 36$ ksi

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB

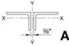


2L3½ SLBB

	Shape	2L3½×3×½		2L3½×3×7/16		2L3½×3×3/8		2L3½×3×5/16		2L3½×3×¼[c]		No. of connectors[a]
	lb/ft	20.4		18.2		15.8		13.2		10.8		
	Design	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	130	196	115	173	100	150	84.1	126	66.3	99.6	b
	1	129	194	114	171	99.1	149	83.3	125	65.8	98.8	
	2	125	188	111	166	96.3	145	81.0	122	64.2	96.6	
	3	119	179	106	159	91.8	138	77.3	116	61.8	92.9	
	4	111	167	98.6	148	85.9	129	72.4	109	58.5	87.9	
	5	102	153	90.4	136	78.8	118	66.5	100	54.1	81.4	
	6	91.3	137	81.2	122	71.0	107	60.0	90.2	48.9	73.5	
	7	80.3	121	71.6	108	62.7	94.3	53.1	79.9	43.4	65.2	
	8	69.3	104	62.0	93.1	54.4	81.7	46.2	69.4	37.8	56.8	
	9	58.6	88.1	52.6	79.0	46.2	69.5	39.4	59.2	32.3	48.6	
	10	48.5	72.9	43.7	65.6	38.5	57.9	33.0	49.6	27.2	40.8	
	11	40.1	60.2	36.1	54.2	31.8	47.9	27.3	41.0	22.5	33.8	
	12	33.7	50.6	30.3	45.6	26.8	40.2	22.9	34.4	18.9	28.4	
	13	28.7	43.1	25.8	38.8	22.8	34.3	19.5	29.3	16.1	24.2	
	14	24.7	37.2	22.3	33.5	19.7	29.6	16.8	25.3	13.9	20.9	
	15							14.7	22.0	12.1	18.2	
Y-Y Axis	0	130	196	115	173	100	150	84.1	126	66.3	99.6	3
	6	117	176	102	154	87.2	131	70.7	106	53.1	79.8	
	8	109	164	95.5	144	82.1	123	67.5	101	51.6	77.5	
	10	96.1	144	84.2	127	72.5	109	60.1	90.3	47.0	70.6	
	12	84.4	127	73.8	111	63.5	95.4	52.7	79.2	41.5	62.3	
	14	72.3	109	63.0	94.7	54.2	81.5	45.0	67.6	35.4	53.2	
	16	60.6	91.0	52.6	79.0	45.2	67.9	37.4	56.2	29.4	44.2	
	18	49.4	74.3	42.7	64.2	36.6	55.0	30.3	45.5	23.8	35.7	
	20	41.7	62.6	36.0	54.1	29.7	44.7	24.6	37.0	19.4	29.1	
	22	34.5	51.8	29.8	44.7	24.6	37.0	20.4	30.7	16.1	24.2	
	24	29.0	43.6	25.0	37.6	20.7	31.1	17.2	25.8	13.6	20.4	
	26	24.7	37.1	21.4	32.1	17.7	26.6	14.7	22.0	11.6	17.4	
	28	21.3	32.0									4
Properties of 2 angles—3/8 in. back to back												
A_g, in.²		6.04		5.34		4.64		3.90		3.16		
r_x, in.		0.877		0.885		0.892		0.900		0.908		
r_y, in.		1.69		1.67		1.66		1.65		1.63		
Properties of single angle												
r_z, in.		0.618		0.620		0.622		0.624		0.628		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



2L3 1/2 SLBB

Table 4-10 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Double Angles—SLBB

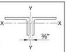
Shape		2L3 1/2×2 1/2×								
		1/2		3/8		5/16		1/4[c]		No. of connectors[a]
lb/ft		18.8		14.4		12.2		9.80		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	119	179	91.4	137	77.2	116	60.7	91.2	b
	1	118	177	90.1	135	76.1	114	60.0	90.1	
	2	112	169	86.2	129	72.8	109	57.9	87.0	
	3	104	156	80.0	120	67.7	102	54.5	82.0	
	4	93.3	140	72.1	108	61.2	92.0	49.8	74.9	
	5	81.2	122	63.2	94.9	53.7	80.7	43.8	65.9	
	6	68.5	103	53.7	80.7	45.8	68.8	37.5	56.4	
	7	56.1	84.3	44.3	66.6	37.9	57.0	31.2	46.9	
	8	44.4	66.7	35.5	53.3	30.5	45.8	25.2	37.9	
	9	35.1	52.7	28.0	42.1	24.1	36.2	20.0	30.0	
	10	28.4	42.7	22.7	34.1	19.5	29.4	16.2	24.3	
	11	23.5	35.3	18.8	28.2	16.1	24.3	13.4	20.1	
	12					13.6	20.4	11.2	16.9	
Y-Y Axis	0	119	179	91.4	137	77.2	116	60.7	91.2	4
	2	112	169	82.4	124	66.7	100	50.0	75.1	
	4	112	168	82.1	123	66.5	100	49.8	74.9	
	6	108	163	80.9	122	65.9	99.1	49.5	74.4	
	8	102	153	76.7	115	63.6	95.5	48.6	73.1	
	10	90.7	136	68.5	102	57.2	86.0	45.1	67.7	
	12	80.5	121	60.6	91.1	50.7	76.2	40.2	60.4	
	14	69.9	105	52.4	78.8	43.9	65.9	34.8	52.3	
	16	59.4	89.3	44.3	66.7	37.0	55.7	29.3	44.1	
	18	49.4	74.2	36.7	55.1	30.6	46.0	24.1	36.2	
	20	40.2	60.5	29.8	44.8	24.9	37.4	19.6	29.5	
	22	33.3	50.0	24.7	37.1	20.6	30.9	16.3	24.4	
	24	28.0	42.0	20.7	31.2	17.3	26.0	13.7	20.6	
	26	23.8	35.8	17.7	26.6	14.8	22.2	11.7	17.6	
	28	20.6	30.9	15.3	22.9	12.7	19.1	10.1	15.2	
Properties of 2 angles—3/8 in. back to back										
A_g, in.^{2}		5.54		4.24		3.58		2.90		
r_x, in.		0.701		0.716		0.723		0.731		
r_y, in.		1.76		1.73		1.72		1.70		
Properties of single angle										
r_z, in.		0.532		0.535		0.538		0.541		

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB



2L3 SLBB

Shape		2L3×2½×												
		½		7/16		3/8		5/16		¼		3/16[c]		No. of connectors[a]
lb/ft		17.0		15.2		13.2		11.2		9.00		6.78		
Design		P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	
Effective length, L_c (ft), with respect to indicated axis														
X-X Axis	0	108	162	95.7	144	83.2	125	70.3	106	56.9	85.5	39.7	59.6	
	1	106	160	94.3	142	82.0	123	69.3	104	56.1	84.4	39.3	59.1	
	2	102	153	90.3	136	78.6	118	66.5	99.9	53.9	81.0	38.2	57.5	
	3	94.4	142	84.0	126	73.2	110	62.0	93.2	50.3	75.7	36.3	54.6	
	4	85.2	128	75.9	114	66.3	99.7	56.3	84.6	45.8	68.8	33.6	50.4	
	5	74.6	112	66.7	100	58.4	87.7	49.7	74.7	40.5	60.8	30.3	45.6	
	6	63.5	95.4	56.9	85.5	49.9	75.0	42.6	64.1	34.9	52.4	26.6	40.0	b
	7	52.4	78.8	47.1	70.8	41.5	62.4	35.6	53.5	29.2	43.9	22.4	33.7	
	8	42.0	63.2	37.9	57.0	33.6	50.4	28.9	43.4	23.8	35.8	18.3	27.5	
	9	33.2	49.9	30.0	45.1	26.6	39.9	22.9	34.5	18.9	28.5	14.6	22.0	
	10	26.9	40.4	24.3	36.5	21.5	32.4	18.6	27.9	15.3	23.0	11.8	17.8	
	11	22.2	33.4	20.1	30.2	17.8	26.7	15.4	23.1	12.7	19.0	9.78	14.7	
	12			16.9	25.4	15.0	22.5	12.9	19.4	10.6	16.0	8.22	12.4	
Y-Y Axis	0	108	162	95.7	144	83.2	125	70.3	106	56.9	85.5	39.7	59.6	
	2	103	154	90.0	135	76.6	115	62.6	94.1	47.8	71.8	31.2	46.9	
	4	101	152	88.8	133	75.8	114	62.1	93.3	47.5	71.4	31.1	46.7	
	6	94.8	142	83.8	126	72.1	108	59.9	90.0	46.4	69.8	30.7	46.1	
	8	83.8	126	74.1	111	63.8	95.9	53.3	80.1	42.3	63.5	29.3	44.1	3
	10	73.0	110	64.4	96.8	55.3	83.1	46.2	69.5	36.8	55.3	26.5	39.9	
	12	61.6	92.5	54.2	81.5	46.4	69.7	38.7	58.2	30.9	46.4	22.4	33.7	
	14	50.4	75.7	44.3	66.5	37.7	56.7	31.4	47.2	25.0	37.6	18.1	27.3	
	16	41.6	62.5	36.4	54.8	30.8	46.3	25.6	38.5	20.3	30.6	14.2	21.4	
	18	32.9	49.4	28.8	43.3	24.4	36.7	20.3	30.5	16.1	24.3	11.8	17.7	
	20	26.7	40.1	23.4	35.1	19.8	29.7	16.5	24.7	13.1	19.7	9.59	14.4	
	22	22.0	33.1	19.3	29.0	16.4	24.6	13.6	20.5	10.9	16.3	7.96	12.0	4
	24	18.5	27.9	16.2	24.4	13.8	20.7	11.5	17.2	9.14	13.7			
Properties of 2 angles—3/8 in. back to back														
A_g, in.²		5.00		4.44		3.86		3.26		2.64		2.00		
r_x, in.		0.718		0.724		0.731		0.739		0.746		0.753		
r_y, in.		1.49		1.48		1.46		1.45		1.44		1.42		
Properties of single angle														
r_z, in.		0.516		0.516		0.517		0.518		0.520		0.521		

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

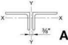


Table 4-10 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

Double Angles—SLBB

2L3 SLBB

Shape		2L3×2×										No. of connectors[a]
		1/2		3/8		5/16		1/4		3/16[c]		
lb/ft		15.4		11.8		10.0		8.20		6.14		
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	$\phi_c P_n$	
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis — X-X Axis	0	97.4	146	75.4	113	63.8	95.9	51.7	77.8	36.4	54.8	
	1	95.0	143	73.6	111	62.3	93.6	50.5	76.0	35.8	53.8	
	2	87.9	132	68.4	103	58.0	87.1	47.1	70.8	33.8	50.9	
	3	77.3	116	60.5	90.9	51.4	77.3	41.9	63.0	30.8	46.3	
	4	64.6	97.1	50.9	76.5	43.5	65.3	35.6	53.5	27.0	40.6	
	5	51.2	77.0	40.8	61.3	35.0	52.6	28.8	43.3	22.3	33.6	
	6	38.6	58.0	31.1	46.8	26.9	40.4	22.3	33.5	17.4	26.1	b
	7	28.4	42.7	23.0	34.5	19.9	29.9	16.6	24.9	13.0	19.5	
	8	21.7	32.7	17.6	26.4	15.2	22.9	12.7	19.0	9.94	14.9	
	9	17.2	25.8	13.9	20.9	12.0	18.1	10.0	15.0	7.85	11.8	
Y-Y Axis	0	97.4	146	75.4	113	63.8	95.9	51.7	77.8	36.4	54.8	
	2	93.1	140	69.8	105	57.3	86.1	43.9	66.0	29.0	43.6	
	4	92.0	138	69.5	104	57.1	85.7	43.8	65.8	28.9	43.5	
	6	86.9	131	66.7	100	55.6	83.6	43.3	65.0	28.8	43.3	
	8	77.5	117	59.6	89.6	49.9	75.1	40.0	60.1	28.0	42.1	4
	10	68.3	103	52.3	78.7	43.8	65.8	35.2	52.8	25.8	38.8	
	12	58.5	87.9	44.7	67.1	37.3	56.0	29.9	44.9	22.2	33.4	
	14	48.6	73.1	37.0	55.6	30.8	46.2	24.6	37.0	18.3	27.5	
	16	40.7	61.1	30.8	46.3	25.5	38.3	20.4	30.6	14.5	21.9	
	18	32.4	48.6	24.4	36.7	20.2	30.3	16.1	24.2	11.9	17.9	
	20	26.2	39.4	19.8	29.8	16.3	24.6	13.1	19.7	9.69	14.6	
	22	21.7	32.6	16.4	24.6	13.5	20.3	10.8	16.3	8.03	12.1	5
	24	18.2	27.4	13.8	20.7	11.4	17.1	9.10	13.7	6.76	10.2	
	26	15.5	23.3									

Properties of 2 angles—3/8 in. back to back

	1/2	3/8	5/16	1/4	3/16
A_g, in.^{2}	4.52	3.50	2.96	2.40	1.83
r_x, in.	0.543	0.555	0.562	0.569	0.577
r_y, in.	1.56	1.54	1.52	1.51	1.49

Properties of single angle

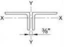
	1/2	3/8	5/16	1/4	3/16
r_z, in.	0.425	0.426	0.428	0.431	0.435

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.

F_y = 36 ksi

Table 4-10 (continued)
Available Strength in Axial Compression, kips
Double Angles—SLBB



2L2½ SLBB

Shape		2L2½×2×								2L2½×1½×				
		3/8		5/16		1/4		3/16[c]		1/4		3/16[c]		
lb/ft		10.6		9.0		7.24		5.50		6.38		4.88		
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	$\phi_c P_n$	No. of connectors[a]
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	
Effective length, L_c (ft), with respect to indicated axis: X-X Axis	0	66.8	100	56.9	85.5	46.1	69.3	34.9	52.5	40.7	61.2	30.8	46.3	
	1	65.3	98.2	55.6	83.6	45.1	67.8	34.3	51.6	38.9	58.5	29.7	44.7	
	2	61.0	91.6	52.0	78.2	42.3	63.5	32.5	48.8	34.0	51.1	26.2	39.4	
	3	54.3	81.7	46.5	69.9	37.9	57.0	29.2	43.9	27.1	40.7	21.1	31.7	
	4	46.2	69.5	39.7	59.7	32.5	48.9	25.2	37.8	19.7	29.7	15.5	23.3	
	5	37.6	56.5	32.5	48.8	26.7	40.2	20.8	31.2	13.2	19.8	10.5	15.7	
	6	29.2	43.9	25.4	38.1	21.0	31.6	16.4	24.7	9.17	13.8	7.28	10.9	b
	7	21.8	32.7	19.0	28.5	15.8	23.8	12.5	18.7					
	8	16.7	25.0	14.5	21.8	12.1	18.2	9.53	14.3					
	9	13.2	19.8	11.5	17.3	9.57	14.4	7.53	11.3					
Y-Y Axis	0	66.8	100	56.9	85.5	46.1	69.3	34.9	52.5	40.7	61.2	30.8	46.3	
	2	62.9	94.5	52.3	78.6	40.6	61.1	28.3	42.6	36.1	54.3	25.5	38.3	
	4	61.3	92.1	51.4	77.2	40.2	60.4	28.1	42.3	36.0	54.1	25.4	38.2	
	6	56.1	84.3	46.3	69.6	36.9	55.5	26.9	40.4	34.4	51.7	25.0	37.6	5
	8	47.9	72.0	39.8	59.9	31.8	47.8	23.7	35.6	29.6	44.5	22.4	33.6	
	10	39.8	59.8	32.8	49.2	26.0	39.1	19.5	29.3	24.9	37.4	18.8	28.3	
	12	31.8	47.7	25.8	38.8	20.4	30.6	15.3	22.9	20.0	30.1	15.1	22.7	
	14	24.3	36.5	20.3	30.6	16.0	24.0	11.9	18.0	15.5	23.3	11.7	17.5	
	16	18.6	28.0	15.6	23.4	12.3	18.4	9.20	13.8	12.2	18.4	9.20	13.8	
	18	14.7	22.1	12.3	18.5	9.70	14.6	7.29	11.0	9.67	14.5	7.28	10.9	
	20	11.9	17.9	10.0	15.0	7.87	11.8	5.92	8.90	7.84	11.8	5.90	8.87	
														6

Properties of 2 angles—3/8 in. back to back

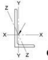
	3/8	5/16	1/4	3/16[c]	1/4	3/16[c]
A_g, in.^{2}	3.10	2.64	2.14	1.64	1.89	1.45
r_x, in.	0.574	0.581	0.589	0.597	0.409	0.416
r_y, in.	1.27	1.26	1.24	1.23	1.32	1.30

Properties of single angle

	3/8	5/16	1/4	3/16[c]	1/4	3/16[c]
r_z, in.	0.419	0.420	0.423	0.426	0.321	0.324

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[a] For Y-Y axis, welded or pretensioned bolted intermediate connectors with Class A or B faying surfaces must be used.
[b] For required number of intermediate connectors, see the discussion of Table 4-8.
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r equal to or greater than 200.



L12

Table 4-11
Available Strength in Axial Compression, kips

F_y = 36 ksi

Concentrically Loaded Single Angles

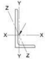
Shape		L12×12×							
		$1^3/_8$		$1^1/_4$		$1^1/_8$		1	
lb/ft		105		96.4		87.2		77.8	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	670	1010	612	920	556	836	496	745
	1	669	1010	611	919	555	835	495	744
	2	667	1000	609	915	553	831	493	741
	3	662	995	604	908	549	825	490	736
	4	655	985	598	899	544	817	485	729
	5	647	972	591	888	537	807	479	720
	6	637	957	582	874	529	795	472	709
	7	625	939	571	858	519	781	463	696
	8	612	919	559	840	509	764	454	682
	9	597	897	546	820	497	747	443	666
	10	581	873	531	798	484	727	432	649
	11	564	847	516	775	470	706	419	630
	12	545	820	499	750	455	684	406	611
	13	526	791	482	724	439	660	392	590
	14	506	761	463	697	423	636	378	568
	15	486	730	445	668	406	611	363	546
	16	465	698	426	640	389	585	348	523
	17	443	666	406	610	371	558	332	499
	18	421	633	386	581	354	532	317	476
	19	400	601	367	551	336	505	301	452
	20	378	568	347	521	318	478	285	428
	21	356	536	327	492	300	452	269	405
	22	335	504	308	463	283	425	254	381
	23	314	472	289	434	266	399	238	358
	24	294	441	270	406	249	374	223	336
	25	274	411	252	379	232	349	209	314
	26	254	382	234	352	216	325	194	292
	27	236	354	217	326	201	301	180	271
	28	219	329	202	303	186	280	168	252
Properties									
A_g, in.^{2}		31.1		28.4		25.8		23.0	
r_z, in.		2.30		2.31		2.33		2.34	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

Menu

F_y = 36 ksi

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

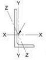


L10

Shape		L10×10×											
		$1^3/_8$		$1^1/_4$		$1^1/_8$		1		$^7/_8$		$^3/_4$[c]	
lb/ft		87.1		79.9		72.3		64.7		56.9		49.1	
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, L_c (ft), with respect to least radius of gyration, r_z	0	552	829	504	758	459	690	410	616	362	544	306	460
	1	551	828	503	757	458	689	409	614	361	543	305	459
	2	547	823	500	752	455	684	406	611	359	540	304	457
	3	542	814	495	744	451	677	402	604	356	534	302	454
	4	534	802	488	733	444	668	396	596	351	527	299	449
	5	524	787	479	720	436	656	389	585	344	517	295	443
	6	512	770	468	704	426	641	380	572	337	506	290	436
	7	498	749	456	685	415	624	370	557	328	493	284	427
	8	483	726	442	664	403	605	359	540	318	478	275	414
	9	466	701	426	641	389	584	347	521	307	462	266	400
	10	448	674	410	616	374	562	333	501	295	444	257	386
	11	429	645	392	590	358	538	319	480	283	426	246	370
	12	409	615	374	562	341	513	305	458	270	406	235	354
	13	388	584	355	534	324	488	289	435	257	386	224	337
	14	367	552	336	505	307	461	274	411	243	365	212	319
	15	346	520	316	475	289	434	258	388	229	344	201	301
	16	324	487	296	445	271	408	242	364	215	323	189	283
	17	303	455	277	416	253	381	226	340	201	302	177	266
	18	281	423	257	387	236	354	210	316	187	282	165	248
	19	261	392	238	358	219	328	195	293	174	261	153	230
	20	240	361	220	330	202	303	180	270	160	241	142	213
	21	221	332	202	303	185	279	165	249	148	222	131	197
	22	201	303	184	277	169	255	151	227	135	203	120	181
	23	184	277	168	253	155	233	138	208	123	186	110	165
	24	169	254	155	233	142	214	127	191	113	170	101	152
	25	156	234	143	214	131	197	117	176	105	157	93.0	140
	26	144	217	132	198	121	182	108	163	96.6	145	86.0	129
	27	134	201	122	184	112	169	100	151	89.6	135	79.8	120
	28	124	187	114	171	105	157	93.3	140	83.3	125	74.2	111
Properties													
A_g, in.^{2}		25.6		23.4		21.3		19.0		16.8		14.5	
r_z, in.		1.91		1.91		1.92		1.92		1.93		1.96	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.



L8

Table 4-11 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

Concentrically Loaded Single Angles

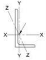
Shape		L8×8×											
		1 1/8		1		7/8		3/4		5/8		9/16[c]	
lb/ft		56.9		51.0		45.0		38.9		32.7		29.6	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	362	544	326	489	287	431	248	373	208	313	178	268
	1	361	543	324	488	286	430	247	371	208	312	178	267
	2	358	538	321	483	283	426	245	368	206	309	177	265
	3	352	529	317	476	279	419	241	362	203	305	175	263
	4	345	518	310	465	273	410	236	355	198	298	172	259
	5	335	504	301	453	265	399	230	345	193	290	169	254
	6	324	487	291	437	257	386	222	334	187	281	165	248
	7	311	467	279	420	247	371	213	320	180	270	160	241
	8	297	446	267	401	235	354	204	306	172	258	155	233
	9	281	423	253	380	223	336	193	290	163	245	148	222
	10	265	399	238	358	211	317	182	274	154	231	140	210
	11	248	373	223	336	198	297	171	257	144	217	131	197
	12	231	348	208	312	184	277	159	239	135	202	122	183
	13	214	322	192	289	170	256	147	222	125	188	113	170
	14	197	296	177	266	157	236	136	204	115	173	104	157
	15	180	270	161	243	144	216	124	187	105	158	95.5	143
	16	163	245	147	220	130	196	113	170	95.9	144	86.9	131
	17	147	221	132	199	118	177	102	153	86.8	130	78.6	118
	18	132	198	118	178	106	159	91.3	137	77.9	117	70.5	106
	19	118	178	106	160	94.8	142	82.0	123	69.9	105	63.3	95.1
	20	107	160	95.9	144	85.5	129	74.0	111	63.1	94.9	57.1	85.9
	21	96.8	145	87.0	131	77.6	117	67.1	101	57.3	86.1	51.8	77.9
	22	88.2	133	79.2	119	70.7	106	61.1	91.9	52.2	78.4	47.2	71.0
	23	80.7	121	72.5	109	64.7	97.2	55.9	84.1	47.7	71.7	43.2	64.9
	24	74.1	111	66.6	100	59.4	89.3	51.4	77.2	43.8	65.9	39.7	59.6
	25	68.3	103	61.4	92.2	54.8	82.3	47.3	71.2	40.4	60.7	36.6	55.0
	26	63.1	94.9	56.7	85.3	50.6	76.1	43.8	65.8	37.4	56.1	33.8	50.8
Properties													
A_g, in.²		16.8		15.1		13.3		11.5		9.69		8.77	
r_z, in.		1.56		1.56		1.57		1.57		1.58		1.58	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

F_y = 36 ksi



L8

Shape		L8×8×		L8×6×											
		1/2[c]		1		7/8		3/4		5/8		9/16[c]			
lb/ft		26.4		44.2		39.1		33.8		28.5		25.7			
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, L_c (ft), with respect to least radius of gyration, r_z	0	148	222	282	424	248	373	215	324	181	272	159	238		
	1	147	222	281	422	247	371	214	322	180	270	158	237		
	2	147	220	277	417	243	366	211	318	177	267	156	235		
	3	145	218	271	407	238	357	207	311	174	261	153	230		
	4	143	215	262	394	230	346	200	301	168	253	149	224		
	5	140	211	252	378	221	332	192	289	161	243	144	217		
	6	137	206	239	359	210	315	183	275	153	231	139	208		
	7	134	201	225	338	198	297	172	259	145	217	132	198		
	8	130	195	210	316	184	277	161	242	135	203	123	185		
	9	125	188	194	292	170	256	149	224	125	188	114	171		
	10	120	181	178	267	156	235	137	205	115	172	105	157		
	11	115	173	161	242	142	213	124	187	104	157	95.3	143		
	12	109	164	145	218	127	191	112	168	94.0	141	86.0	129		
	13	102	153	129	194	113	170	99.7	150	83.9	126	76.9	116		
	14	93.9	141	114	171	100	150	88.2	133	74.2	112	68.1	102		
	15	86.1	129	99.6	150	87.4	131	77.1	116	64.9	97.6	59.7	89.7		
	16	78.4	118	87.5	132	76.8	115	67.8	102	57.1	85.8	52.4	78.8		
	17	71.0	107	77.5	117	68.1	102	60.0	90.2	50.5	76.0	46.5	69.8		
	18	63.9	96.0	69.1	104	60.7	91.2	53.6	80.5	45.1	67.8	41.4	62.3		
	19	57.3	86.1	62.1	93.3	54.5	81.9	48.1	72.2	40.5	60.8	37.2	55.9		
	20	51.7	77.7	56.0	84.2	49.2	73.9	43.4	65.2	36.5	54.9	33.6	50.4		
	21	46.9	70.5	50.8	76.4	44.6	67.0	39.3	59.1	33.1	49.8	30.4	45.8		
	22	42.7	64.2												
	23	39.1	58.8												
	24	35.9	54.0												
	25	33.1	49.8												
	26	30.6	46.0												

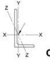
Properties

	L8×8×1/2	L8×6×1	L8×6×7/8	L8×6×3/4	L8×6×5/8	L8×6×9/16
A_g, in.^{2}	7.84	13.1	11.5	9.99	8.41	7.61
r_z, in.	1.59	1.28	1.28	1.29	1.29	1.30

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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



L8

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

F_y = 36 ksi

Shape	L8×6×				L8×4×							
	1/2[c]		7/16[c]		1		7/8		3/4		5/8	
lb/ft	23.0		20.2		37.4		33.1		28.7		24.2	
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, L_c (ft), with respect to least radius of gyration, r_z												
0	136	204	112	168	239	360	211	317	183	275	154	231
1	135	204	112	168	237	356	209	314	181	272	152	229
2	134	201	111	166	229	345	202	304	175	264	148	222
3	132	198	109	164	217	327	192	288	167	250	140	211
4	128	193	107	160	202	303	178	268	155	233	130	196
5	124	186	104	156	183	276	162	243	141	212	119	179
6	119	179	100	151	163	245	144	217	125	189	106	160
7	113	170	95.6	144	142	214	126	189	109	165	92.8	140
8	107	161	90.5	136	121	182	107	161	93.5	141	79.5	120
9	101	151	85.1	128	101	152	89.5	135	78.2	118	66.7	100
10	93.6	141	79.4	119	82.5	124	73.1	110	64.0	96.2	54.8	82.3
11	85.2	128	73.5	110	68.2	103	60.4	90.8	52.9	79.5	45.3	68.0
12	76.8	115	67.5	101	57.3	86.1	50.8	76.3	44.5	66.8	38.0	57.2
13	68.7	103	61.2	92.0	48.8	73.4	43.3	65.0	37.9	56.9	32.4	48.7
14	60.9	91.5	54.3	81.6	42.1	63.3	37.3	56.1	32.7	49.1	27.9	42.0
15	53.3	80.1	47.7	71.7								
16	46.9	70.4	41.9	63.0								
17	41.5	62.4	37.1	55.8								
18	37.0	55.6	33.1	49.8								
19	33.2	49.9	29.7	44.7								
20	30.0	45.1	26.8	40.3								
21	27.2	40.9	24.3	36.6								
Properties												
A_g, in.^{2}	6.80		5.99		11.1		9.79		8.49		7.16	
r_z, in.	1.30		1.31		0.844		0.846		0.850		0.856	

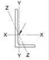
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

F_y = 36 ksi



L8–L7

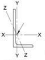
Shape		L8×4×						L7×4×					
		9/16[c]		1/2[c]		7/16[c]		3/4		5/8		1/2[c]	
lb/ft		21.9		19.6		17.2		26.2		22.1		17.9	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	134	202	114	172	95.1	143	167	251	140	211	110	165
	1	133	200	113	171	94.3	142	165	248	139	208	109	164
	2	130	195	111	166	92.1	138	160	241	134	202	106	160
	3	125	188	106	160	88.6	133	152	228	128	192	102	153
	4	118	177	101	151	83.8	126	141	212	119	179	96.1	144
	5	108	163	93.4	140	78.1	117	129	194	108	163	88.1	132
	6	96.7	145	85.4	128	71.5	108	115	173	96.9	146	78.8	118
	7	84.6	127	75.9	114	64.4	96.8	100	151	84.8	127	69.1	104
	8	72.5	109	65.2	98.0	57.0	85.7	85.9	129	72.7	109	59.4	89.2
	9	60.9	91.5	54.8	82.4	48.7	73.1	72.0	108	61.1	91.8	50.0	75.2
	10	50.0	75.1	45.1	67.8	40.1	60.3	59.1	88.8	50.2	75.4	41.2	61.9
	11	41.3	62.1	37.3	56.0	33.1	49.8	48.8	73.4	41.5	62.3	34.0	51.1
	12	34.7	52.2	31.3	47.1	27.8	41.8	41.0	61.6	34.8	52.4	28.6	43.0
	13	29.6	44.5	26.7	40.1	23.7	35.7	34.9	52.5	29.7	44.6	24.4	36.6
	14	25.5	38.3	23.0	34.6	20.5	30.7	30.1	45.3	25.6	38.5	21.0	31.6
Properties													
A_g, in.^{2}		6.49		5.80		5.11		7.74		6.50		5.26	
r_z, in.		0.859		0.863		0.867		0.855		0.860		0.866	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

Menu



L7–L6

Table 4-11 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

Concentrically Loaded Single Angles

Shape		L7×4×				L6×6×							
		7/16[c]		3/8[c]		1		7/8		3/4		5/8	
lb/ft		15.7		13.6		37.4		33.1		28.7		24.2	
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, L_c (ft), with respect to least radius of gyration, r_z	0	91.6	138	74.2	112	237	356	210	316	182	274	154	231
	1	90.9	137	73.7	111	236	354	209	314	181	273	153	230
	2	88.8	133	71.9	108	232	349	206	309	178	268	150	226
	3	85.3	128	69.2	104	226	339	200	301	174	261	146	220
	4	80.6	121	65.5	98.4	217	326	192	289	167	251	141	211
	5	74.9	113	61.0	91.7	206	310	183	275	159	239	134	201
	6	68.5	103	55.9	84.0	194	292	172	259	149	225	126	189
	7	61.0	91.7	50.4	75.7	181	272	160	241	139	209	117	176
	8	52.5	78.9	44.6	67.1	166	250	147	222	128	192	108	162
	9	44.3	66.5	38.5	57.9	151	228	134	202	116	175	98.1	148
	10	36.5	54.9	31.8	47.8	136	205	121	182	105	158	88.3	133
	11	30.2	45.3	26.3	39.5	121	182	108	162	93.3	140	78.6	118
	12	25.3	38.1	22.1	33.2	107	161	94.7	142	82.2	123	69.2	104
	13	21.6	32.5	18.8	28.3	93.0	140	82.4	124	71.5	108	60.3	90.6
	14	18.6	28.0	16.2	24.4	80.2	121	71.1	107	61.7	92.7	52.0	78.1
	15					69.9	105	61.9	93.1	53.7	80.7	45.3	68.1
	16					61.4	92.3	54.4	81.8	47.2	71.0	39.8	59.8
	17					54.4	81.7	48.2	72.5	41.8	62.9	35.3	53.0
	18					48.5	72.9	43.0	64.6	37.3	56.1	31.4	47.3
	19					43.5	65.4	38.6	58.0	33.5	50.3	28.2	42.4

Properties

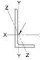
	7/16[c]	3/8[c]	1	7/8	3/4	5/8
A_g, in.^{2}	4.63	4.00	11.0	9.75	8.46	7.13
r_z, in.	0.869	0.873	1.17	1.17	1.17	1.17

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

F_y = 36 ksi



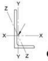
L6

Shape		L6×6×										L6×4×	
		9/16		1/2		7/16[c]		3/8[c]		5/16[c]		7/8	
lb/ft		21.9		19.6		17.2		14.9		12.4		27.2	
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, L_c (ft), with respect to least radius of gyration, r_z	0	139	209	124	187	105	158	82.4	124	60.8	91.3	172	259
	1	138	208	124	186	105	158	82.1	123	60.6	91.0	171	257
	2	136	204	122	183	104	156	81.3	122	59.9	90.1	165	249
	3	132	199	118	178	102	153	79.8	120	58.9	88.6	157	236
	4	127	192	114	171	98.9	149	77.8	117	57.6	86.5	146	219
	5	121	182	109	163	95.5	143	75.3	113	55.8	83.9	133	200
	6	114	172	102	154	90.0	135	72.3	109	53.7	80.8	119	178
	7	106	160	95.3	143	83.9	126	68.9	104	51.4	77.2	104	156
	8	98.1	147	87.8	132	77.3	116	65.1	97.8	48.7	73.2	88.7	133
	9	89.5	134	80.0	120	70.5	106	60.9	91.6	45.8	68.9	74.3	112
	10	80.7	121	72.2	108	63.5	95.5	55.3	83.1	42.7	64.2	60.9	91.5
	11	72.0	108	64.4	96.7	56.7	85.2	49.4	74.3	39.5	59.4	50.3	75.6
	12	63.5	95.4	56.8	85.4	50.0	75.1	43.7	65.6	36.2	54.4	42.3	63.6
	13	55.4	83.3	49.6	74.5	43.6	65.6	38.2	57.4	32.0	48.1	36.0	54.2
	14	47.8	71.9	42.8	64.3	37.7	56.6	33.0	49.6	27.7	41.6	31.1	46.7
	15	41.7	62.6	37.3	56.0	32.8	49.3	28.8	43.2	24.1	36.2		
	16	36.6	55.0	32.8	49.2	28.8	43.3	25.3	38.0	21.2	31.8		
	17	32.4	48.8	29.0	43.6	25.5	38.4	22.4	33.7	18.8	28.2		
	18	28.9	43.5	25.9	38.9	22.8	34.2	20.0	30.0	16.7	25.2		
	19	26.0	39.0	23.2	34.9	20.5	30.7	17.9	27.0	15.0	22.6		
Properties													
A_g, in.^{2}		6.45		5.77		5.08		4.38		3.67		8.00	
r_z, in.		1.18		1.18		1.18		1.19		1.19		0.854	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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



L6

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

F_y = 36 ksi

Shape		L6×4×									
		3/4		5/8		9/16		1/2		7/16[c]	
lb/ft		23.6		20.0		18.1		16.2		14.3	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	150	225	126	190	114	172	102	154	88.0	132
	1	148	223	125	188	113	170	101	152	87.3	131
	2	144	216	121	182	110	165	98.3	148	85.1	128
	3	136	205	115	173	104	157	93.5	140	81.6	123
	4	127	191	107	161	97.2	146	87.0	131	76.7	115
	5	116	174	97.7	147	88.6	133	79.4	119	70.0	105
	6	103	155	87.3	131	79.2	119	71.0	107	62.7	94.2
	7	90.1	135	76.4	115	69.4	104	62.3	93.6	55.0	82.6
	8	77.2	116	65.5	98.4	59.5	89.4	53.5	80.3	47.3	71.0
	9	64.7	97.3	55.0	82.6	50.0	75.1	45.0	67.6	39.8	59.8
	10	53.1	79.8	45.1	67.8	41.1	61.8	37.0	55.6	32.8	49.3
	11	43.9	65.9	37.3	56.1	34.0	51.0	30.6	46.0	27.1	40.7
	12	36.9	55.4	31.3	47.1	28.5	42.9	25.7	38.6	22.8	34.2
	13	31.4	47.2	26.7	40.1	24.3	36.5	21.9	32.9	19.4	29.2
	14	27.1	40.7	23.0	34.6	21.0	31.5	18.9	28.4	16.7	25.1

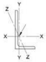
Properties

	3/4	5/8	9/16	1/2	7/16
A_g, in.^{2}	6.94	5.86	5.31	4.75	4.18
r_z, in.	0.856	0.859	0.861	0.864	0.867

ASD	LRFD	
Ω_c = 1.67	ϕ_c = 0.90	[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly. Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

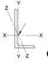


L6

Shape		L6×4×				L6×3½×					
		3/8[c]		5/16[c]		1/2		3/8[c]		5/16[c]	
lb/ft		12.3		10.3		15.3		11.7		9.80	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	71.8	108	56.1	84.3	97.0	146	68.2	102	53.1	79.8
	1	71.2	107	55.7	83.7	95.7	144	67.5	101	52.6	79.0
	2	69.5	105	54.4	81.7	92.0	138	65.4	98.3	51.0	76.7
	3	66.8	100	52.3	78.6	86.1	129	62.1	93.3	48.5	72.9
	4	63.1	94.8	49.4	74.3	78.5	118	57.6	86.6	45.1	67.8
	5	58.6	88.0	46.0	69.2	69.6	105	52.4	78.7	41.2	61.9
	6	53.5	80.4	42.1	63.3	60.2	90.4	46.4	69.7	36.7	55.2
	7	47.6	71.6	37.9	57.0	50.6	76.1	39.2	58.9	32.1	48.2
	8	41.0	61.6	33.6	50.5	41.5	62.4	32.2	48.4	27.3	41.0
	9	34.6	52.0	29.2	43.9	33.1	49.8	25.8	38.8	21.9	32.9
	10	28.5	42.9	24.2	36.3	26.8	40.3	20.9	31.4	17.7	26.7
	11	23.6	35.4	20.0	30.0	22.2	33.3	17.3	26.0	14.7	22.0
	12	19.8	29.8	16.8	25.2	18.6	28.0	14.5	21.8	12.3	18.5
	13	16.9	25.4	14.3	21.5						
	14	14.6	21.9	12.3	18.5						
Properties											
A_g, in.^{2}		3.61		3.03		4.50		3.44		2.89	
r_z, in.		0.870		0.874		0.756		0.763		0.767	

ASD	LRFD	
$\Omega_c = 1.67$	$\phi_c = 0.90$	[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly. Note: Heavy line indicates L_c/r_z equal to or greater than 200.

Menu



L5

Table 4-11 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Concentrically Loaded Single Angles

Shape		L5×5×											
		7/8		3/4		5/8		1/2		7/16		3/8[c]	
lb/ft		27.2		23.6		20.0		16.2		14.3		12.3	
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, L_c (ft), with respect to least radius of gyration, r_z	0	172	259	150	226	127	191	103	155	91.0	137	77.0	116
	1	171	257	149	224	126	190	102	154	90.3	136	76.5	115
	2	167	251	146	219	123	185	100	150	88.2	133	75.3	113
	3	160	241	140	210	118	178	96.2	145	84.8	127	73.1	110
	4	152	228	132	199	112	168	91.0	137	80.2	121	69.5	104
	5	141	212	123	185	104	157	84.8	127	74.8	112	64.7	97.3
	6	129	194	113	169	95.4	143	77.7	117	68.6	103	59.4	89.3
	7	116	175	102	153	86.0	129	70.1	105	61.9	93.1	53.7	80.7
	8	103	155	90.0	135	76.3	115	62.3	93.6	55.1	82.8	47.8	71.8
	9	89.9	135	78.6	118	66.7	100	54.5	81.9	48.2	72.4	41.8	62.9
	10	77.2	116	67.4	101	57.3	86.1	46.9	70.5	41.5	62.4	36.1	54.2
	11	65.1	97.8	56.9	85.5	48.4	72.7	39.7	59.6	35.2	52.9	30.6	46.0
	12	54.7	82.2	47.8	71.8	40.7	61.1	33.3	50.1	29.6	44.4	25.7	38.7
	13	46.6	70.0	40.7	61.2	34.6	52.1	28.4	42.7	25.2	37.9	21.9	32.9
	14	40.2	60.4	35.1	52.8	29.9	44.9	24.5	36.8	21.7	32.6	18.9	28.4
	15	35.0	52.6	30.6	46.0	26.0	39.1	21.3	32.1	18.9	28.4	16.5	24.7
	16	30.8	46.2	26.9	40.4	22.9	34.4	18.8	28.2	16.6	25.0	14.5	21.7
Properties													
A_g, in.^{2}		8.00		6.98		5.90		4.79		4.22		3.65	
r_z, in.		0.971		0.972		0.975		0.980		0.983		0.986	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

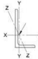
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

Menu

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

F_y = 36 ksi



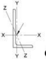
L5

Shape		L5×5×		L5×3½×									
		5/16^c		3/4		5/8		1/2		3/8^c		5/16^c	
lb/ft		10.3		19.8		16.8		13.6		10.4		8.70	
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, L_c (ft), with respect to least radius of gyration, r_z	0	57.8	86.9	126	190	106	160	86.2	130	64.9	97.5	51.0	76.7
	1	57.5	86.5	124	187	105	158	85.1	128	64.2	96.5	50.5	75.9
	2	56.7	85.1	119	179	101	151	81.7	123	62.1	93.3	48.9	73.5
	3	55.2	83.0	111	168	94.0	141	76.4	115	58.3	87.7	46.3	69.6
	4	53.2	79.9	101	152	85.5	128	69.5	104	53.1	79.9	42.9	64.5
	5	50.7	76.2	89.5	135	75.6	114	61.6	92.5	47.2	70.9	38.9	58.5
	6	47.8	71.8	77.0	116	65.1	97.8	53.1	79.8	40.7	61.2	34.3	51.6
	7	44.4	66.8	64.5	96.9	54.5	81.9	44.6	67.0	34.3	51.5	26.9	43.5
	8	40.3	60.6	52.5	78.9	44.4	66.8	36.4	54.7	28.1	42.2	23.7	35.7
	9	35.4	53.2	41.7	62.7	35.4	53.1	29.0	43.6	22.4	33.7	19.0	28.5
	10	30.5	45.9	33.8	50.8	28.6	43.0	23.5	35.3	18.1	27.3	15.4	23.1
	11	26.0	39.0	27.9	42.0	23.7	35.6	19.4	29.2	15.0	22.5	12.7	19.1
	12	21.8	32.8	23.5	35.3	19.9	29.9	16.3	24.5	12.6	18.9	10.7	16.0
	13	18.6	27.9										
	14	16.0	24.1										
	15	14.0	21.0										
	16	12.3	18.4										
Properties													
A_g, in.²		3.07		5.85		4.93		4.00		3.05		2.56	
r_z, in.		0.990		0.744		0.746		0.750		0.755		0.758	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

^c Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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



L5

Table 4-11 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Concentrically Loaded Single Angles

Shape		L5×3½×		L5×3×									
		¼[c]		½		7/16		⅜[c]		5/16[c]		¼[c]	
lb/ft		7.00		12.8		11.3		9.80		8.20		6.60	
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, L_c (ft), with respect to least radius of gyration, r_z	0	37.0	55.6	80.8	122	71.4	107	60.8	91.4	47.8	71.8	35.1	52.8
	1	36.7	55.1	79.4	119	70.1	105	59.9	90.0	47.1	70.8	34.6	52.0
	2	35.7	53.7	75.1	113	66.3	99.7	57.3	86.0	45.1	67.8	33.2	49.9
	3	34.2	51.4	68.5	103	60.5	91.0	52.4	78.7	41.9	63.0	30.9	46.5
	4	32.0	48.1	60.2	90.5	53.3	80.0	46.1	69.3	37.9	56.9	28.0	42.1
	5	29.1	43.8	51.0	76.7	45.2	67.9	39.1	58.8	33.1	49.8	24.6	37.0
	6	25.9	38.9	41.7	62.7	37.0	55.5	32.1	48.2	27.2	40.8	21.0	31.6
	7	22.5	33.8	32.8	49.3	29.1	43.8	25.3	38.0	21.5	32.3	17.4	26.1
	8	19.1	28.7	25.2	37.9	22.4	33.7	19.5	29.3	16.6	24.9	13.5	20.2
	9	15.4	23.2	19.9	29.9	17.7	26.6	15.4	23.1	13.1	19.7	10.6	16.0
	10	12.5	18.8	16.1	24.2	14.3	21.5	12.5	18.7	10.6	15.9	8.61	12.9
	11	10.3	15.5										
	12	8.69	13.1										

Properties

	L5×3½×¼	L5×3×½	L5×3×7/16	L5×3×⅜	L5×3×5/16	L5×3×¼
A_g, in.^{2}	2.07	3.75	3.31	2.86	2.41	1.94
r_z, in.	0.761	0.642	0.644	0.646	0.649	0.652

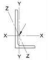
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

F_y = 36 ksi

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

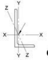


L4

Shape		L4×4×											
		3/4		5/8		1/2		7/16		3/8		5/16	
lb/ft		18.5		15.7		12.8		11.3		9.80		8.20	
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, L_c (ft), with respect to least radius of gyration, r_z	0	117	176	99.4	149	80.8	122	71.1	107	61.7	92.7	51.6	77.5
	1	116	174	98.1	147	79.8	120	70.3	106	60.9	91.5	50.9	76.6
	2	111	168	94.5	142	76.9	116	67.7	102	58.6	88.1	49.1	73.8
	3	105	157	88.7	133	72.2	108	63.5	95.5	55.1	82.8	46.1	69.3
	4	95.8	144	81.2	122	66.1	99.3	58.2	87.5	50.5	75.9	42.3	63.6
	5	85.5	128	72.4	109	59.0	88.7	52.0	78.1	45.1	67.8	37.8	56.9
	6	74.4	112	63.0	94.7	51.4	77.2	45.3	68.0	39.3	59.1	33.0	49.6
	7	63.1	94.8	53.5	80.3	43.6	65.6	38.4	57.8	33.4	50.2	28.1	42.2
	8	52.2	78.4	44.2	66.5	36.1	54.3	31.8	47.9	27.7	41.7	23.3	35.1
	9	42.0	63.1	35.6	53.5	29.1	43.7	25.7	38.6	22.4	33.6	18.9	28.4
	10	34.0	51.1	28.8	43.3	23.6	35.4	20.8	31.3	18.1	27.2	15.3	23.0
	11	28.1	42.3	23.8	35.8	19.5	29.3	17.2	25.8	15.0	22.5	12.6	19.0
	12	23.6	35.5	20.0	30.1	16.4	24.6	14.4	21.7	12.6	18.9	10.6	15.9
	13											9.04	13.6
Properties													
A_g, in.^{2}		5.44		4.61		3.75		3.30		2.86		2.40	
r_z, in.		0.774		0.774		0.776		0.777		0.779		0.781	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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



L4

Table 4-11 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

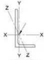
Concentrically Loaded Single Angles

Shape		L4×4×		L4×3½×								L4×3×	
		¼[c]		½		3/8		5/16		¼[c]		5/8	
lb/ft		6.60		11.9		9.10		7.70		6.20		13.6	
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, L_c (ft), with respect to least radius of gyration, r_z	0	36.3	54.5	75.4	113	57.8	86.8	48.4	72.7	35.6	53.6	86.0	129
	1	36.0	54.1	74.3	112	56.9	85.6	47.7	71.6	35.3	53.0	84.4	127
	2	35.1	52.8	71.1	107	54.5	81.9	45.6	68.6	34.3	51.5	79.7	120
	3	33.7	50.6	66.0	99.3	50.6	76.1	42.4	63.8	32.6	48.9	72.5	109
	4	31.7	47.7	59.6	89.5	45.7	68.7	38.3	57.6	30.1	45.3	63.4	95.3
	5	29.4	44.1	52.1	78.4	40.0	60.2	33.6	50.5	27.0	40.5	53.4	80.3
	6	26.6	40.0	44.3	66.6	34.1	51.2	28.7	43.1	23.3	35.0	43.3	65.1
	7	22.7	34.1	36.6	54.9	28.2	42.3	23.7	35.6	19.3	29.0	33.8	50.9
	8	18.9	28.3	29.3	44.0	22.6	34.0	19.1	28.7	15.5	23.3	25.9	38.9
	9	15.2	22.9	23.1	34.8	17.9	26.8	15.1	22.7	12.3	18.4	20.5	30.8
	10	12.4	18.6	18.7	28.1	14.5	21.7	12.2	18.3	9.93	14.9	16.6	24.9
	11	10.2	15.3	15.5	23.3	12.0	18.0	10.1	15.2	8.21	12.3		
	12	8.58	12.9					8.48	12.7	6.90	10.4		
	13	7.31	11.0										
Properties													
A_g, in.²		1.93		3.50		2.68		2.25		1.82		3.99	
r_z, in.		0.783		0.716		0.719		0.721		0.723		0.631	

ASD	LRFD	
$\Omega_c = 1.67$	$\phi_c = 0.90$	[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly. Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles



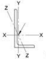
L4–L3½

Shape		L4×3×								L3½×3½×			
		½		⅜		5/16		¼[c]		½		7/16	
lb/ft		11.1		8.50		7.20		5.80		11.1		9.80	
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, L_c (ft), with respect to least radius of gyration, r_z	0	70.1	105	53.7	80.7	44.9	67.5	33.8	50.8	70.1	105	62.3	93.6
	1	68.7	103	52.7	79.2	44.1	66.3	33.3	50.0	68.9	104	61.3	92.1
	2	65.0	97.6	49.8	74.8	41.7	62.7	31.8	47.8	65.6	98.6	58.4	87.7
	3	59.1	88.8	45.3	68.2	38.0	57.1	29.4	44.2	60.4	90.8	53.8	80.8
	4	51.8	77.8	39.8	59.8	33.4	50.2	26.4	39.7	53.9	80.9	48.0	72.1
	5	43.7	65.6	33.6	50.5	28.2	42.4	22.9	34.4	46.4	69.8	41.4	62.2
	6	35.5	53.3	27.3	41.1	23.0	34.6	18.7	28.1	38.8	58.3	34.6	52.0
	7	27.7	41.7	21.4	32.2	18.1	27.2	14.7	22.0	31.3	47.0	28.0	42.0
	8	21.2	31.9	16.4	24.7	13.9	20.9	11.3	16.9	24.4	36.7	21.9	32.9
	9	16.8	25.2	13.0	19.5	11.0	16.5	8.89	13.4	19.3	29.0	17.3	26.0
	10	13.6	20.4	10.5	15.8	8.88	13.3	7.20	10.8	15.6	23.5	14.0	21.0
	11									12.9	19.4	11.6	17.4

Properties						
A_g, in.²	3.25	2.49	2.09	1.69	3.25	2.89
r_z, in.	0.633	0.636	0.638	0.639	0.679	0.681

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.



L3½

Table 4-11 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Concentrically Loaded Single Angles

Shape		L3½×3½×						L3½×3×					
		3/8		5/16		1/4[c]		1/2		7/16		3/8	
lb/ft		8.50		7.20		5.80		10.2		9.10		7.90	
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, L_c (ft), with respect to least radius of gyration, r_z	0	53.9	81.0	45.3	68.0	34.8	52.3	65.1	97.8	57.6	86.5	50.0	75.2
	1	53.0	79.7	44.5	66.9	34.4	51.7	63.8	95.9	56.4	84.8	49.0	73.7
	2	50.5	75.9	42.4	63.8	33.3	50.0	60.1	90.4	53.2	79.9	46.2	69.5
	3	46.6	70.0	39.1	58.8	31.4	47.2	54.5	81.8	48.2	72.4	41.9	63.0
	4	41.6	62.5	35.0	52.5	28.4	42.6	47.4	71.2	42.0	63.1	36.6	54.9
	5	35.9	54.0	30.2	45.4	24.6	36.9	39.6	59.6	35.2	52.8	30.6	46.1
	6	30.0	45.1	25.3	38.0	20.6	30.9	31.9	47.9	28.3	42.5	24.7	37.1
	7	24.3	36.5	20.5	30.8	16.7	25.1	24.6	36.9	21.9	32.9	19.1	28.7
	8	19.0	28.6	16.1	24.2	13.1	19.7	18.8	28.3	16.7	25.2	14.6	22.0
	9	15.0	22.6	12.7	19.1	10.4	15.6	14.9	22.3	13.2	19.9	11.6	17.4
	10	12.2	18.3	10.3	15.5	8.40	12.6	12.0	18.1	10.7	16.1	9.37	14.1
	11	10.1	15.1	8.50	12.8	6.94	10.4						
Properties													
A_g, in.²		2.50		2.10		1.70		3.02		2.67		2.32	
r_z, in.		0.683		0.685		0.688		0.618		0.620		0.622	

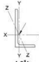
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

F_y = 36 ksi



L3½

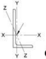
Shape		L3½×3×				L3½×2½×							
		5/16		1/4[c]		1/2		3/8		5/16		1/4[c]	
lb/ft		6.60		5.40		9.40		7.20		6.10		4.90	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	42.0	63.2	33.1	49.8	59.7	89.7	45.7	68.7	38.6	58.0	30.3	45.6
	1	41.2	62.0	32.6	49.0	58.1	87.4	44.5	66.9	37.6	56.5	29.7	44.6
	2	38.9	58.4	31.0	46.7	53.6	80.6	41.1	61.8	34.7	52.2	27.8	41.8
	3	35.3	53.0	28.6	43.0	46.9	70.5	36.0	54.1	30.5	45.8	24.8	37.2
	4	30.8	46.3	25.0	37.6	38.9	58.5	29.9	45.0	25.4	38.1	20.7	31.0
	5	25.8	38.8	21.1	31.7	30.6	45.9	23.6	35.4	20.0	30.1	16.4	24.6
	6	20.9	31.3	17.0	25.6	22.7	34.2	17.6	26.4	15.0	22.6	12.3	18.5
	7	16.2	24.3	13.3	20.0	16.7	25.1	12.9	19.4	11.0	16.6	9.04	13.6
	8	12.4	18.6	10.2	15.3	12.8	19.2	9.90	14.9	8.45	12.7	6.92	10.4
	9	9.78	14.7	8.03	12.1							5.47	8.22
	10	7.93	11.9	6.50	9.78								
Properties													
A_g, in.²		1.95		1.58		2.77		2.12		1.79		1.45	
r_z, in.		0.624		0.628		0.532		0.535		0.538		0.541	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

Menu



L3

Table 4-11 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Concentrically Loaded Single Angles

Shape		L3×3×											
		1/2		7/16		3/8		5/16		1/4		3/16[c]	
lb/ft		9.40		8.30		7.20		6.10		4.90		3.71	
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, L_c (ft), with respect to least radius of gyration, r_z	0	59.5	89.4	52.4	78.7	45.5	68.4	38.4	57.7	31.0	46.7	20.5	30.8
	1	58.2	87.4	51.2	77.0	44.5	66.8	37.5	56.4	30.4	45.6	20.2	30.4
	2	54.4	81.7	47.9	71.9	41.6	62.5	35.1	52.7	28.4	42.7	19.3	29.0
	3	48.6	73.0	42.8	64.3	37.2	55.9	31.4	47.2	25.4	38.2	17.9	26.9
	4	41.5	62.4	36.5	54.9	31.8	47.7	26.9	40.4	21.8	32.7	16.1	24.2
	5	33.9	50.9	29.8	44.8	25.9	39.0	22.0	33.0	17.8	26.8	13.5	20.3
	6	26.4	39.7	23.3	35.0	20.3	30.5	17.2	25.8	14.0	21.0	10.6	16.0
	7	19.8	29.7	17.4	26.2	15.2	22.8	12.9	19.4	10.5	15.8	7.97	12.0
	8	15.1	22.8	13.3	20.0	11.6	17.5	9.87	14.8	8.04	12.1	6.10	9.18
	9	12.0	18.0	10.5	15.8	9.18	13.8	7.80	11.7	6.35	9.54	4.82	7.25
Properties													
A_g, in.^{2}		2.76		2.43		2.11		1.78		1.44		1.09	
r_z, in.		0.580		0.580		0.581		0.583		0.585		0.586	

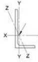
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

F_y = 36 ksi

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles



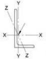
L3

Shape		L3×2½×											
		½		7/16		3/8		5/16		¼		3/16[c]	
lb/ft		8.50		7.60		6.60		5.60		4.50		3.39	
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, L_c (ft), with respect to least radius of gyration, r_z	0	53.9	81.0	47.9	71.9	41.6	62.5	35.1	52.8	28.5	42.8	19.8	29.8
	1	52.4	78.7	46.5	69.9	40.4	60.8	34.2	51.3	27.7	41.6	19.5	29.2
	2	48.1	72.3	42.7	64.2	37.1	55.8	31.4	47.2	25.4	38.2	18.3	27.5
	3	41.7	62.7	37.0	55.7	32.2	48.4	27.2	41.0	22.1	33.2	16.3	24.4
	4	34.2	51.4	30.3	45.6	26.4	39.7	22.4	33.6	18.2	27.3	13.8	20.7
	5	26.4	39.8	23.5	35.3	20.5	30.8	17.3	26.1	14.1	21.2	10.7	16.1
	6	19.3	29.0	17.1	25.8	15.0	22.5	12.7	19.1	10.3	15.6	7.87	11.8
	7	14.2	21.3	12.6	18.9	11.0	16.5	9.32	14.0	7.60	11.4	5.78	8.69
	8	10.9	16.3	9.64	14.5	8.41	12.6	7.13	10.7	5.82	8.75	4.43	6.65
Properties													
A_g, in.²		2.50		2.22		1.93		1.63		1.32		1.00	
r_z, in.		0.516		0.516		0.517		0.518		0.520		0.521	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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



L3–L2½

Table 4-11 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Concentrically Loaded Single Angles

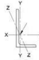
Shape		L3×2×										L2½×2½×	
		½		3/8		5/16		¼		3/16[c]		½	
lb/ft		7.70		5.90		5.00		4.10		3.07		7.70	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	48.7	73.2	37.7	56.7	31.9	48.0	25.9	38.9	18.3	27.5	48.7	73.2
	1	46.7	70.2	36.2	54.4	30.6	46.0	24.8	37.3	17.7	26.6	47.1	70.9
	2	41.2	61.9	31.9	48.0	27.0	40.6	22.0	33.0	16.0	24.1	42.7	64.2
	3	33.4	50.2	25.9	38.9	22.0	33.0	17.9	26.9	13.6	20.4	36.3	54.5
	4	24.9	37.4	19.3	29.1	16.5	24.7	13.5	20.2	10.4	15.7	28.8	43.3
	5	17.0	25.6	13.3	19.9	11.3	17.0	9.31	14.0	7.24	10.9	21.5	32.3
	6	11.8	17.8	9.21	13.8	7.86	11.8	6.46	9.71	5.03	7.56	15.2	22.8
	7	8.70	13.1	6.77	10.2	5.78	8.68	4.75	7.14	3.70	5.56	11.1	16.7
	8											8.53	12.8
Properties													
A_g, in.²		2.26		1.75		1.48		1.20		0.917		2.26	
r_z, in.		0.425		0.426		0.428		0.431		0.435		0.481	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles



L2½

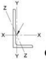
Shape		L2½×2½×								L2½×2×	
		3/8		5/16		1/4		3/16[c]		3/8	
lb/ft		5.90		5.00		4.10		3.07		5.30	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	37.3	56.1	31.5	47.3	25.7	38.6	19.0	28.5	33.4	50.2
	1	36.1	54.2	30.5	45.8	24.8	37.3	18.6	27.9	32.0	48.1
	2	32.7	49.2	27.6	41.5	22.5	33.8	17.0	25.6	28.1	42.3
	3	27.8	41.7	23.4	35.2	19.1	28.7	14.5	21.8	22.7	34.0
	4	22.1	33.2	18.6	28.0	15.2	22.9	11.5	17.3	16.7	25.2
	5	16.4	24.7	13.9	20.9	11.3	17.1	8.59	12.9	11.4	17.1
	6	11.6	17.4	9.79	14.7	8.02	12.0	6.07	9.12	7.89	11.9
	7	8.53	12.8	7.20	10.8	5.89	8.85	4.46	6.70		
	8	6.53	9.81	5.51	8.28	4.51	6.78	3.41	5.13		
Properties											
A_g, in.^{2}		1.73		1.46		1.19		0.901		1.55	
r_z, in.		0.481		0.481		0.482		0.482		0.419	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

Menu



L2½

Table 4-11 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Concentrically Loaded Single Angles

Shape		L2½×2×						L2½×1½×			
		5/16		1/4		3/16[c]		1/4		3/16[c]	
lb/ft		4.50		3.62		2.75		3.19		2.44	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	28.5	42.8	23.1	34.7	17.4	26.2	20.4	30.7	15.4	23.1
	1	27.3	41.0	22.1	33.2	16.8	25.3	19.0	28.5	14.5	21.8
	2	24.0	36.0	19.5	29.3	14.9	22.4	15.2	22.9	11.7	17.6
	3	19.3	29.0	15.8	23.7	12.1	18.2	10.5	15.8	8.15	12.2
	4	14.3	21.5	11.7	17.6	9.04	13.6	6.37	9.57	4.96	7.45
	5	9.72	14.6	7.99	12.0	6.20	9.32	4.07	6.12	3.17	4.77
	6	6.75	10.1	5.55	8.34	4.30	6.47				
	7	4.96	7.46	4.08	6.13	3.16	4.75				

Properties

	5/16	1/4	3/16	1/4	3/16
A_g, in.²	1.32	1.07	0.818	0.947	0.724
r_z, in.	0.420	0.423	0.426	0.321	0.324

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

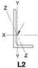
[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

Menu

F_y = 36 ksi

Table 4-11 (continued)
Available Strength in Axial Compression, kips
Concentrically Loaded Single Angles

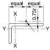


L2

Shape		L2×2×									
		3/8		5/16		1/4		3/16		1/8[c]	
lb/ft		4.70		3.92		3.19		2.44		1.65	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	29.5	44.4	25.0	37.6	20.3	30.6	15.6	23.4	9.25	13.9
	1	28.1	42.2	23.8	35.7	19.3	29.1	14.8	22.2	8.95	13.5
	2	24.1	36.2	20.4	30.7	16.6	25.0	12.7	19.1	8.08	12.1
	3	18.7	28.1	15.8	23.8	12.9	19.4	9.92	14.9	6.77	10.2
	4	13.1	19.7	11.1	16.7	9.05	13.6	6.98	10.5	4.79	7.20
	5	8.52	12.8	7.22	10.8	5.90	8.87	4.56	6.86	3.13	4.71
	6	5.92	8.90	5.01	7.53	4.10	6.16	3.17	4.76	2.18	3.27

Properties					
A_g, in.^{2}	1.37	1.16	0.944	0.722	0.491
r_z, in.	0.386	0.386	0.387	0.389	0.391

ASD	LRFD	
$\Omega_c = 1.67$	$\phi_c = 0.90$	[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly. Note: Heavy line indicates L_c/r_z equal to or greater than 200.



L12

Table 4-12 Available Strength in Axial Compression, kips

F_y = 36 ksi

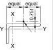
Eccentrically Loaded Single Angles

Shape		L12×12×							
		1 3/8		1 1/4		1 1/8		1	
lb/ft		105		96.4		87.2		77.8	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	355	534	343	516	328	494	311	467
	1	354	533	342	515	328	493	310	466
	2	353	530	341	513	326	491	309	464
	3	350	526	338	509	324	487	306	461
	4	346	521	334	503	320	482	303	456
	5	341	514	330	496	316	475	298	449
	6	336	505	324	488	310	467	293	442
	7	329	496	318	479	304	458	287	433
	8	322	485	310	468	297	448	281	423
	9	313	473	302	457	289	437	273	413
	10	305	461	294	444	281	425	266	401
	11	296	447	285	431	273	412	257	389
	12	286	433	276	417	263	399	249	376
	13	276	419	266	403	254	385	240	363
	14	266	404	256	388	245	371	230	349
	15	256	389	246	373	235	357	221	336
	16	246	373	236	359	225	342	212	322
	17	235	358	226	344	215	328	203	308
	18	225	343	216	329	206	314	193	295
	19	215	328	206	314	196	299	184	281
	20	205	313	197	300	187	286	175	268
	21	196	299	187	286	178	272	167	255
	22	186	285	178	272	169	259	158	242
	23	177	271	169	259	161	246	150	230
	24	168	258	161	246	153	233	142	218
	25	160	245	152	233	145	221	135	206
	26	151	232	144	221	137	210	127	195
	27	143	220	136	209	129	198	120	184
	28	136	208	129	198	122	187	114	174
Properties									
A_g, in.^{2}		31.1		28.4		25.8		23.0	
r_z, in.		2.30		2.31		2.33		2.34	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles

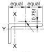


L10

Shape		L10×10×											
		1³/₈		1¹/₄		1¹/₈		1		⁷/₈		³/₄ᶜ	
lb/ft		87.1		79.9		72.3		64.7		56.9		49.1	
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, L_c (ft), with respect to least radius of gyration, r_z	0	262	393	254	383	247	371	234	352	223	336	187	282
	1	261	393	254	382	246	370	233	351	223	335	187	282
	2	259	390	252	379	245	368	232	349	221	333	187	281
	3	257	386	249	375	242	364	229	345	219	329	187	281
	4	253	380	246	370	238	358	225	339	215	324	186	280
	5	248	373	241	363	233	351	221	333	211	317	185	278
	6	242	365	235	354	228	343	215	325	205	310	184	277
	7	236	356	229	345	221	334	209	316	199	301	181	272
	8	229	345	221	335	214	324	202	306	193	291	176	265
	9	221	334	214	323	207	312	195	295	186	281	172	258
	10	213	322	206	311	199	301	187	284	178	270	165	250
	11	204	310	197	299	190	288	179	272	170	258	158	239
	12	196	297	189	286	182	276	171	260	162	246	150	228
	13	187	284	180	274	173	263	163	247	154	234	143	217
	14	178	271	171	261	165	250	154	235	146	223	135	206
	15	170	258	163	248	156	238	146	223	138	211	128	195
	16	161	245	154	235	148	225	138	211	130	199	121	184
	17	152	233	146	222	140	213	130	199	123	188	113	173
	18	144	220	138	210	132	201	123	188	115	176	107	163
	19	136	208	130	198	124	189	115	177	108	166	100	153
	20	128	196	122	187	116	178	108	166	101	155	94.1	143
	21	121	185	115	176	109	167	102	156	95.4	146	88.0	134
	22	113	174	108	165	102	157	95.4	145	89.1	136	82.2	125
	23	107	163	101	155	96.4	147	89.3	136	83.2	127	76.7	117
	24	100	154	95.4	145	90.5	138	83.7	128	77.9	119	71.7	109
	25	95.1	145	89.8	137	85.1	130	78.6	120	73.1	111	67.1	102
	26	89.8	137	84.8	129	80.2	122	74.0	113	68.7	105	63.0	96.4
	27	84.9	130	80.1	122	75.7	115	69.8	106	64.7	99.0	59.2	90.7
	28	80.5	123	75.8	116	71.6	109	65.9	100	61.0	93.3	55.8	85.4
Properties													
A_g, in.²		25.6		23.4		21.3		19.0		16.8		14.5	
r_z, in.		1.91		1.91		1.92		1.92		1.93		1.96	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

ᶜ Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.



L8

Table 4-12 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Eccentrically Loaded Single Angles

Shape		L8×8×											
		1¹/₈		1		⁷/₈		³/₄		⁵/₈		⁹/₁₆ᶜ	
lb/ft		56.9		51.0		45.0		38.9		32.7		29.6	
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, L_c (ft), with respect to least radius of gyration, r_z	0	174	262	167	251	160	240	150	225	127	192	108	163
	1	173	261	167	251	159	239	149	225	127	191	108	163
	2	172	258	165	248	157	237	148	222	127	191	108	162
	3	169	254	162	244	155	233	145	219	126	189	107	161
	4	165	249	158	239	151	228	142	213	125	188	107	160
	5	160	242	154	232	147	221	137	207	124	186	105	159
	6	155	234	148	224	141	213	132	200	121	181	103	154
	7	149	225	142	215	135	205	127	191	116	175	100	150
	8	142	216	136	206	129	196	120	182	110	167	97.4	146
	9	135	205	129	196	122	186	114	173	104	158	94.2	141
	10	128	195	122	186	116	176	108	163	98.3	149	90.7	135
	11	121	184	115	175	109	166	101	154	92.1	140	86.1	129
	12	114	174	108	165	102	155	94.8	144	86.0	130	80.3	122
	13	107	163	101	154	95.6	145	88.3	134	80.0	121	74.6	113
	14	100	153	94.9	144	89.1	136	82.1	125	74.1	113	69.1	105
	15	93.7	143	88.4	134	82.8	126	76.1	116	68.6	104	63.8	97.5
	16	87.3	133	82.1	125	76.8	117	70.4	107	63.3	96.8	58.8	90.0
	17	81.1	123	76.1	116	71.1	108	64.9	99.4	58.3	89.2	54.1	82.8
	18	75.1	114	70.3	107	65.5	100	59.7	91.4	53.5	81.9	49.6	75.9
	19	69.6	106	65.1	99.6	60.5	92.6	55.0	84.2	49.1	75.2	45.5	69.6
	20	64.7	99.0	60.4	92.4	56.0	85.8	50.8	77.8	45.3	69.3	41.9	64.1
	21	60.2	92.2	56.2	85.9	52.0	79.6	47.1	72.0	41.9	64.1	38.7	59.2
	22	56.2	86.1	52.3	80.1	48.4	74.1	43.7	66.9	38.8	59.4	35.8	54.8
	23	52.6	80.5	48.9	74.8	45.1	69.1	40.7	62.3	36.1	55.2	33.2	50.9
	24	49.3	75.5	45.8	70.1	42.2	64.6	38.0	58.1	33.6	51.4	30.9	47.4
	25	46.3	70.9	42.9	65.7	39.5	60.5	35.5	54.4	31.4	48.0	28.9	44.2
	26	43.6	66.7	40.3	61.8	37.1	56.8	33.3	50.9	29.4	44.9	27.0	41.3
Properties													
A_g, in.²		16.8		15.1		13.3		11.5		9.69		8.77	
r_z, in.		1.56		1.56		1.57		1.57		1.58		1.58	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

ᶜ Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles

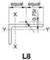
F_y = 36 ksi

L8

Shape	L8×8×		L8×6×									
	1/2[c,f]		1		7/8		3/4		5/8		9/16[c]	
lb/ft	26.4		44.2		39.1		33.8		28.5		25.7	
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, L_c (ft), with respect to least radius of gyration, r_z												
0	89.1	134	160	240	159	239	157	237	154	232	153	230
1	89.1	133	159	239	158	238	157	236	153	230	151	228
2	88.8	133	157	237	156	235	154	232	149	225	146	220
3	88.4	132	154	233	153	231	150	227	143	216	139	210
4	87.8	131	150	227	148	224	145	219	135	205	130	198
5	87.0	130	145	220	139	210	135	205	127	194	121	185
6	84.7	127	134	204	128	195	125	190	119	182	112	172
7	82.3	123	123	188	118	180	114	174	109	167	104	160
8	79.8	119	113	173	108	165	104	159	98.3	150	94.5	145
9	77.3	115	104	159	98.9	151	94.1	144	88.1	135	84.3	129
10	74.9	112	95.1	145	89.8	137	85.0	130	78.9	121	75.1	115
11	72.5	108	86.6	132	81.4	125	76.6	118	70.6	108	67.0	103
12	70.1	104	78.7	121	73.7	113	69.0	106	63.2	97.6	59.8	92.5
13	67.1	99.8	71.5	110	66.6	102	62.2	96.0	56.6	87.5	53.4	82.7
14	63.9	94.6	64.8	99.8	60.2	92.8	56.0	86.5	50.7	78.5	47.8	74.0
15	59.3	89.2	58.7	90.4	54.3	83.8	50.4	77.8	45.4	70.3	42.7	66.2
16	54.6	83.6	53.3	82.1	49.2	75.9	45.5	70.3	40.8	63.2	38.4	59.5
17	50.2	76.8	48.7	75.0	44.8	69.1	41.3	63.8	36.9	57.2	34.7	53.7
18	46.0	70.4	44.6	68.7	41.0	63.1	37.6	58.1	33.6	52.0	31.5	48.7
19	42.1	64.5	41.0	63.1	37.6	57.9	34.5	53.2	30.7	47.4	28.7	44.4
20	38.7	59.3	37.8	58.2	34.6	53.3	31.7	48.9	28.1	43.5	26.3	40.7
21	35.7	54.7	35.0	53.9	32.0	49.3	29.2	45.1	25.9	40.0	24.2	37.4
22	33.1	50.6										
23	30.7	46.9										
24	28.5	43.6										
25	26.6	40.7										
26	24.9	38.0										
Properties												
A_g, in.^{2}	7.84		13.1		11.5		9.99		8.41		7.61	
r_z, in.	1.59		1.28		1.28		1.29		1.29		1.30	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.



L8

Table 4-12 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Eccentrically Loaded Single Angles

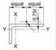
Shape	L8×6×				L8×4×							
	1/2[c,f]		7/16[c,f]		1		7/8		3/4		5/8	
lb/ft	23.0		20.2		37.4		33.1		28.7		24.2	
Design	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z: 0	125	188	91.8	138	67.8	102	65.9	99.0	64.0	96.2	62.2	93.5
1	125	187	91.9	138	67.2	101	65.2	98.1	63.4	95.3	61.5	92.6
2	124	186	91.9	138	65.4	98.5	63.3	95.3	61.6	92.8	59.6	89.8
3	124	186	91.2	136	62.6	94.4	60.5	91.2	58.8	88.7	56.5	85.3
4	125	186	90.7	135	59.0	89.2	57.0	86.2	55.1	83.3	52.6	79.7
5	118	179	90.7	135	55.1	83.5	53.0	80.3	50.9	77.2	48.3	73.3
6	108	166	92.1	135	50.9	77.3	48.7	73.9	46.5	70.7	43.7	66.6
7	99.4	152	92.7	141	46.6	70.9	44.3	67.4	42.0	64.1	39.2	59.9
8	89.5	137	84.2	130	42.2	64.4	40.0	61.0	37.7	57.6	34.9	53.4
9	79.9	123	75.0	115	38.0	58.1	35.8	54.7	33.6	51.4	30.9	47.4
10	71.2	110	66.5	103	34.0	52.0	31.8	48.7	29.7	45.5	27.2	41.7
11	63.2	97.9	59.1	91.8	30.4	46.5	28.4	43.5	26.4	40.4	24.0	36.8
12	56.2	85.1	52.6	81.8	27.4	41.9	25.4	39.0	23.5	36.1	21.3	32.7
13	50.0	77.6	46.8	72.9	24.7	37.8	22.9	35.1	21.1	32.3	19.0	29.2
14	44.6	69.3	41.6	64.8	22.4	34.3	20.7	31.7	19.0	29.2	17.1	26.2
15	39.8	61.8	37.0	57.7								
16	35.7	55.4	33.1	51.6								
17	32.2	49.9	29.8	46.4								
18	29.1	45.2	27.0	42.0								
19	26.5	41.2	24.5	38.1								
20	24.3	37.6	22.4	34.8								
21	22.3	34.6	20.5	31.9								
Properties												
A_g, in.^{2}	6.80		5.99		11.1		9.79		8.49		7.16	
r_z, in.	1.30		1.31		0.844		0.846		0.850		0.856	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles

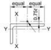


L8–L7

Shape	L8×4×						L7×4×					
	9/16[c]		1/2[c,f]		7/16[c,f]		3/4		5/8		1/2[c]	
lb/ft	21.9		19.6		17.2		26.2		22.1		17.9	
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, L_c (ft), with respect to least radius of gyration, r_z: 0	60.0	90.2	57.8	87.0	55.5	83.4	65.1	97.9	62.5	94.0	59.5	89.4
1	59.4	89.3	57.2	86.0	54.8	82.5	64.4	96.8	61.8	93.0	58.8	88.4
2	57.6	86.7	55.3	83.4	52.9	79.7	62.1	93.5	59.8	90.0	56.7	85.4
3	54.7	82.5	52.4	79.2	50.0	75.5	58.7	88.6	56.5	85.3	53.4	80.6
4	51.0	77.2	48.7	73.8	46.2	70.1	54.8	82.9	52.3	79.3	49.2	74.6
5	46.7	70.9	44.6	67.7	42.1	64.0	50.3	76.4	47.7	72.4	44.4	67.5
6	42.1	64.1	40.3	61.4	37.9	57.8	45.7	69.5	42.9	65.4	39.5	60.3
7	37.6	57.4	36.0	55.0	33.7	51.7	41.0	62.6	38.2	58.4	34.8	53.3
8	33.3	51.0	31.7	48.6	29.9	45.9	36.6	56.0	33.9	51.9	30.5	46.8
9	29.4	45.1	27.9	42.8	26.2	40.3	32.5	49.7	29.8	45.7	26.7	41.0
10	25.8	39.5	24.3	37.4	22.8	35.1	28.6	43.8	26.1	40.1	23.2	35.6
11	22.6	34.8	21.3	32.7	19.9	30.6	25.3	38.8	22.9	35.2	20.2	31.1
12	20.0	30.8	18.8	28.9	17.5	26.9	22.5	34.5	20.3	31.2	17.8	27.4
13	17.9	27.5	16.7	25.7	15.5	23.8	20.1	30.8	18.0	27.7	15.7	24.2
14	16.0	24.6	14.9	23.0	13.8	21.3	18.0	27.7	16.2	24.9	14.0	21.6
Properties												
A_g, in.^{2}	6.49		5.80		5.11		7.74		6.50		5.26	
r_z, in.	0.859		0.863		0.867		0.855		0.860		0.866	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.



L7–L6

Table 4-12 (continued) Available Strength in Axial Compression, kips

F_y = 36 ksi

Eccentrically Loaded Single Angles

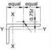
Shape		L7×4×				L6×6×							
		7/16[c,f]		3/8[c,f]		1		7/8		3/4		5/8	
lb/ft		15.7		13.6		37.4		33.1		28.7		24.2	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	56.9	85.5	54.0	81.2	101	152	99.2	149	94.0	141	87.8	132
	1	56.1	84.5	53.3	80.1	100	151	98.6	148	93.4	140	87.3	131
	2	54.0	81.4	51.1	77.0	99.3	149	97.0	145	91.7	138	85.7	128
	3	50.7	76.6	47.7	72.2	96.7	145	94.2	141	89.1	134	83.1	125
	4	46.6	70.6	43.6	66.1	93.1	140	90.6	136	85.5	128	79.6	120
	5	42.0	64.0	39.1	59.5	88.9	134	86.3	130	81.3	122	75.5	114
	6	37.4	57.2	34.6	52.9	84.1	127	81.4	123	76.5	115	70.8	107
	7	33.0	50.5	30.4	46.6	79.0	119	76.2	115	71.4	108	65.9	99.0
	8	28.7	44.1	26.5	40.9	73.7	111	70.8	107	66.1	100	60.8	92.3
	9	24.9	38.4	23.1	35.6	68.3	103	65.4	99.5	60.8	92.6	55.7	84.8
	10	21.6	33.2	19.9	30.7	63.0	95.9	60.1	91.5	55.7	84.9	50.8	77.4
	11	18.7	28.9	17.2	26.5	57.8	88.2	54.9	83.8	50.7	77.4	46.0	70.3
	12	16.4	25.3	15.0	23.1	52.8	80.7	50.0	76.4	46.0	70.3	41.6	63.6
	13	14.5	22.4	13.2	20.4	48.1	73.5	45.3	69.3	41.6	63.6	37.4	57.2
	14	12.9	19.9	11.7	18.1	43.6	66.7	40.9	62.6	37.4	57.2	33.5	51.3
	15					39.7	60.7	37.1	56.8	33.8	51.8	30.2	46.2
	16					36.2	55.5	33.8	51.8	30.7	47.0	27.3	41.8
	17					33.2	50.9	30.9	47.3	28.0	42.9	24.8	38.0
	18					30.5	46.8	28.4	43.4	25.6	39.3	22.7	34.7
	19					28.2	43.2	26.1	40.0	23.5	36.1	20.8	31.8
Properties													
A_g, in.^{2}		4.63		4.00		11.0		9.75		8.46		7.13	
r_z, in.		0.869		0.873		1.17		1.17		1.17		1.17	

ASD	LRFD
Ω_c = 1.67	ϕ_c = 0.90

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles

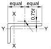


L6

Shape		L6×6×										L6×4×	
		9/16		1/2		7/16[c]		3/8[c,f]		5/16[c,f]		7/8	
lb/ft		21.9		19.6		17.2		14.9		12.4		27.2	
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, L_c (ft), with respect to least radius of gyration, r_z	0	83.3	125	77.9	117	64.6	97.2	49.6	74.5	34.6	52.1	72.1	108
	1	82.8	124	77.7	116	64.5	97.0	49.5	74.4	34.6	52.0	71.1	107
	2	81.3	122	77.3	116	64.3	96.6	49.2	74.0	34.4	51.7	68.4	103
	3	78.8	118	75.2	113	63.8	95.9	48.8	73.4	34.0	51.2	64.3	97.1
	4	75.5	113	72.0	108	62.8	94.3	48.0	72.1	33.6	50.5	59.3	89.8
	5	71.5	108	68.1	102	60.6	90.9	46.1	69.3	33.0	49.7	53.9	81.9
	6	67.1	101	63.8	96.5	58.0	86.8	44.3	66.5	32.4	48.6	48.6	73.9
	7	62.3	94.5	59.2	89.8	54.4	82.4	42.5	63.7	31.2	46.8	43.5	66.4
	8	57.5	87.3	54.5	82.8	49.9	75.8	40.6	60.8	29.7	44.5	38.7	59.2
	9	52.6	80.1	49.8	75.7	45.5	69.3	38.8	58.0	28.2	42.2	34.2	52.4
	10	47.9	73.0	45.2	68.9	41.2	62.9	36.5	54.3	26.6	39.9	30.0	46.1
	11	43.4	66.2	40.8	62.3	37.2	56.8	34.1	50.3	25.1	37.5	26.5	40.6
	12	39.1	59.8	36.7	56.2	33.3	51.0	30.6	46.3	23.5	35.1	23.5	36.1
	13	35.1	53.8	32.9	50.4	29.8	45.6	27.3	41.9	21.5	32.0	21.0	32.2
	14	31.4	48.2	29.4	44.9	26.5	40.7	24.3	37.2	19.3	28.6	18.8	28.9
	15	28.3	43.3	26.3	40.3	23.8	36.4	21.7	33.2	17.3	25.7		
	16	25.6	39.1	23.7	36.4	21.4	32.8	19.5	29.8	15.5	23.1		
	17	23.2	35.5	21.5	32.9	19.4	29.6	17.6	26.9	14.0	20.9		
	18	21.2	32.4	19.6	30.0	17.6	26.9	15.9	24.4	12.7	18.9		
	19	19.4	29.7	17.9	27.4	16.0	24.6	14.5	22.2	11.6	17.2		
Properties													
A_g, in.^{2}		6.45		5.77		5.08		4.38		3.67		8.00	
r_z, in.		1.18		1.18		1.18		1.19		1.19		0.854	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.



L6

Table 4-12 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Eccentrically Loaded Single Angles

Shape		L6×4×									
		3/4		5/8		9/16		1/2		7/16[c]	
lb/ft		23.6		20.0		18.1		16.2		14.3	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	70.4	105	67.6	101	66.5	99.0	64.0	96.3	62.8	94.4
	1	69.4	104	66.5	100	65.3	98.2	63.1	95.0	61.9	93.1
	2	66.5	100	63.4	95.6	62.1	93.5	60.5	91.2	59.2	89.3
	3	62.1	93.8	58.8	88.9	57.9	87.5	56.2	85.0	54.9	83.1
	4	56.9	86.2	53.9	81.8	52.8	80.1	50.9	77.3	49.5	75.3
	5	51.5	78.3	48.6	73.9	47.2	71.9	45.2	68.9	43.6	66.5
	6	46.2	70.4	43.1	65.9	41.7	63.7	39.7	60.7	37.9	58.1
	7	41.0	62.7	38.0	58.2	36.5	55.9	34.6	53.0	32.7	50.3
	8	36.2	55.5	33.3	51.1	31.8	48.8	30.0	46.1	28.2	43.4
	9	31.8	48.8	29.0	44.6	27.6	42.5	25.9	39.9	24.2	37.4
	10	27.8	42.7	25.2	38.8	23.9	36.8	22.3	34.4	20.8	32.1
	11	24.4	37.5	22.0	33.8	20.7	32.0	19.3	29.8	17.9	27.7
	12	21.5	33.1	19.3	29.8	18.2	28.0	16.9	26.1	15.6	24.1
	13	19.2	29.5	17.1	26.4	16.1	24.8	14.9	23.0	13.7	21.2
	14	17.2	26.4	15.3	23.5	14.3	22.0	13.2	20.4	12.2	18.8
Properties											
A_g, in.^{2}		6.94		5.86		5.31		4.75		4.18	
r_z, in.		0.856		0.859		0.861		0.864		0.867	

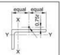
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles



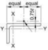
L6

Shape		L6×4×				L6×3½×					
		3/8 [c,f]		5/16 [c,f]		1/2		3/8 [c,f]		5/16 [c,f]	
lb/ft		12.3		10.3		15.3		11.7		9.80	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	59.9	90.0	55.7	83.7	47.7	71.6	44.1	66.3	41.5	62.5
	1	58.9	88.7	55.8	83.8	46.9	70.6	43.3	65.2	40.8	61.3
	2	56.2	84.8	53.2	80.3	44.7	67.5	41.1	62.1	38.5	58.1
	3	51.9	78.6	48.7	73.9	41.4	62.6	37.8	57.3	35.2	53.3
	4	46.6	70.9	43.4	66.1	37.3	56.6	33.9	51.5	31.2	47.5
	5	41.0	62.6	37.8	57.8	33.0	50.3	29.7	45.4	27.1	41.5
	6	35.6	54.6	32.5	50.0	28.8	44.1	25.7	39.4	23.3	35.8
	7	30.6	47.2	27.8	42.9	24.9	38.3	21.9	33.7	19.9	30.7
	8	26.2	40.4	23.8	36.8	21.5	33.0	18.6	28.7	17.0	26.2
	9	22.3	34.5	20.3	31.5	18.3	28.2	15.7	24.3	14.2	22.0
	10	19.1	29.5	17.2	26.8	15.8	24.3	13.4	20.7	12.1	18.7
	11	16.4	25.3	14.7	22.9	13.7	21.1	11.6	17.9	10.4	16.0
	12	14.2	22.0	12.7	19.7	12.0	18.5	10.1	15.6	9.04	13.9
	13	12.4	19.3	11.1	17.2						
	14	11.0	17.0	9.83	15.2						
Properties											
A_g, in.²		3.61		3.03		4.50		3.44		2.89	
r_z, in.		0.870		0.874		0.756		0.763		0.767	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

Menu



L5

Table 4-12 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

Eccentrically Loaded Single Angles

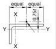
Shape		L5×5×											
		7/8		3/4		5/8		1/2		7/16		3/8[c]	
lb/ft		27.2		23.6		20.0		16.2		14.3		12.3	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	72.2	108	69.0	103	66.0	99.2	61.0	91.8	56.6	85.1	46.6	70.0
	1	71.6	107	68.5	102	65.4	98.3	60.5	91.0	56.1	84.4	46.5	69.8
	2	70.0	105	66.8	100	63.7	95.9	58.9	88.6	54.6	82.2	46.2	69.4
	3	67.4	101	64.2	96.7	61.1	92.1	56.3	84.9	52.2	78.7	45.7	68.7
	4	64.0	96.6	60.7	91.7	57.7	87.1	53.0	80.1	49.1	74.1	43.8	65.7
	5	60.0	90.7	56.7	85.8	53.7	81.2	49.2	74.4	45.5	68.8	41.4	62.1
	6	55.6	84.3	52.4	79.4	49.3	74.8	45.0	68.3	41.5	63.0	38.7	58.5
	7	51.1	77.6	47.9	72.8	44.9	68.2	40.8	62.0	37.5	57.0	34.8	53.0
	8	46.6	70.9	43.4	66.1	40.5	61.6	36.6	55.7	33.5	51.1	31.1	47.4
	9	42.1	64.2	39.1	59.6	36.2	55.3	32.5	49.7	29.7	45.4	27.5	42.0
	10	37.9	57.8	35.0	53.4	32.2	49.3	28.8	44.0	26.2	40.1	24.2	37.0
	11	33.8	51.7	31.1	47.5	28.5	43.6	25.3	38.7	23.0	35.2	21.1	32.3
	12	30.1	46.1	27.6	42.2	25.1	38.5	22.2	34.0	20.1	30.8	18.4	28.2
	13	27.0	41.3	24.6	37.7	22.3	34.2	19.6	30.0	17.7	27.2	16.1	24.7
	14	24.3	37.2	22.1	33.8	19.9	30.5	17.4	26.7	15.7	24.1	14.3	21.9
	15	22.0	33.6	19.9	30.5	17.9	27.4	15.6	23.9	14.1	21.6	12.7	19.5
	16	20.0	30.5	18.0	27.6	16.2	24.8	14.0	21.5	12.6	19.4	11.4	17.5

Properties						
A_g, in.^{2}	8.00	6.98	5.90	4.79	4.22	3.65
r_z, in.	0.971	0.972	0.975	0.980	0.983	0.986

ASD	LRFD	
$\Omega_c = 1.67$	$\phi_c = 0.90$	[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly. Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles

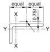


L5

Shape		L5×5×		L5×3½×										
		5/16[c,f]		3/4		5/8		1/2		3/8[c]		5/16[c,f]	
lb/ft		10.3		19.8		16.8		13.6		10.4		8.70	
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, L_c (ft), with respect to least radius of gyration, r_z	0	34.7	52.2	55.5	83.4	54.8	82.3	53.3	80.2	49.9	75.0	47.6	71.6
	1	34.6	52.0	55.0	82.8	54.2	81.5	52.0	78.3	48.9	73.6	46.6	70.2
	2	34.3	51.6	53.5	80.6	51.2	77.3	48.5	73.2	45.9	69.4	43.6	65.8
	3	33.9	51.0	49.0	74.2	46.6	70.5	43.9	66.5	41.2	62.5	38.9	59.1
	4	32.6	48.9	43.9	66.7	41.3	62.7	38.8	59.1	35.6	54.3	33.5	51.2
	5	31.0	46.5	38.7	59.0	36.3	55.3	33.7	51.4	30.2	46.2	28.2	43.4
	6	29.5	44.2	33.9	51.8	31.5	48.2	28.8	44.2	25.3	39.0	23.6	36.4
	7	27.9	41.8	29.5	45.1	27.1	41.6	24.5	37.7	21.2	32.7	19.5	30.1
	8	26.3	39.1	25.4	39.0	23.2	35.6	20.8	32.0	17.7	27.4	16.1	25.0
	9	24.2	35.8	21.8	33.5	19.7	30.4	17.5	27.0	14.8	22.9	13.4	20.7
	10	21.3	32.4	18.9	29.0	17.0	26.1	15.0	23.1	12.5	19.3	11.2	17.4
	11	18.6	28.5	16.5	25.3	14.7	22.7	12.9	19.9	10.7	16.6	9.62	14.8
	12	16.1	24.7	14.5	22.3	12.9	19.9	11.2	17.3	9.32	14.3	8.31	12.8
	13	14.1	21.7										
	14	12.5	19.1										
	15	11.1	17.0										
	16	9.97	15.2										
Properties													
A_g, in.^{2}		3.07		5.85		4.93		4.00		3.05		2.56	
r_z, in.		0.990		0.744		0.746		0.750		0.755		0.758	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.



L5

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles

$F_y = 36$ ksi

Shape		L5×3½×		L5×3×									
		¼[c,f]		½		7/16		⅜[c]		5/16[c,f]		¼[c,f]	
lb/ft		7.00		12.8		11.3		9.80		8.20		6.60	
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, L_c (ft), with respect to least radius of gyration, r_z	0	32.1	48.3	36.2	54.4	34.7	52.2	34.2	51.4	31.9	47.9	30.0	45.1
	1	32.3	48.5	35.3	53.2	34.0	51.1	33.4	50.3	31.1	46.8	29.1	43.9
	2	32.4	48.6	33.0	49.8	31.8	48.0	31.2	47.1	28.9	43.7	26.8	40.6
	3	33.1	49.1	29.9	45.3	28.6	43.4	27.8	42.2	25.7	39.0	23.5	35.8
	4	30.0	46.0	26.3	40.1	25.0	38.1	24.0	36.5	22.1	33.8	20.0	30.5
	5	25.0	38.5	22.7	34.7	21.4	32.7	20.3	31.0	18.7	28.6	16.6	25.6
	6	20.6	31.9	19.3	29.6	18.1	27.7	16.9	26.0	15.4	23.7	13.7	21.2
	7	17.0	26.5	16.3	25.0	15.1	23.2	14.0	21.6	12.7	19.6	11.3	17.5
	8	14.1	22.0	13.6	20.9	12.6	19.4	11.6	17.9	10.4	16.1	9.23	14.2
	9	11.7	18.2	11.5	17.8	10.6	16.4	9.79	15.0	8.72	13.4	7.64	11.8
	10	9.79	15.2	9.95	15.2	9.12	14.0	8.33	12.8	7.38	11.3	6.43	9.94
	11	8.31	12.9										
	12	7.14	11.0										

Properties

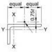
	L5×3½×¼	L5×3×½	L5×3×7/16	L5×3×⅜	L5×3×5/16	L5×3×¼
A_g, in.²	2.07	3.75	3.31	2.86	2.41	1.94
r_z, in.	0.761	0.642	0.644	0.646	0.649	0.652

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with $F_y = 36$ ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles



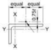
L4

Shape		L4×4×											
		3/4		5/8		1/2		7/16		3/8		5/16	
lb/ft		18.5		15.7		12.8		11.3		9.80		8.20	
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, L_c (ft), with respect to least radius of gyration, r_z	0	46.0	69.1	44.7	67.1	41.3	62.2	39.6	59.6	36.9	55.5	32.1	48.2
	1	45.4	68.3	44.1	66.3	40.8	61.4	39.1	58.8	36.4	54.8	31.9	48.0
	2	43.8	66.0	42.4	63.9	39.2	59.0	37.5	56.5	34.9	52.5	31.5	47.3
	3	41.4	62.5	39.9	60.2	36.7	55.4	35.0	52.9	32.5	49.1	29.4	44.4
	4	38.4	58.0	36.7	55.6	33.6	50.8	32.0	48.4	29.6	44.8	26.7	40.4
	5	35.0	53.0	33.2	50.4	30.2	45.8	28.6	43.4	26.4	40.1	23.7	36.0
	6	31.4	47.7	29.6	45.0	26.7	40.6	25.1	38.3	23.1	35.2	20.7	31.5
	7	27.9	42.5	26.0	39.7	23.3	35.5	21.8	33.3	20.0	30.6	17.8	27.2
	8	24.5	37.4	22.7	34.7	20.1	30.8	18.8	28.7	17.1	26.2	15.2	23.3
	9	21.3	32.5	19.6	29.9	17.2	26.4	16.0	24.5	14.5	22.2	12.8	19.6
	10	18.5	28.4	16.9	25.9	14.8	22.6	13.7	20.9	12.3	18.9	10.8	16.6
	11	16.3	24.9	14.7	22.6	12.8	19.6	11.8	18.1	10.6	16.3	9.34	14.2
	12	14.4	22.0	12.9	19.8	11.2	17.2	10.3	15.7	9.26	14.1	8.09	12.3
	13									8.12	12.4	7.07	10.8

Properties						
A_g, in.^{2}	5.44	4.61	3.75	3.30	2.86	2.40
r_z, in.	0.774	0.774	0.776	0.777	0.779	0.781

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

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



L4

Table 4-12 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

Eccentrically Loaded Single Angles

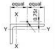
Shape		L4×4×		L4×3½×								L4×3×	
		¼[c,f]		½		⅜		5/16		¼[c,f]		⅝	
lb/ft		6.60		11.9		9.10		7.70		6.20		13.6	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	21.9	33.0	50.4	75.8	48.0	72.1	36.0	54.1	24.5	36.9	39.4	59.2
	1	21.8	32.8	49.7	74.8	48.1	72.3	36.0	54.0	24.5	36.8	38.9	58.5
	2	21.6	32.5	47.7	72.1	48.5	73.4	35.8	53.7	23.8	35.8	37.5	56.6
	3	20.8	31.2	44.5	67.8	43.7	66.6	34.8	51.8	22.8	34.2	34.6	52.5
	4	19.6	29.4	40.6	62.3	37.9	58.3	34.8	52.5	21.9	32.6	29.7	45.2
	5	18.3	27.5	34.8	53.6	32.3	49.9	29.4	45.7	21.9	31.6	25.1	38.3
	6	17.2	25.6	28.6	44.2	25.8	40.0	23.7	36.9	21.4	33.5	21.0	32.3
	7	15.5	23.0	23.5	36.4	20.8	32.3	18.8	29.4	16.8	26.3	17.5	26.9
	8	13.2	20.2	19.3	29.9	16.8	26.2	15.1	23.6	13.3	20.9	14.6	22.4
	9	11.1	16.9	16.0	24.8	13.7	21.4	12.3	19.1	10.7	16.8	12.3	18.9
	10	9.34	14.2	13.4	20.8	11.4	17.8	10.1	15.8	8.88	13.8	10.5	16.1
	11	7.97	12.1	11.5	17.7	9.72	15.0	8.59	13.3	7.45	11.6		
	12	6.87	10.5			8.33	12.9	7.34	11.3	6.34	9.88		
	13	5.99	9.15										
Properties													
A_g, in.^{2}		1.93		3.50		2.68		2.25		1.82		3.99	
r_z, in.		0.783		0.716		0.719		0.721		0.723		0.631	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with $F_y = 36$ ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles

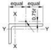


L4–L3½

Shape		L4×3×								L3½×3½×			
		1/2		3/8		5/16		1/4[c,f]		1/2		7/16	
lb/ft		11.1		8.50		7.20		5.80		11.1		9.80	
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, L_c (ft), with respect to least radius of gyration, r_z	0	39.3	59.1	38.0	57.2	37.5	56.3	31.2	46.9	33.7	50.6	32.0	48.1
	1	38.7	58.2	37.3	56.1	36.2	54.6	31.0	46.6	33.1	49.8	31.4	47.3
	2	36.9	55.8	35.0	53.0	32.9	49.8	31.0	46.7	31.4	47.4	29.8	45.0
	3	32.8	49.9	30.5	46.4	28.9	44.1	26.3	40.3	29.0	43.8	27.4	41.4
	4	27.8	42.4	25.2	38.6	23.6	36.2	21.8	33.5	26.0	39.4	24.5	37.2
	5	23.2	35.5	20.6	31.6	18.9	29.2	17.2	26.7	22.8	34.7	21.4	32.6
	6	19.2	29.5	16.7	25.7	15.1	23.4	13.5	21.0	19.7	30.1	18.4	28.1
	7	15.7	24.3	13.5	20.8	12.1	18.8	10.7	16.7	16.8	25.7	15.6	23.8
	8	12.9	19.9	10.9	16.9	9.83	15.2	8.59	13.3	14.1	21.6	13.0	20.0
	9	10.8	16.7	9.09	14.0	8.09	12.5	7.02	10.8	11.9	18.3	11.0	16.8
	10	9.21	14.1	7.65	11.8	6.78	10.4	5.85	9.07	10.2	15.6	9.39	14.3
	11									8.84	13.5	8.09	12.3
Properties													
A_g, in.^{2}		3.25		2.49		2.09		1.69		3.25		2.89	
r_z, in.		0.633		0.636		0.638		0.639		0.679		0.681	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.



L3½

Table 4-12 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Eccentrically Loaded Single Angles

Shape		L3½×3½×						L3½×3×					
		3/8		5/16		1/4[c]		1/2		7/16		3/8	
lb/ft		8.50		7.20		5.80		10.2		9.10		7.90	
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, L_c (ft), with respect to least radius of gyration, r_z	0	30.8	46.3	28.1	42.3	21.0	31.7	36.8	55.3	37.8	56.8	38.7	58.3
	1	30.2	45.5	27.6	41.5	21.0	31.5	36.2	54.6	37.1	55.8	37.9	57.1
	2	28.6	43.1	26.1	39.3	20.7	31.1	34.6	52.3	35.1	53.2	35.5	53.8
	3	26.2	39.6	23.8	36.0	19.5	29.3	32.1	48.9	32.1	49.0	31.7	48.6
	4	23.3	35.4	21.1	32.0	18.1	27.1	28.5	43.6	28.1	43.1	27.3	41.9
	5	20.3	30.8	18.3	27.8	16.1	24.5	23.2	35.6	22.5	34.6	21.4	33.1
	6	17.3	26.4	15.5	23.7	13.6	20.8	18.7	28.9	17.9	27.7	16.9	26.2
	7	14.6	22.3	13.0	19.8	11.3	17.3	15.1	23.4	14.3	22.2	13.4	20.7
	8	12.1	18.5	10.7	16.4	9.31	14.2	12.3	19.0	11.6	17.9	10.7	16.6
	9	10.1	15.5	8.95	13.7	7.70	11.7	10.2	15.7	9.56	14.7	8.80	13.6
	10	8.61	13.1	7.56	11.5	6.46	9.89	8.62	13.2	8.01	12.3	7.34	11.3
	11	7.39	11.3	6.46	9.89	5.50	8.42						
Properties													
A_g, in.^{2}		2.50		2.10		1.70		3.02		2.67		2.32	
r_z, in.		0.683		0.685		0.688		0.618		0.620		0.622	

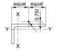
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles



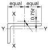
L3$^1/_2$

Shape		L3$^1/_2$×3×				L3$^1/_2$×2$^1/_2$×							
		$^5/_{16}$		$^1/_4$[c]		$^1/_2$		$^3/_8$		$^5/_{16}$		$^1/_4$[c]	
lb/ft		6.60		5.40		9.40		7.20		6.10		4.90	
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, L_c (ft), with respect to least radius of gyration, r_z	0	34.6	52.0	24.6	37.0	28.2	42.4	27.7	41.6	27.2	40.9	26.3	39.5
	1	34.8	52.2	24.6	37.0	27.7	41.7	27.0	40.7	25.9	39.1	25.2	38.0
	2	35.2	53.4	23.8	35.6	25.5	38.5	23.9	36.1	22.8	34.6	22.0	33.4
	3	30.2	46.3	23.3	34.5	21.6	32.9	20.0	30.5	18.9	28.8	17.9	27.4
	4	25.4	39.3	22.6	35.0	17.9	27.4	16.2	24.8	15.0	23.1	13.9	21.4
	5	20.0	30.9	18.2	28.3	14.6	22.4	12.9	19.9	11.8	18.2	10.7	16.6
	6	15.5	24.1	13.8	21.6	11.8	18.1	10.2	15.8	9.31	14.3	8.30	12.8
	7	12.1	18.9	10.7	16.7	9.54	14.6	8.16	12.5	7.34	11.3	6.47	10.0
	8	9.67	15.0	8.48	13.2	7.86	12.0	6.64	10.2	5.93	9.15	5.19	8.02
	9	7.87	12.2	6.86	10.6							4.25	6.57
	10	6.54	10.1	5.67	8.81								
Properties													
A_g, in.^{2}		1.95		1.58		2.77		2.12		1.79		1.45	
r_z, in.		0.624		0.628		0.532		0.535		0.538		0.541	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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



L3

Table 4-12 (continued)
Available Strength in Axial Compression, kips

$F_y = 36$ ksi

Eccentrically Loaded Single Angles

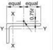
Shape	L3×3× 1/2		7/16		3/8		5/16		1/4		3/16[c,f]	
lb/ft	9.40		8.30		7.20		6.10		4.90		3.71	
Design	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD	P_n/Ω_c ASD	$\phi_c P_n$ LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z: 0	25.3	38.1	24.4	36.7	23.4	35.1	21.8	32.8	19.5	29.4	12.4	18.6
1	24.7	37.2	23.8	35.8	22.8	34.3	21.2	32.0	19.1	28.7	12.3	18.5
2	23.2	35.0	22.2	33.6	21.2	32.0	19.7	29.8	17.7	26.7	12.0	18.0
3	20.9	31.7	20.0	30.2	19.0	28.7	17.5	26.6	15.6	23.7	11.1	16.6
4	18.3	27.8	17.3	26.4	16.4	24.9	15.0	22.9	13.3	20.3	10.2	15.2
5	15.6	23.8	14.7	22.4	13.8	21.0	12.5	19.1	11.0	16.8	9.19	13.6
6	13.1	20.0	12.2	18.7	11.3	17.4	10.3	15.7	8.97	13.7	7.38	11.2
7	10.8	16.5	10.0	15.3	9.24	14.1	8.30	12.7	7.16	10.9	5.84	8.93
8	8.98	13.7	8.29	12.6	7.59	11.6	6.77	10.3	5.80	8.88	4.68	7.17
9	7.57	11.5	6.95	10.6	6.33	9.69	5.62	8.60	4.78	7.32	3.84	5.87
Properties												
A_g, in.^{2}	2.76		2.43		2.11		1.78		1.44		1.09	
r_z, in.	0.580		0.580		0.581		0.583		0.585		0.586	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with $F_y = 36$ ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with $F_y = 36$ ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles



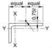
L3

Shape		L3×2½×											
		1/2		7/16		3/8		5/16		1/4		3/16[c,f]	
lb/ft		8.50		7.60		6.60		5.60		4.50		3.39	
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, L_c (ft), with respect to least radius of gyration, r_z	0	24.8	37.3	25.8	38.7	26.1	39.3	26.7	40.1	24.5	36.8	14.9	22.5
	1	24.4	36.7	25.2	38.0	25.5	38.4	25.8	39.0	24.8	37.2	14.7	22.1
	2	23.1	35.0	23.7	35.9	23.6	35.9	23.5	35.8	21.9	33.4	14.1	21.1
	3	21.3	32.5	21.4	32.8	20.8	31.8	20.0	30.7	18.1	27.8	14.3	20.7
	4	17.4	26.7	16.9	26.0	16.2	24.9	15.3	23.6	13.9	21.5	12.1	18.8
	5	13.8	21.2	13.3	20.4	12.5	19.3	11.6	17.9	10.3	16.0	8.77	13.6
	6	10.9	16.8	10.3	15.9	9.63	14.8	8.81	13.6	7.74	12.0	6.46	10.0
	7	8.71	13.4	8.20	12.6	7.54	11.6	6.82	10.5	5.94	9.21	4.90	7.64
	8	7.10	10.9	6.64	10.2	6.07	9.37	5.45	8.42	4.70	7.29	3.85	5.99
Properties													
A_g, in.^{2}		2.50		2.22		1.93		1.63		1.32		1.00	
r_z, in.		0.516		0.516		0.517		0.518		0.520		0.521	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

Menu



L3–L2½

Table 4-12 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Eccentrically Loaded Single Angles

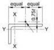
Shape	L3×2×										L2½×2½×	
	½		3/8		5/16		¼		3/16[c,f]		½	
lb/ft	7.70		5.90		5.00		4.10		3.07		7.70	
Design	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z												
0	18.3	27.6	17.7	26.7	17.0	25.6	16.3	24.6	15.4	23.2	18.2	27.4
1	17.5	26.3	16.7	25.2	15.9	24.0	15.4	23.2	14.4	21.8	17.7	26.6
2	15.3	23.2	14.3	21.7	13.5	20.5	12.9	19.6	11.9	18.2	16.2	24.5
3	12.7	19.3	11.6	17.7	10.8	16.5	10.0	15.4	9.11	13.9	14.2	21.5
4	10.2	15.6	9.10	13.9	8.37	12.8	7.60	11.6	6.68	10.3	12.0	18.2
5	8.00	12.2	6.98	10.7	6.33	9.74	5.65	8.71	4.86	7.52	9.85	15.0
6	6.31	9.68	5.41	8.31	4.86	7.47	4.28	6.60	3.62	5.60	7.90	12.0
7	5.09	7.82	4.31	6.62	3.84	5.91	3.35	5.17	2.80	4.33	6.42	9.82
8											5.31	8.12
Properties												
A_g, in.²	2.26		1.75		1.48		1.20		0.917		2.26	
r_z, in.	0.425		0.426		0.428		0.431		0.435		0.481	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles



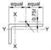
L2½

Shape		L2½×2½×								L2½×2×	
		3/8		5/16		1/4		3/16[c]		3/8	
lb/ft		5.90		5.00		4.10		3.07		5.30	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	17.0	25.6	16.1	24.2	14.8	22.3	11.6	17.5	16.9	25.4
	1	16.5	24.8	15.5	23.4	14.3	21.5	11.6	17.4	16.4	24.8
	2	14.9	22.6	14.0	21.2	12.8	19.4	11.0	16.4	15.0	22.8
	3	12.9	19.5	11.9	18.1	10.8	16.4	9.24	14.0	11.9	18.2
	4	10.6	16.2	9.80	14.9	8.78	13.3	7.37	11.2	8.99	13.8
	5	8.57	13.0	7.78	11.8	6.89	10.5	5.70	8.72	6.68	10.2
	6	6.74	10.3	6.06	9.27	5.30	8.11	4.32	6.62	5.08	7.82
	7	5.40	8.26	4.81	7.36	4.17	6.38	3.36	5.15	3.99	6.14
	8	4.41	6.75	3.90	5.97	3.36	5.14	2.69	4.11		
Properties											
A_g, in.^{2}		1.73		1.46		1.19		0.901		1.55	
r_z, in.		0.481		0.481		0.482		0.482		0.419	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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



L2½

Table 4-12 (continued)
Available Strength in Axial Compression, kips

F_y = 36 ksi

Eccentrically Loaded Single Angles

Shape		L2½×2×						L2½×1½×			
		5/16		1/4		3/16[c]		1/4		3/16[c]	
lb/ft		4.50		3.62		2.75		3.19		2.44	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	17.4	26.2	17.6	26.4	15.6	23.4	9.14	13.7	8.60	12.9
	1	16.8	25.3	16.7	25.3	15.6	23.5	8.34	12.5	7.86	11.8
	2	15.0	22.9	14.3	21.9	12.5	19.2	6.65	10.1	6.04	9.20
	3	11.5	17.7	10.7	16.5	9.57	14.7	4.88	7.47	4.27	6.56
	4	8.48	13.0	7.68	11.8	6.62	10.2	3.44	5.29	2.94	4.52
	5	6.19	9.55	5.51	8.53	4.66	7.23	2.50	3.85	2.10	3.23
	6	4.64	7.16	4.08	6.31	3.40	5.28				
	7	3.61	5.57	3.15	4.86	2.60	4.03				
Properties											
A_g, in.^{2}		1.32		1.07		0.818		0.947		0.724	
r_z, in.		0.420		0.423		0.426		0.321		0.324	

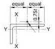
ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.

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

F_y = 36 ksi

Table 4-12 (continued)
Available Strength in Axial Compression, kips
Eccentrically Loaded Single Angles



L2

Shape		L2×2×									
		3/8		5/16		1/4		3/16		1/8[c,f]	
lb/ft		4.70		3.92		3.19		2.44		1.65	
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	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to least radius of gyration, r_z	0	11.6	17.4	11.2	16.8	10.5	15.8	9.46	14.2	5.46	8.21
	1	11.0	16.7	10.6	16.0	10.0	15.0	8.93	13.4	5.37	8.07
	2	9.70	14.6	9.23	13.9	8.57	12.9	7.57	11.4	4.86	7.29
	3	7.92	12.0	7.42	11.2	6.79	10.3	5.91	8.99	4.23	6.32
	4	6.17	9.42	5.69	8.69	5.12	7.82	4.36	6.68	3.37	4.98
	5	4.67	7.14	4.24	6.48	3.75	5.74	3.14	4.81	2.40	3.58
	6	3.61	5.53	3.25	4.97	2.84	4.35	2.35	3.59	1.76	2.63
Properties											
A_g, in.^{2}		1.37		1.16		0.944		0.722		0.491	
r_z, in.		0.386		0.386		0.387		0.389		0.391	

ASD	LRFD
$\Omega_c = 1.67$	$\phi_c = 0.90$

[c] Shape is slender for compression with F_y = 36 ksi; tabulated values have been adjusted accordingly.
[f] Shape exceeds compact limit for flexure with F_y = 36 ksi.
Note: Heavy line indicates L_c/r_z equal to or greater than 200.

Menu

Table 7-1
Available Shear Strength of Bolts, kips

Nominal Bolt Diameter, d, in.					5/8		3/4		7/8		1	
Nominal Bolt Area, in.²					0.307		0.442		0.601		0.785	
Designation	Thread Cond.	F_{nv}/Ω (ksi) ASD	ϕF_{nv} (ksi) LRFD	Loading	r_n/Ω ASD	ϕr_n LRFD	r_n/Ω ASD	ϕr_n LRFD	r_n/Ω ASD	ϕr_n LRFD	r_n/Ω ASD	ϕr_n LRFD
Group A	N	27.0	40.5	S	8.29	12.4	11.9	17.9	16.2	24.3	21.2	31.8
				D	16.6	24.9	23.9	35.8	32.5	48.7	42.4	63.6
	X	34.0	51.0	S	10.4	15.7	15.0	22.5	20.4	30.7	26.7	40.0
				D	20.9	31.3	30.1	45.1	40.9	61.3	53.4	80.1
Group B	N	34.0	51.0	S	10.4	15.7	15.0	22.5	20.4	30.7	26.7	40.0
				D	20.9	31.3	30.1	45.1	40.9	61.3	53.4	80.1
	X	42.0	63.0	S	12.9	19.3	18.6	27.8	25.2	37.9	33.0	49.5
				D	25.8	38.7	37.1	55.7	50.5	75.7	65.9	98.9
Group C	N	45.0	67.5	S	–	–	–	–	–	–	35.3	53.0
				D	–	–	–	–	–	–	70.7	106
	X	56.5	84.8	S	–	–	–	–	–	–	44.4	66.6
				D	–	–	–	–	–	–	88.7	133
A307	Not applicable	13.5	20.3	S	4.14	6.23	5.97	8.97	8.11	12.2	10.6	15.9
				D	8.29	12.5	11.9	17.9	16.2	24.4	21.2	31.9

Nominal Bolt Diameter, d, in.					1 1/8		1 1/4		1 3/8		1 1/2	
Nominal Bolt Area, in.²					0.994		1.23		1.48		1.77	
Designation	Thread Cond.	F_{nv}/Ω (ksi) ASD	ϕF_{nv} (ksi) LRFD	Loading	r_n/Ω ASD	ϕr_n LRFD	r_n/Ω ASD	ϕr_n LRFD	r_n/Ω ASD	ϕr_n LRFD	r_n/Ω ASD	ϕr_n LRFD
Group A	N	27.0	40.5	S	26.8	40.3	33.2	49.8	40.0	59.9	47.8	71.7
				D	53.7	80.5	66.4	99.6	79.9	120	95.6	143
	X	34.0	51.0	S	33.8	50.7	41.8	62.7	50.3	75.5	60.2	90.3
				D	67.6	101	83.6	125	101	151	120	181
Group B	N	34.0	51.0	S	33.8	50.7	41.8	62.7	50.3	75.5	60.2	90.3
				D	67.6	101	83.6	125	101	151	120	181
	X	42.0	63.0	S	41.7	62.6	51.7	77.5	62.2	93.2	74.3	112
				D	83.5	125	103	155	124	186	149	223
Group C	N	45.0	67.5	S	44.7	67.1	55.4	83.0	–	–	–	–
				D	89.5	134	111	166	–	–	–	–
	X	56.5	84.8	S	56.2	84.3	69.5	104	–	–	–	–
				D	112	169	139	209	–	–	–	–
A307	Not applicable	13.5	20.3	S	13.4	20.2	16.6	25.0	20.0	30.0	23.9	35.9
				D	26.8	40.4	33.2	49.9	40.0	60.1	47.8	71.9

ASD	LRFD	
$\Omega = 2.00$	$\phi = 0.75$	– Indicates that this grade is unavailable in the given diameter. For end loaded connections greater than 38 in., see AISC *Specification* Table J3.2 footnote b. Group A includes ASTM F3125 Grades A325 and F1852 bolts. Group B includes ASTM F3125 Grades A490 and F2280 bolts. Group C includes ASTM F3043 and ASTM F3111. Thread condition "N" indicates that threads are included in the shear plane. Thread condition "X" indicates that threads are excluded from the shear plane. S = single shear D = double shear

Table 7-2
Available Tensile Strength of Bolts, kips

Nominal Bolt Diameter, d, in.			$^{5}/_{8}$		$^{3}/_{4}$		$^{7}/_{8}$		1	
Nominal Bolt Area, in.[2]			0.307		0.442		0.601		0.785	
Designation	F_{nt}/Ω (ksi)	ϕF_{nt} (ksi)	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Group A	45.0	67.5	13.8	20.7	19.9	29.8	27.1	40.6	35.3	53.0
Group B	56.5	84.8	17.3	26.0	25.0	37.4	34.0	51.0	44.4	66.6
Group C	75.0	113	–	–	–	–	–	–	58.9	88.4
A307	22.5	33.8	6.90	10.4	9.94	14.9	13.5	20.3	17.7	26.5
Nominal Bolt Diameter, d, in.			$1^{1}/_{8}$		$1^{1}/_{4}$		$1^{3}/_{8}$		$1^{1}/_{2}$	
Nominal Bolt Area, in.[2]			0.994		1.23		1.48		1.77	
Designation	F_{nt}/Ω (ksi)	ϕF_{nt} (ksi)	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Group A	45.0	67.5	44.7	67.1	55.2	82.8	66.8	100	79.5	119
Group B	56.5	84.8	56.2	84.2	69.3	104	83.9	126	99.8	150
Group C	75.0	113	74.6	112	92.0	138	–	–	–	–
A307	22.5	33.8	22.4	33.5	27.6	41.4	33.4	50.1	39.8	59.6

ASD	LRFD
$\Omega = 2.00$	$\phi = 0.75$

– Indicates that this grade is unavailable in the given diameter.
Group A includes ASTM F3125 Grades A325 and F1852 bolts.
Group B includes ASTM F3125 Grades A490 and F2280 bolts.
Group C includes ASTM F3043 and ASTM F3111.

Group A Bolts (Includes A325 and F1852 bolts)

Table 7-3
Slip-Critical Connections
Available Slip Resistance, kips
(Class A Faying Surface, μ = 0.30)

Group A Bolts									
Hole Type	Loading	Nominal Bolt Diameter, *d*, in.							
		5/8		3/4		7/8		1	
		Minimum Group A Bolt Pretension, kips							
		19		28		39		51	
		r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
STD/SSLT	S	4.29	6.44	6.33	9.49	8.81	13.2	11.5	17.3
	D	8.59	12.9	12.7	19.0	17.6	26.4	23.1	34.6
OVS/SSLP	S	3.66	5.47	5.39	8.07	7.51	11.2	9.82	14.7
	D	7.32	10.9	10.8	16.1	15.0	22.5	19.6	29.4
LSL	S	3.01	4.51	4.44	6.64	6.18	9.25	8.08	12.1
	D	6.02	9.02	8.87	13.3	12.4	18.5	16.2	24.2
Hole Type	Loading	Nominal Bolt Diameter, *d*, in.							
		1 1/8		1 1/4		1 3/8		1 1/2	
		Minimum Group A Bolt Pretension, kips							
		64		81		97		118	
		r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
STD/SSLT	S	14.5	21.7	18.3	27.5	21.9	32.9	26.7	40.0
	D	28.9	43.4	36.6	54.9	43.8	65.8	53.3	80.0
OVS/SSLP	S	12.3	18.4	15.6	23.3	18.7	28.0	22.7	34.0
	D	24.7	36.9	31.2	46.7	37.4	55.9	45.5	68.0
LSL	S	10.1	15.2	12.8	19.2	15.4	23.0	18.7	28.0
	D	20.3	30.4	25.7	38.4	30.7	46.0	37.4	56.0

STD = standard hole
OVS = oversized hole
SSLT = short-slotted hole with length transverse to the line of force
SSLP = short-slotted hole with length parallel to the line of force
LSL = long-slotted hole with length transverse or parallel to the line of force

S = single shear
D = double shear

Hole Type	ASD	LRFD
STD and SSLT	$\Omega = 1.50$	$\phi = 1.00$
OVS and SSLP	$\Omega = 1.76$	$\phi = 0.85$
LSL	$\Omega = 2.14$	$\phi = 0.70$

Note: Slip-critical bolt values assume no more than one filler has been provided or bolts have been added to distribute loads in the fillers.
See AISC *Specification* Sections J3.8 and J5 for provisions when fillers are present.
For Class B faying surfaces, multiply the tabulated available strength by 1.67.

Table 7-3 (continued)
Slip-Critical Connections
Available Slip Resistance, kips
(Class A Faying Surface, $\mu = 0.30$)

Group B Bolts (Includes A490 and F2280 bolts)

Group B Bolts									
Hole Type	Loading	Nominal Bolt Diameter, d, in.							
		$^5/_8$		$^3/_4$		$^7/_8$		1	
		Minimum Group B Bolt Pretension, kips							
		24		35		49		64	
		r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
STD/SSLT	S	5.42	8.14	7.91	11.9	11.1	16.6	14.5	21.7
	D	10.8	16.3	15.8	23.7	22.1	33.2	28.9	43.4
OVS/SSLP	S	4.62	6.92	6.74	10.1	9.44	14.1	12.3	18.4
	D	9.25	13.8	13.5	20.2	18.9	28.2	24.7	36.9
LSL	S	3.80	5.70	5.54	8.31	7.76	11.6	10.1	15.2
	D	7.60	11.4	11.1	16.6	15.5	23.3	20.3	30.4
Hole Type	Loading	Nominal Bolt Diameter, d, in.							
		$1^1/_8$		$1^1/_4$		$1^3/_8$		$1^1/_2$	
		Minimum Group B Bolt Pretension, kips							
		80		102		121		148	
		r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
STD/SSLT	S	18.1	27.1	23.1	34.6	27.3	41.0	33.4	50.2
	D	36.2	54.2	46.1	69.2	54.7	82.0	66.9	100
OVS/SSLP	S	15.4	23.1	19.6	29.4	23.3	34.9	28.5	42.6
	D	30.8	46.1	39.3	58.8	46.6	69.7	57.0	85.3
LSL	S	12.7	19.0	16.2	24.2	19.2	28.7	23.4	35.1
	D	25.3	38.0	32.3	48.4	38.3	57.4	46.9	70.2

STD = standard hole
OVS = oversized hole
SSLT = short-slotted hole with length transverse to the line of force
SSLP = short-slotted hole with length parallel to the line of force
LSL = long-slotted hole with length transverse or parallel to the line of force

S = single shear
D = double shear

Hole Type	ASD	LRFD
STD and SSLT	$\Omega = 1.50$	$\phi = 1.00$
OVS and SSLP	$\Omega = 1.76$	$\phi = 0.85$
LSL	$\Omega = 2.14$	$\phi = 0.70$

Note: Slip-critical bolt values assume no more than one filler has been provided or bolts have been added to distribute loads in the fillers.
See AISC *Specification* Sections J3.8 and J5 for provisions when fillers are present.
For Class B faying surfaces, multiply the tabulated available strength by 1.67.

Group C, Grade 2 Bolts

Table 7-3 (continued)
Slip-Critical Connections
Available Slip Resistance, kips
(Class A Faying Surface, μ = 0.30)

Group C Bolts									
Hole Type	Loading	Nominal Bolt Diameter, *d*, in.							
		5/8		3/4		7/8		1	
		Minimum Group C Grade 2 Bolt Pretension, kips							
		–		–		–		90	
		r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
STD/SSLT	S	–	–	–	–	–	–	20.3	30.5
	D	–	–	–	–	–	–	40.7	61.0
OVS/SSLP	S	–	–	–	–	–	–	17.3	25.9
	D	–	–	–	–	–	–	34.7	51.9
LSL	S	–	–	–	–	–	–	14.3	21.4
	D	–	–	–	–	–	–	28.5	42.7
Hole Type	Loading	Nominal Bolt Diameter, *d*, in.							
		1 1/8		1 1/4		1 3/8		1 1/2	
		Minimum Group C Grade 2 Bolt Pretension, kips							
		113		143		–		–	
		r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
STD/SSLT	S	25.5	38.3	32.3	48.5	–	–	–	–
	D	51.1	76.6	64.6	97.0	–	–	–	–
OVS/SSLP	S	21.8	32.6	27.5	41.2	–	–	–	–
	D	43.5	65.1	55.1	82.4	–	–	–	–
LSL	S	17.9	26.8	22.7	33.9	–	–	–	–
	D	35.8	53.6	45.3	67.9	–	–	–	–

STD = standard hole
OVS = oversized hole
SSLT = short-slotted hole with length transverse to the line of force
SSLP = short-slotted hole with length parallel to the line of force
LSL = long-slotted hole with length transverse or parallel to the line of force

S = single shear
D = double shear

Hole Type	ASD	LRFD
STD and SSLT	Ω = 1.50	ϕ = 1.00
OVS and SSLP	Ω = 1.76	ϕ = 0.85
LSL	Ω = 2.14	ϕ = 0.70

– Indicates that this grade is unavailable for the given diameter.
Note: Slip-critical bolt values assume no more than one filler has been provided or bolts have been added to distribute loads in the fillers.
See AISC *Specification* Sections J3.8 and J5 for provisions when fillers are present.
For Class B faying surfaces, multiply the tabulated available strength by 1.67.

Menu

Table 7-4
Available Bearing and Tearout Strength at Bolt Holes Based on Bolt Spacing
kip/in. thickness

Hole Type	Bolt Spacing, s, in.	F_u ksi	Nominal Bolt Diameter, d, in. 5/8 r_n/Ω ASD	5/8 ϕr_n LRFD	3/4 r_n/Ω ASD	3/4 ϕr_n LRFD	7/8 r_n/Ω ASD	7/8 ϕr_n LRFD	1 r_n/Ω ASD	1 ϕr_n LRFD
STD SSLT	$2^2/_3\ d_b$	58	34.1	51.1	41.3	62.0	48.6	72.9	53.7	80.5
		65	38.2	57.3	46.3	69.5	54.4	81.7	60.1	90.2
	3 in.	58	43.5	65.3	52.2	78.3	60.9	91.4	65.3	97.9
		65	48.8	73.1	58.5	87.8	68.3	102	73.1	110
SSLP	$2^2/_3\ d_b$	58	27.6	41.3	34.8	52.2	42.1	63.1	47.1	70.7
		65	30.9	46.3	39.0	58.5	47.1	70.7	52.8	79.2
	3 in.	58	43.5	65.3	52.2	78.3	60.9	91.4	58.7	88.1
		65	48.8	73.1	58.5	87.8	68.3	102	65.8	98.7
OVS	$2^2/_3\ d_b$	58	29.7	44.6	37.0	55.5	44.2	66.3	49.3	74.0
		65	33.3	50.0	41.4	62.2	49.6	74.3	55.3	82.9
	3 in.	58	43.5	65.3	52.2	78.3	60.9	91.4	60.9	91.4
		65	48.8	73.1	58.5	87.8	68.3	102	68.3	102
LSLP	$2^2/_3\ d_b$	58	3.62	5.44	4.35	6.53	5.08	7.61	5.80	8.70
		65	4.06	6.09	4.88	7.31	5.69	8.53	6.50	9.75
	3 in.	58	43.5	65.3	39.2	58.7	28.3	42.4	17.4	26.1
		65	48.8	73.1	43.9	65.8	31.7	47.5	19.5	29.3
LSLT	$2^2/_3\ d_b$	58	28.4	42.6	34.4	51.7	40.5	60.7	44.7	67.1
		65	31.8	47.7	38.6	57.9	45.4	68.0	50.1	75.2
	3 in.	58	36.3	54.4	43.5	65.3	50.8	76.1	54.4	81.6
		65	40.6	60.9	48.8	73.1	56.9	85.3	60.9	91.4
STD, SSLT, SSLP, OVS, LSLP	$s \geq s_{full}$	58	43.5	65.3	52.2	78.3	60.9	91.4	69.6	104
		65	48.8	73.1	58.5	87.8	68.3	102	78.0	117
LSLT	$s \geq s_{full}$	58	36.3	54.4	43.5	65.3	50.8	76.1	58.0	87.0
		65	40.6	60.9	48.8	73.1	56.9	85.3	65.0	97.5

	Hole Type	5/8	3/4	7/8	1
Spacing for full bearing and tearout strength, s_{full}[a], in.	STD, SSLT, LSLT	$1^{15}/_{16}$	$2^5/_{16}$	$2^{11}/_{16}$	$3^1/_8$
	OVS	$2^1/_{16}$	$2^7/_{16}$	$2^{13}/_{16}$	$3^1/_4$
	SSLP	$2^1/_8$	$2^1/_2$	$2^7/_8$	$3^5/_{16}$
	LSLP	$2^{13}/_{16}$	$3^3/_8$	$3^{15}/_{16}$	$4^1/_2$
Minimum Spacing[a] = $2^2/_3 d$, in.		$1^{11}/_{16}$	2	$2^5/_{16}$	$2^{11}/_{16}$

STD = standard hole
SSLT = short-slotted hole oriented with length transverse to the line of force
SSLP = short-slotted hole oriented with length parallel to the line of force
OVS = oversized hole
LSLP = long-slotted hole oriented with length parallel to the line of force
LSLT = long-slotted hole oriented with length transverse to the line of force

ASD	LRFD
$\Omega = 2.00$	$\phi = 0.75$

Note: Spacing indicated is from the center of the hole or slot to the center of the adjacent hole or slot in the line of force. Hole deformation is considered. When hole deformation is not considered, see AISC *Specification* Section J3.10.

[a] Decimal value has been rounded to the nearest sixteenth of an inch.

Table 7-4 (continued)
Available Bearing and Tearout Strength at Bolt Holes Based on Bolt Spacing
kip/in. thickness

Hole Type	Bolt Spacing, s, in.	F_u, ksi	$1^1/_8$ r_n/Ω ASD	$1^1/_8$ ϕr_n LRFD	$1^1/_4$ r_n/Ω ASD	$1^1/_4$ ϕr_n LRFD	$1^3/_8$ r_n/Ω ASD	$1^3/_8$ ϕr_n LRFD	$1^1/_2$ r_n/Ω ASD	$1^1/_2$ ϕr_n LRFD
STD SSLT	$2^2/_3 d_b$	58	60.9	91.4	68.2	102	75.4	113	82.7	124
		65	68.3	102	76.4	115	84.5	127	92.6	139
	3 in.	58	60.9	91.4	–	–	–	–	–	–
		65	68.3	102	–	–	–	–	–	–
SSLP	$2^2/_3 d_b$	58	52.2	78.3	59.5	89.2	66.7	100	74.0	111
		65	58.5	87.8	66.6	99.9	74.8	112	82.9	124
	3 in.	58	52.2	78.3	–	–	–	–	–	–
		65	58.5	87.8	–	–	–	–	–	–
OVS	$2^2/_3 d_b$	58	54.4	81.6	61.6	92.4	68.9	103	76.1	114
		65	60.9	91.4	69.1	104	77.2	116	85.3	128
	3 in.	58	54.4	81.6	–	–	–	–	–	–
		65	60.9	91.4	–	–	–	–	–	–
LSLP	$2^2/_3 d_b$	58	6.53	9.79	7.25	10.9	7.98	12.0	8.70	13.1
		65	7.31	11.0	8.13	12.2	8.94	13.4	9.75	14.6
	3 in.	58	6.53	9.79	–	–	–	–	–	–
		65	7.31	11.0	–	–	–	–	–	–
LSLT	$2^2/_3 d_b$	58	50.8	76.1	56.8	85.2	62.8	94.3	68.9	103
		65	56.9	85.3	63.6	95.5	70.4	106	77.2	116
	3 in.	58	50.8	76.1	–	–	–	–	–	–
		65	56.9	85.3	–	–	–	–	–	–
STD, SSLT, SSLP, OVS, LSLP	$s \geq s_{full}$	58	78.3	117	87.0	131	95.7	144	104	157
		65	87.8	132	97.5	146	107	161	117	176
LSLT	$s \geq s_{full}$	58	65.3	97.9	72.5	109	79.8	120	87.0	131
		65	73.1	110	81.3	122	89.4	134	97.5	146

Spacing for full bearing and tearout strength s_{full}[a], in.		$1^1/_8$	$1^1/_4$	$1^3/_8$	$1^1/_2$
	STD, SSLT, LSLT	$3^1/_2$	$3^7/_8$	$4^1/_4$	$4^5/_8$
	OVS	$3^{11}/_{16}$	$4^1/_{16}$	$4^7/_{16}$	$4^{13}/_{16}$
	SSLP	$3^3/_4$	$4^1/_8$	$4^1/_2$	$4^7/_8$
	LSLP	$5^1/_{16}$	$5^5/_8$	$6^3/_{16}$	$6^3/_4$
Minimum Spacing[a] = $2^2/_3 d$, in.		3	$3^5/_{16}$	$3^{11}/_{16}$	4

STD = standard hole
SSLT = short-slotted hole oriented with length transverse to the line of force
SSLP = short-slotted hole oriented with length parallel to the line of force
OVS = oversized hole
LSLP = long-slotted hole oriented with length parallel to the line of force
LSLT = long-slotted hole oriented with length transverse to the line of force

ASD	LRFD
$\Omega = 2.00$	$\phi = 0.75$

– Indicates spacing less than minimum spacing required per AISC *Specification* Section J3.3.

Note: Spacing indicated is from the center of the hole or slot to the center of the adjacent hole or slot in the line of force. Hole deformation is considered. When hole deformation is not considered, see AISC *Specification* Section J3.10.

[a] Decimal value has been rounded to the nearest sixteenth of an inch.

Table 7-5
Available Bearing and Tearout Strength at Bolt Holes Based on Edge Distance
kip/in. thickness

Hole Type	Edge Distance, l_e, in.	F_u, ksi	Nominal Bolt Diameter, d, in.							
			5/8		3/4		7/8		1	
			r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
STD SSLT	1 1/4	58	31.5	47.3	29.4	44.0	27.2	40.8	23.9	35.9
		65	35.3	53.0	32.9	49.4	30.5	45.7	26.8	40.2
	2	58	43.5	65.3	52.2	78.3	53.3	79.9	50.0	75.0
		65	48.8	73.1	58.5	87.8	59.7	89.6	56.1	84.1
SSLP	1 1/4	58	28.3	42.4	26.1	39.2	23.9	35.9	20.7	31.0
		65	31.7	47.5	29.3	43.9	26.8	40.2	23.2	34.7
	2	58	43.5	65.3	52.2	78.3	50.0	75.0	46.8	70.1
		65	48.8	73.1	58.5	87.8	56.1	84.1	52.4	78.6
OVS	1 1/4	58	29.4	44.0	27.2	40.8	25.0	37.5	21.8	32.6
		65	32.9	49.4	30.5	45.7	28.0	42.0	24.4	36.6
	2	58	43.5	65.3	52.2	78.3	51.1	76.7	47.9	71.8
		65	48.8	73.1	58.5	87.8	57.3	85.9	53.6	80.4
LSLP	1 1/4	58	16.3	24.5	10.9	16.3	5.44	8.16	–	–
		65	18.3	27.4	12.2	18.3	6.09	9.14	–	–
	2	58	42.4	63.6	37.0	55.5	31.5	47.3	26.1	39.2
		65	47.5	71.3	41.4	62.2	35.3	53.0	29.3	43.9
LSLT	1 1/4	58	26.3	39.4	24.5	36.7	22.7	34.0	19.9	29.9
		65	29.5	44.2	27.4	41.1	25.4	38.1	22.3	33.5
	2	58	36.3	54.4	43.5	65.3	44.4	66.6	41.7	62.5
		65	40.6	60.9	48.8	73.1	49.8	74.6	46.7	70.1
STD, SSLT, SSLP, OVS, LSLP	$l_e \geq l_{e\,full}$	58	43.5	65.3	52.2	78.3	60.9	91.4	69.6	104
		65	48.8	73.1	58.5	87.8	68.3	102	78.0	117
LSLT	$l_e \geq l_{e\,full}$	58	36.3	54.4	43.5	65.3	50.8	76.1	58.0	87.0
		65	40.6	60.9	48.8	73.1	56.9	85.3	65.0	97.5
Edge distance for full bearing and tearout strength $l_e \geq l_{e\,full}$[a], in.		STD, SSLT, LSLT	1 5/8		1 15/16		2 1/4		2 9/16	
		OVS	1 11/16		2		2 5/16		2 5/8	
		SSLP	1 11/16		2		2 5/16		2 11/16	
		LSLP	2 1/16		2 7/16		2 7/8		3 1/4	

STD = standard hole
SSLT = short-slotted hole oriented with length transverse to the line of force
SSLP = short-slotted hole oriented with length parallel to the line of force
OVS = oversized hole
LSLP = long-slotted hole oriented with length parallel to the line of force
LSLT = long-slotted hole oriented with length transverse to the line of force

ASD	LRFD	
$\Omega = 2.00$	$\phi = 0.75$	– Indicates edge distance less than minimum required per AISC *Specification* Section J3.4. Note: Edge distance indicated is from the center of the hole or slot to the edge of the element in the line of force. Hole deformation is considered. When hole deformation is not considered, see AISC *Specification* Section J3.10. [a] Decimal value has been rounded to the nearest sixteenth of an inch.

Table 7-5 (continued)
Available Bearing and Tearout Strength at Bolt Holes Based on Edge Distance
kip/in. thickness

Hole Type	Edge Distance, l_e, in.	F_u, ksi	Nominal Bolt Diameter, d, in.							
			$1^1/_8$		$1^1/_4$		$1^3/_8$		$1^1/_2$	
			r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n	r_n/Ω	ϕr_n
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
STD SSLT	$1^1/_4$	58	21.8	32.6	19.6	29.4	17.4	26.1	15.2	22.8
STD SSLT	$1^1/_4$	65	24.4	36.6	21.9	32.9	19.5	29.3	17.1	25.6
STD SSLT	2	58	47.9	71.8	45.7	68.5	43.5	65.3	41.3	62.0
STD SSLT	2	65	53.6	80.4	51.2	76.8	48.8	73.1	46.3	69.5
SSLP	$1^1/_4$	58	17.4	26.1	15.2	22.8	13.1	19.6	10.9	16.3
SSLP	$1^1/_4$	65	19.5	29.3	17.1	25.6	14.6	21.9	12.2	18.3
SSLP	2	58	43.5	65.3	41.3	62.0	39.2	58.7	37.0	55.5
SSLP	2	65	48.8	73.1	46.3	69.5	43.9	65.8	41.4	62.2
OVS	$1^1/_4$	58	18.5	27.7	16.3	24.5	14.1	21.2	12.0	17.9
OVS	$1^1/_4$	65	20.7	31.1	18.3	27.4	15.8	23.8	13.4	20.1
OVS	2	58	44.6	66.9	42.4	63.6	40.2	60.4	38.1	57.1
OVS	2	65	50.0	75.0	47.5	71.3	45.1	67.6	42.7	64.0
LSLP	$1^1/_4$	58	–	–	–	–	–	–	–	–
LSLP	$1^1/_4$	65	–	–	–	–	–	–	–	–
LSLP	2	58	20.7	31.0	15.2	22.8	9.79	14.7	4.35	6.53
LSLP	2	65	23.2	34.7	17.1	25.6	11.0	16.5	4.88	7.31
LSLT	$1^1/_4$	58	18.1	27.2	16.3	24.5	14.5	21.8	12.7	19.0
LSLT	$1^1/_4$	65	20.3	30.5	18.3	27.4	16.3	24.4	14.2	21.3
LSLT	2	58	39.9	59.8	38.1	57.1	36.3	54.4	34.4	51.7
LSLT	2	65	44.7	67.0	42.7	64.0	40.6	60.9	38.6	57.9
STD, SSLT, SSLP, OVS, LSLP	$l_e \geq l_{e\,full}$	58	78.3	117	87.0	131	95.7	144	104	157
STD, SSLT, SSLP, OVS, LSLP	$l_e \geq l_{e\,full}$	65	87.8	132	97.5	146	107	161	117	176
LSLT	$l_e \geq l_{e\,full}$	58	65.3	97.9	72.5	109	79.8	120	87.0	131
LSLT	$l_e \geq l_{e\,full}$	65	73.1	110	81.3	122	89.4	134	97.5	146
Edge distance for full bearing and tearout strength $l_e \geq l_{e\,full}$[a], in.		STD, SSLT, LSLT	$2^7/_8$		$3^3/_{16}$		$3^1/_2$		$3^{13}/_{16}$	
		OVS	3		$3^5/_{16}$		$3^5/_8$		$3^{15}/_{16}$	
		SSLP	3		$3^5/_{16}$		$3^5/_8$		$3^{15}/_{16}$	
		LSLP	$3^{11}/_{16}$		$4^1/_{16}$		$4^1/_2$		$4^7/_8$	

STD = standard hole
SSLT = short-slotted hole oriented with length transverse to the line of force
SSLP = short-slotted hole oriented with length parallel to the line of force
OVS = oversized hole
LSLP = long-slotted hole oriented with length parallel to the line of force
LSLT = long-slotted hole oriented with length transverse to the line of force

ASD	LRFD
$\Omega = 2.00$	$\phi = 0.75$

– Indicates edge distance less than minimum required per AISC *Specification* Section J3.4.

Note: Edge distance indicated is from the center of the hole or slot to the edge of the element in the line of force. Hole deformation is considered. When hole deformation is not considered, see AISC *Specification* Section J3.10.

[a] Decimal value has been rounded to the nearest sixteenth of an inch.