TABLES OF DIMENSIONS AND PROPERTIES

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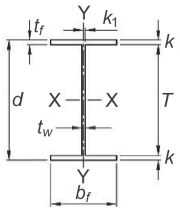


Table 4-1
W-Shapes (Welded*)
Dimensions

Shape	Area, A	Nominal Wt.	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}	lb/ft	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W24×146[c2]	40.0	139	24.7	24¾	0.625	⅝	5/16	12.9	12⅞	1.00	1	1.00	1	5/16	22⅝	5½
×131[c2]	39.9	138	24.5	24½	0.625	⅝	5/16	12.9	12⅞	1.00	1	1.00	1	5/16	22⅝	5½
×117[c1,c2,f2]	32.0	111	24.3	24¼	0.560	9/16	5/16	12.8	12¾	0.750	¾	0.750	¾	5/16	22⅝	5½
×104[c1,c2,f2]	30.5	106	24.1	24	0.500	½	¼	12.8	12¾	0.750	¾	0.750	¾	¼	22⅝	5½
×94[c1,c2]	29.3	102	24.3	24¼	0.500	½	¼	9.07	9⅛	1.00	1	1.00	1	¼	22½	5½
×84[c1,c2]	23.7	82.3	24.1	24⅛	0.450	7/16	¼	9.02	9	0.750	¾	0.750	¾	¼	22½	5½
×76[c1,c2]	23.6	81.8	23.9	23⅞	0.450	7/16	¼	8.99	9	0.750	¾	0.750	¾	¼	22½	5½
×68[c1,c2,f2]	19.3	67.0	23.7	23¾	0.410	7/16	¼	8.97	9	0.560	9/16	0.560	9/16	¼	22½	5½
×62[c1,c2]	18.9	65.6	23.7	23¾	0.450	7/16	¼	7.04	7	0.625	⅝	0.625	⅝	¼	22½	3½[g]
×55[c1,c2,f2]	16.3	56.5	23.6	23⅝	0.410	7/16	¼	7.01	7	0.500	½	0.500	½	¼	22⅝	3½[g]
W21×122[c2]	37.1	129	21.7	21⅝	0.625	⅝	5/16	12.4	12⅜	1.00	1	1.00	1	5/16	19¾	5½
×111[c2]	35.5	123	21.5	21½	0.560	9/16	5/16	12.3	12⅜	1.00	1	1.00	1	5/16	19¾	5½
×101[c1,c2,f2]	28.4	98.6	21.4	21⅜	0.500	½	¼	12.3	12¼	0.750	¾	0.750	¾	¼	19¾	5½
×93[c2]	27.8	96.6	21.6	21⅝	0.560	9/16	5/16	8.42	8⅜	1.00	1	1.00	1	5/16	19¾	5½
×83[c1,c2]	22.5	78.1	21.4	21⅜	0.500	½	¼	8.36	8⅜	0.750	¾	0.750	¾	¼	19¾	5½
×73[c1,c2]	21.3	74.0	21.2	21¼	0.450	7/16	¼	8.30	8¼	0.750	¾	0.750	¾	¼	19¾	5½
×68[c1,c2]	19.3	66.9	21.1	21⅛	0.450	7/16	¼	8.27	8¼	0.625	⅝	0.625	⅝	¼	19¾	5½
×62[c1,c2]	18.4	63.9	21.0	21	0.410	7/16	¼	8.24	8¼	0.625	⅝	0.625	⅝	¼	19¾	5½
×57[c1,c2]	16.3	56.7	21.1	21	0.410	7/16	¼	6.56	6½	0.625	⅝	0.625	⅝	¼	19¾	3½
×55[c1,c2,f2]	15.6	54.3	20.8	20¾	0.375	⅜	3/16	8.22	8¼	0.500	½	0.500	½	3/16	19¾	5½
×50[c1,c2]	14.0	48.5	20.8	20⅞	0.375	⅜	3/16	6.53	6½	0.500	½	0.500	½	3/16	19¾	3½
×48[c1,c2,f2]	14.2	49.4	20.6	20⅝	0.350	⅜	3/16	8.14	8⅛	0.450	7/16	0.450	7/16	3/16	19¾	5½
×44[c1,c2,f2]	12.8	44.4	20.7	20⅝	0.350	⅜	3/16	6.50	6½	0.450	7/16	0.450	7/16	3/16	19¾	3½
W18×106[c2]	32.8	114	18.7	18¾	0.625	⅝	5/16	11.2	11¼	1.00	1	1.00	1	5/16	16⅞	5½
×97[c2]	31.5	109	18.6	18⅝	0.560	9/16	5/16	11.1	11⅛	1.00	1	1.00	1	5/16	16⅞	5½
×86[c2,f2]	25.1	87.2	18.4	18⅜	0.500	½	¼	11.1	11⅛	0.750	¾	0.750	¾	¼	16⅞	5½
×76[c1,c2,f2]	20.7	71.9	18.2	18¼	0.410	7/16	¼	11.0	11	0.625	⅝	0.625	⅝	¼	16⅞	5½
×71[c2]	20.0	69.3	18.5	18½	0.500	½	¼	7.64	7⅝	0.750	¾	0.750	¾	¼	16⅞	3½[g]
×65[c2]	19.0	65.9	18.4	18⅜	0.450	7/16	¼	7.59	7⅝	0.750	¾	0.750	¾	¼	16⅞	3½[g]
×60[c1,c2]	18.2	63.1	18.2	18¼	0.410	7/16	¼	7.56	7½	0.750	¾	0.750	¾	¼	16¾	3½[g]
×55[c1,c2]	16.3	56.7	18.1	18⅛	0.410	7/16	¼	7.53	7½	0.625	⅝	0.625	⅝	¼	16⅞	3½[g]
×50[c1,c2]	14.3	49.7	18.0	18	0.350	⅜	3/16	7.50	7½	0.560	9/16	0.560	9/16	3/16	16⅞	3½[g]
×46[c1,c2]	13.5	46.8	18.1	18	0.350	⅜	3/16	6.06	6	0.625	⅝	0.625	⅝	3/16	16⅞	3½[g]
×40[c1,c2,f2]	11.3	39.3	17.9	17⅞	0.313	5/16	3/16	6.02	6	0.500	½	0.500	½	3/16	16⅞	3½[g]
×35[c1,c2,f2]	10.2	35.4	17.7	17¾	0.313	5/16	3/16	6.00	6	0.410	7/16	0.410	7/16	3/16	16⅞	3½[g]

[c1,c2] Shape is slender for compression with F_y = 30 ksi and F_y = 65 ksi, respectively.

[f2] Shape exceeds compact limit for flexure with F_y = 65 ksi.

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

* The values in the tables apply to sections that are continuously welded with complete-joint-penetration groove welds, including laser welds.

Note: Welded sections are available both in austenitic and duplex stainless steel.

Table 4-1 (continued)

W-Shapes (Welded)
Properties

W24–W18

Shape	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
			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
W24×146	6.45	36.4	4230	342	10.3	386	358	55.5	2.99	85.4	3.52	23.7	10.2	50300
×131	6.45	36.0	4160	339	10.2	382	358	55.5	3.00	85.4	3.52	23.5	10.2	49500
×117	8.53	40.7	3220	265	10.0	299	262	41.0	2.87	63.2	3.42	23.6	4.89	36400
×104	8.53	45.2	3100	257	10.1	288	262	41.0	2.93	62.9	3.45	23.4	4.48	35800
×94	4.54	44.6	2930	241	9.99	273	125	27.5	2.06	42.5	2.46	23.3	6.68	16900
×84	6.01	50.2	2280	189	9.80	215	91.9	20.4	1.97	31.7	2.38	23.4	3.15	12500
×76	5.99	49.8	2230	187	9.73	213	91.0	20.2	1.97	31.4	2.38	23.2	3.13	12200
×68	8.01	55.1	1740	147	9.49	168	67.5	15.0	1.87	23.5	2.31	23.1	1.55	9030
×62	5.63	49.9	1600	135	9.19	158	36.5	10.4	1.39	16.6	1.77	23.1	1.80	4860
×55	7.01	55.1	1330	113	9.04	133	28.8	8.23	1.33	13.2	1.72	23.1	1.10	3850
W21×122	6.20	31.5	3060	282	9.08	317	318	51.3	2.93	78.8	3.42	20.7	9.64	34100
×111	6.15	34.8	2930	273	9.09	305	310	50.5	2.96	77.2	3.42	20.5	9.08	32600
×101	8.20	39.8	2300	215	8.99	240	233	37.9	2.86	58.0	3.35	20.7	4.23	24800
×93	4.21	35.0	2140	198	8.77	227	99.8	23.7	1.89	37.0	2.28	20.6	6.50	10600
×83	5.57	39.8	1670	156	8.61	179	73.2	17.5	1.80	27.5	2.20	20.7	3.12	7810
×73	5.53	43.8	1590	150	8.63	171	71.6	17.3	1.83	26.8	2.21	20.5	2.86	7490
×68	6.62	44.1	1380	131	8.45	150	59.1	14.3	1.75	22.4	2.15	20.5	1.92	6190
×62	6.59	48.2	1330	127	8.51	145	58.4	14.2	1.78	22.0	2.17	20.4	1.76	6060
×57	5.25	48.4	1130	107	8.30	124	29.5	9.00	1.34	14.3	1.68	20.5	1.49	3090
×55	8.22	52.8	1090	105	8.35	120	46.4	11.3	1.72	17.6	2.12	20.3	1.02	4780
×50	6.53	52.8	915	88.0	8.10	103	23.3	7.13	1.29	11.4	1.64	20.3	0.883	2400
×48	9.04	56.3	967	93.8	8.24	108	40.5	9.96	1.69	15.5	2.09	20.2	0.771	4110
×44	7.22	56.6	826	79.8	8.04	93.5	20.7	6.36	1.27	10.1	1.62	20.3	0.673	2120
W18×106	5.60	26.7	2000	214	7.80	242	234	41.9	2.67	64.4	3.12	17.7	8.60	18400
×97	5.55	29.6	1930	208	7.84	234	228	41.1	2.69	62.9	3.11	17.6	8.11	17700
×86	7.40	33.8	1500	163	7.73	183	171	30.8	2.61	47.3	3.04	17.7	3.76	13300
×76	8.80	41.3	1230	135	7.70	150	139	25.2	2.59	38.5	3.01	17.6	2.15	10700
×71	5.09	34.0	1110	120	7.45	138	55.9	14.6	1.67	23.0	2.04	17.8	2.79	4400
×65	5.06	37.6	1070	116	7.50	133	54.8	14.4	1.70	22.5	2.04	17.7	2.57	4270
×60	5.04	40.7	1020	112	7.50	128	54.1	14.3	1.72	22.1	2.05	17.5	2.42	4120
×55	6.02	41.1	882	97.5	7.35	111	44.6	11.8	1.65	18.4	2.00	17.5	1.58	3400
×50	6.70	48.2	779	86.6	7.38	98.2	39.4	10.5	1.66	16.3	1.99	17.4	1.10	3000
×46	4.85	48.1	718	79.3	7.30	91.0	23.2	7.67	1.31	12.0	1.60	17.5	1.19	1770
×40	6.02	54.1	582	65.0	7.17	74.7	18.2	6.05	1.27	9.47	1.56	17.4	0.660	1380
×35	7.32	54.0	493	55.7	6.95	64.8	14.8	4.93	1.20	7.79	1.52	17.3	0.445	1110

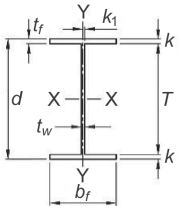


Table 4-1 (continued)
W-Shapes (Welded*)
Dimensions

Shape	Area, A	Nominal Wt.	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}	lb/ft	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W16×100[c2]	29.2	101	17.0	17	0.560	9/16	5/16	10.4	10 3/8	1.00	1	1.00	1	5/16	15 1/8	5 1/2
×89[c2]	28.2	97.9	16.8	16 3/4	0.500	1/2	1/4	10.4	10 3/8	1.00	1	1.00	1	1/4	15 1/8	5 1/2
×77[c2]	22.2	77.1	16.5	16 1/2	0.450	7/16	1/4	10.3	10 1/4	0.750	3/4	0.750	3/4	1/4	15	5 1/2
×67[c2,f2]	18.9	65.7	16.3	16 3/8	0.410	7/16	1/4	10.2	10 1/4	0.625	5/8	0.625	5/8	1/4	15 1/8	5 1/2
×57[c2]	17.4	60.4	16.4	16 3/8	0.450	7/16	1/4	7.12	7 1/8	0.750	3/4	0.750	3/4	1/4	15	3 1/2[g]
×50[c1,c2]	14.5	50.3	16.3	16 1/4	0.375	3/8	3/16	7.07	7 1/8	0.625	5/8	0.625	5/8	3/16	15 1/8	3 1/2[g]
×45[c1,c2]	13.1	45.6	16.1	16 1/8	0.350	3/8	3/16	7.04	7	0.560	9/16	0.560	9/16	3/16	15	3 1/2[g]
×40[c1,c2,f2]	11.7	40.6	16.0	16	0.313	5/16	3/16	7.00	7	0.500	1/2	0.500	1/2	3/16	15	3 1/2[g]
×36[c1,c2,f2]	11.0	38.1	15.9	15 7/8	0.313	5/16	3/16	6.99	7	0.450	7/16	0.450	7/16	3/16	15 1/8	3 1/2[g]
×31[c1,c2]	9.18	31.9	15.9	15 7/8	0.280	1/4	1/8	5.53	5 1/2	0.450	7/16	0.450	7/16	1/8	15 1/8	3 1/2
×26[c1,c2,f2]	7.60	26.4	15.7	15 3/4	0.250	1/4	1/8	5.50	5 1/2	0.350	3/8	0.350	3/8	1/8	15 1/8	3 1/2
W14×132[f2]	37.3	130	14.7	14 5/8	0.625	5/8	5/16	14.7	14 3/4	1.00	1	1.00	1	5/16	12 5/8	5 1/2
×120[f2]	37.2	129	14.5	14 1/2	0.625	5/8	5/16	14.7	14 5/8	1.00	1	1.00	1	5/16	12 5/8	5 1/2
×109[f2]	35.4	123	14.3	14 3/8	0.500	1/2	1/4	14.6	14 5/8	1.00	1	1.00	1	1/4	12 5/8	5 1/2
×99[c2,f2]	28.3	98.1	14.2	14 1/8	0.500	1/2	1/4	14.6	14 5/8	0.750	3/4	0.750	3/4	1/4	12 5/8	5 1/2
×90[c2,f2]	27.4	95.1	14.0	14	0.450	7/16	1/4	14.5	14 1/2	0.750	3/4	0.750	3/4	1/4	12 5/8	5 1/2
×82	26.4	91.5	14.3	14 1/4	0.500	1/2	1/4	10.1	10 1/8	1.00	1	1.00	1	1/4	12 5/8	5 1/2
×74[c2]	20.9	72.4	14.2	14 1/8	0.450	7/16	1/4	10.1	10 1/8	0.750	3/4	0.750	3/4	1/4	12 5/8	5 1/2
×68[c2]	20.1	69.9	14.0	14	0.410	7/16	1/4	10.0	10	0.750	3/4	0.750	3/4	1/4	12 1/2	5 1/2
×61[c2,f2]	17.2	59.9	13.9	13 7/8	0.375	3/8	3/16	10.0	10	0.625	5/8	0.625	5/8	3/16	12 5/8	5 1/2
×53[c2]	14.8	51.5	13.9	13 7/8	0.375	3/8	3/16	8.06	8	0.625	5/8	0.625	5/8	3/16	12 5/8	5 1/2
×48[c2]	14.4	50.1	13.8	13 3/4	0.350	3/8	3/16	8.03	8	0.625	5/8	0.625	5/8	3/16	12 5/8	5 1/2
×43[c1,c2,f2]	12.0	41.6	13.7	13 5/8	0.313	5/16	3/16	8.00	8	0.500	1/2	0.500	1/2	3/16	12 5/8	5 1/2
×38[c1,c2]	10.9	37.7	14.1	14 1/8	0.313	5/16	3/16	6.77	6 3/4	0.500	1/2	0.500	1/2	3/16	13 1/8	3 1/2[g]
×34[c1,c2,f2]	9.74	33.8	14.0	14	0.280	1/4	1/8	6.75	6 3/4	0.450	7/16	0.450	7/16	1/8	13 1/8	3 1/2
×30[c1,c2,f2]	8.70	30.2	13.8	13 7/8	0.280	1/4	1/8	6.73	6 3/4	0.375	3/8	0.375	3/8	1/8	13	3 1/2
×26[c1,c2]	7.39	25.7	13.9	13 7/8	0.250	1/4	1/8	5.03	5	0.410	7/16	0.410	7/16	1/8	13	2 3/4[g]
×22[c1,c2,f2]	6.36	22.1	13.7	13 3/4	0.220	1/4	1/8	5.00	5	0.350	3/8	0.350	3/8	1/8	13	2 3/4[g]

[c1,c2] Shape is slender for compression with $F_y = 30$ ksi and $F_y = 65$ ksi, respectively.

[f2] Shape exceeds compact limit for flexure with $F_y = 65$ ksi.

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

* The values in the tables apply to sections that are continuously welded with complete-joint-penetration groove welds, including laser welds.

Note: Welded sections are available both in austenitic and duplex stainless steel.

Table 4-1 (continued)

W-Shapes (Welded)
Properties

W16–W14

Shape	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
			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
W16×100	5.20	26.8	1490	175	7.14	198	188	36.1	2.54	55.3	2.93	16.0	7.55	12000
×89	5.20	29.6	1430	171	7.13	192	188	36.1	2.58	55.0	2.95	15.8	7.26	11700
×77	6.87	33.3	1090	132	6.99	147	137	26.5	2.48	40.5	2.86	15.8	3.28	8480
×67	8.16	36.7	900	110	6.90	123	111	21.7	2.42	33.1	2.80	15.7	1.97	6800
×57	4.75	33.1	778	94.9	6.69	109	45.2	12.7	1.61	19.8	1.93	15.7	2.38	2770
×50	5.66	40.1	650	79.7	6.70	90.5	36.9	10.4	1.60	16.1	1.90	15.7	1.38	2270
×45	6.29	42.8	574	71.3	6.61	80.9	32.6	9.27	1.58	14.3	1.88	15.5	1.02	1970
×40	7.00	48.0	509	63.6	6.59	71.9	28.6	8.18	1.56	12.6	1.87	15.5	0.723	1720
×36	7.77	48.0	464	58.3	6.50	66.2	25.7	7.34	1.53	11.4	1.84	15.5	0.571	1530
×31	6.14	53.6	376	47.3	6.40	54.2	12.7	4.60	1.18	7.17	1.44	15.5	0.436	759
×26	7.86	60.0	297	37.9	6.25	43.6	9.72	3.54	1.13	5.53	1.40	15.4	0.233	573
W14×132	7.37	20.3	1490	203	6.31	227	530	71.9	3.77	109	4.23	13.7	10.6	24900
×120	7.35	20.0	1440	199	6.23	223	530	72.1	3.77	109	4.24	13.5	10.6	24100
×109	7.30	24.6	1370	192	6.23	213	519	71.1	3.83	107	4.24	13.3	9.95	22900
×99	9.73	25.4	1080	152	6.17	167	389	53.3	3.71	80.7	4.15	13.5	4.57	17600
×90	9.67	27.8	1030	147	6.13	162	381	52.6	3.73	79.5	4.14	13.3	4.38	16700
×82	5.05	24.6	973	136	6.08	153	172	34.0	2.55	51.8	2.90	13.3	6.95	7600
×74	6.73	28.2	763	107	6.05	120	129	25.5	2.49	38.9	2.84	13.5	3.15	5830
×68	6.67	30.5	726	104	6.01	115	125	25.0	2.49	38.0	2.83	13.3	3.01	5490
×61	8.00	33.7	614	88.4	5.97	98.0	104	20.8	2.46	31.7	2.80	13.3	1.81	4590
×53	6.45	33.7	507	73.0	5.85	81.9	54.6	13.5	1.92	20.7	2.23	13.3	1.50	2410
×48	6.42	35.9	494	71.5	5.85	79.9	54.0	13.4	1.93	20.5	2.23	13.2	1.45	2340
×43	8.00	40.6	402	58.7	5.79	65.4	42.7	10.7	1.89	16.3	2.19	13.2	0.782	1860
×38	6.77	41.9	372	52.7	5.85	59.5	25.9	7.65	1.54	11.8	1.83	13.6	0.684	1200
×34	7.50	46.8	331	47.3	5.83	53.2	23.1	6.84	1.54	10.5	1.82	13.6	0.497	1060
×30	8.97	46.6	279	40.5	5.67	45.8	19.1	5.67	1.48	8.75	1.78	13.4	0.329	859
×26	6.13	52.3	234	33.7	5.63	38.5	8.71	3.46	1.09	5.39	1.32	13.5	0.293	396
×22	7.14	59.1	196	28.7	5.56	32.7	7.30	2.92	1.07	4.53	1.30	13.4	0.186	325

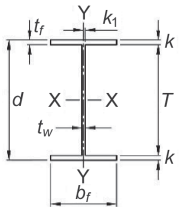


Table 4-1 (continued)

W-Shapes (Welded*)

Dimensions

Shape	Area, A	Nominal Wt.	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}	lb/ft	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W12×106	31.2	108	12.9	12⅞	0.625	⅝	⅝16	12.2	12¼	1.00	1	1.00	1	⅝16	10⅞	5½
×96	30.4	106	12.7	12¾	0.560	9⁄16	⅝16	12.2	12⅛	1.00	1	1.00	1	⅝16	10⅞	5½
×87[f2]	23.7	82.1	12.5	12½	0.500	½	¼	12.1	12⅛	0.750	¾	0.750	¾	¼	10⅞	5½
×79[f2]	23.1	80.1	12.4	12⅜	0.450	7⁄16	¼	12.1	12⅛	0.750	¾	0.750	¾	¼	10⅞	5½
×72[c2,f2]	20.0	69.3	12.3	12¼	0.450	7⁄16	¼	12.0	12	0.625	⅝	0.625	⅝	¼	11⅛	5½
×65[c2,f2]	19.1	66.2	12.1	12⅛	0.375	⅜	⅜16	12.0	12	0.625	⅝	0.625	⅝	⅜16	10⅞	5½
×58[c2,f2]	16.3	56.7	12.2	12¼	0.350	⅜	⅜16	10.0	10	0.625	⅝	0.625	⅝	⅜16	10⅞	5½
×53[c2,f2]	15.0	52.2	12.1	12	0.350	⅜	⅜16	10.0	10	0.560	9⁄16	0.560	9⁄16	⅜16	11	5½
×50[c2]	14.2	49.3	12.2	12¼	0.375	⅜	⅜16	8.08	8⅛	0.625	⅝	0.625	⅝	⅜16	10⅞	5½
×45[c2,f2]	12.9	44.6	12.1	12	0.350	⅜	⅜16	8.05	8	0.560	9⁄16	0.560	9⁄16	⅜16	11	5½
×40[c1,c2,f2]	11.1	38.4	11.9	12	0.280	¼	⅛	8.01	8	0.500	½	0.500	½	⅛	10⅞	5½
×35[c2]	10.2	35.3	12.5	12½	0.313	⅝16	⅜16	6.56	6½	0.500	½	0.500	½	⅜16	11½	3½
×30[c1,c2,f2]	8.72	30.3	12.3	12⅜	0.250	¼	⅛	6.52	6½	0.450	7⁄16	0.450	7⁄16	⅛	11⅜	3½
×26[c1,c2,f2]	7.39	25.6	12.2	12¼	0.220	¼	⅛	6.49	6½	0.375	⅜	0.375	⅜	⅛	11½	3½
×22[c1,c2]	6.17	21.4	12.3	12¼	0.250	¼	⅛	4.03	4	0.410	7⁄16	0.410	7⁄16	⅛	11½	2¼[g]
×19[c1,c2]	5.34	18.5	12.2	12⅛	0.220	¼	⅛	4.01	4	0.350	⅜	0.350	⅜	⅛	11½	2¼[g]
×16[c1,c2,f2]	4.53	15.7	12.0	12	0.220	¼	⅛	3.99	4	0.250	¼	0.250	¼	⅛	11½	2¼[g]
×14[c1,c2,f2]	4.27	14.8	11.9	11⅞	0.220	¼	⅛	3.97	4	0.220	¼	0.220	¼	⅛	11½	2¼[g]
W10×88	26.1	90.6	10.8	10⅞	0.625	⅝	⅝16	10.3	10¼	1.00	1	1.00	1	⅝16	8⅞	5½
×77	24.7	85.8	10.6	10⅝	0.500	½	¼	10.2	10¼	1.00	1	1.00	1	¼	8⅞	5½
×68	19.2	66.5	10.4	10⅜	0.450	7⁄16	¼	10.1	10⅛	0.750	¾	0.750	¾	¼	8⅞	5½
×60[f2]	16.3	56.6	10.2	10¼	0.410	7⁄16	¼	10.1	10⅛	0.625	⅝	0.625	⅝	¼	8⅞	5½
×54[f2]	15.8	54.9	10.1	10⅛	0.375	⅜	⅜16	10.0	10	0.625	⅝	0.625	⅝	⅜16	8⅞	5½
×49[c2,f2]	14.3	49.7	10.0	10	0.350	⅜	⅜16	10.0	10	0.560	9⁄16	0.560	9⁄16	⅜16	8⅞	5½
×45	13.1	45.6	10.1	10⅛	0.350	⅜	⅜16	8.02	8	0.625	⅝	0.625	⅝	⅜16	8⅞	5½
×39[c2,f2]	10.8	37.4	9.92	9⅞	0.313	⅝16	⅜16	7.99	8	0.500	½	0.500	½	⅜16	8⅞	5½
×33[c2,f2]	9.64	33.5	9.73	9¾	0.280	¼	⅛	7.96	8	0.450	7⁄16	0.450	7⁄16	⅛	8⅞	5½
×30[c2]	8.78	30.5	10.5	10½	0.313	⅝16	⅜16	5.81	5¾	0.500	½	0.500	½	⅜16	9½	2¾[g]
×26[c2]	7.54	26.2	10.3	10⅜	0.250	¼	⅛	5.77	5¾	0.450	7⁄16	0.450	7⁄16	⅛	9⅜	2¾[g]
×22[c1,c2,f2]	6.40	22.2	10.2	10⅛	0.250	¼	⅛	5.75	5¾	0.350	⅜	0.350	⅜	⅛	9½	2¾[g]
×19[c2]	5.64	19.6	10.2	10¼	0.250	¼	⅛	4.02	4	0.410	7⁄16	0.410	7⁄16	⅛	9⅜	2¾[g]
×17[c1,c2]	4.88	16.9	10.1	10⅛	0.250	¼	⅛	4.01	4	0.313	⅝16	0.313	⅝16	⅛	9½	2¼[g]
×15[c1,c2,f2]	4.37	15.2	9.99	10	0.250	¼	⅛	4.00	4	0.250	¼	0.250	¼	⅛	9½	2¼[g]
×12[c1,c2,f2]	3.43	12.2	9.87	9⅞	0.188+	⅜16	⅛	3.96	4	0.220	¼	0.220	¼	⅛	9½	2¼[g]

[c1,c2] Shape is slender for compression with F_y = 30 ksi and F_y = 65 ksi, respectively.

[f2] Shape exceeds compact limit for flexure with F_y = 65 ksi.

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

* The values in the tables apply to sections that are continuously welded with complete-joint-penetration groove welds, including laser welds.

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note: Welded sections are available both in austenitic and duplex stainless steel.

Table 4-1 (continued)
W-Shapes (Welded)
Properties

W12–W10

Shape	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
			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
W12×106	6.10	17.4	933	145	5.47	164	303	49.6	3.12	75.5	3.53	11.9	8.80	10700
×96	6.10	19.1	894	141	5.42	159	303	49.6	3.16	75.3	3.55	11.7	8.50	10400
×87	8.07	22.0	683	109	5.37	122	222	36.6	3.06	55.6	3.45	11.8	3.80	7650
×79	8.07	24.2	665	107	5.37	119	222	36.6	3.10	55.5	3.47	11.7	3.66	7520
×72	9.60	24.6	562	91.4	5.31	101	180	30.0	3.00	45.6	3.39	11.7	2.26	6140
×65	9.60	28.9	534	88.3	5.29	97.1	180	30.0	3.07	45.4	3.42	11.5	2.11	5930
×58	8.00	31.3	457	75.0	5.29	82.8	104	20.8	2.53	31.6	2.84	11.6	1.74	3490
×53	8.93	31.4	412	68.1	5.23	75.2	93.4	18.7	2.49	28.3	2.81	11.5	1.31	3110
×50	6.46	29.2	380	62.2	5.17	69.7	55.0	13.6	1.97	20.8	2.26	11.6	1.47	1840
×45	7.19	31.4	339	56.0	5.13	62.6	48.7	12.1	1.95	18.5	2.24	11.5	1.08	1620
×40	8.01	38.9	291	48.8	5.13	54.0	42.8	10.7	1.97	16.3	2.24	11.4	0.731	1390
×35	6.56	36.8	276	44.2	5.21	49.7	23.6	7.18	1.52	11.0	1.79	12.0	0.650	848
×30	7.24	45.6	237	38.5	5.21	42.9	20.8	6.38	1.54	9.74	1.79	11.9	0.445	730
×26	8.65	52.0	198	32.4	5.17	36.0	17.1	5.27	1.52	8.04	1.77	11.8	0.264	598
×22	4.91	45.9	148	24.1	4.90	27.9	4.49	2.23	0.852	3.51	1.05	11.9	0.238	159
×19	5.73	52.3	126	20.7	4.87	23.9	3.77	1.88	0.841	2.95	1.04	11.9	0.152	132
×16	7.98	52.3	96.8	16.1	4.62	19.0	2.66	1.33	0.766	2.13	0.984	11.8	0.0823	91.7
×14	9.02	52.1	87.2	14.7	4.52	17.4	2.30	1.16	0.735	1.87	0.958	11.7	0.0691	78.6
W10×88	5.15	14.1	532	98.5	4.51	113	182	35.4	2.64	53.9	3.01	9.80	7.36	4380
×77	5.10	17.2	498	94.0	4.49	107	177	34.7	2.68	52.6	3.01	9.60	6.87	4080
×68	6.73	19.8	380	73.0	4.45	82.0	129	25.5	2.59	38.7	2.92	9.65	3.04	3000
×60	8.08	21.8	314	61.6	4.39	68.7	107	21.3	2.57	32.3	2.89	9.58	1.82	2460
×54	8.00	23.6	303	59.9	4.37	66.6	104	20.8	2.57	31.6	2.87	9.48	1.75	2340
×49	8.93	25.4	270	54.0	4.35	59.8	93.4	18.7	2.55	28.3	2.86	9.44	1.28	2080
×45	6.42	25.3	246	48.6	4.33	54.3	53.8	13.4	2.02	20.4	2.29	9.48	1.39	1210
×39	7.99	28.5	196	39.5	4.26	43.9	42.5	10.6	1.99	16.2	2.25	9.42	0.743	943
×33	8.84	31.5	170	35.0	4.21	38.7	37.8	9.51	1.98	14.4	2.24	9.28	0.539	815
×30	5.81	30.4	168	31.9	4.37	36.1	16.4	5.63	1.37	8.67	1.60	10.0	0.567	409
×26	6.41	37.6	143	27.8	4.36	31.1	14.4	5.00	1.38	7.64	1.60	9.85	0.389	350
×22	8.21	38.0	116	22.7	4.25	25.5	11.1	3.86	1.32	5.93	1.55	9.85	0.211	269
×19	4.90	37.5	96.2	18.9	4.13	21.6	4.45	2.21	0.888	3.46	1.07	9.79	0.227	107
×17	6.42	37.9	77.8	15.4	3.99	17.9	3.38	1.68	0.832	2.66	1.04	9.79	0.130	80.8
×15	8.00	38.0	65.2	13.1	3.86	15.4	2.68	1.34	0.783	2.15	0.999	9.74	0.0915	63.5
×12	9.00	52.9	53.1	10.8	3.93	12.4	2.28	1.15	0.816	1.80	1.01	9.65	0.0458	53.1

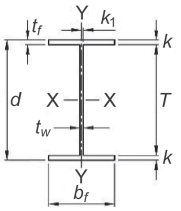


Table 4-1 (continued)
W-Shapes (Welded*)
Dimensions

Shape	Area, A	Nominal Wt.	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	Workable Gage
												k_{des}	k_{det}			
	in.^{2}	lb/ft	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W8×67	20.5	71.1	9.00	9	0.560	9/16	5/16	8.28	8¼	1.00	1	1.00	1	5/16	7⅛	5½
×58	16.0	55.4	8.75	8¾	0.500	½	¼	8.22	8¼	0.750	¾	0.750	¾	¼	7⅛	5½
×48	13.1	45.5	8.50	8½	0.410	7/16	¼	8.11	8⅛	0.625	⅝	0.625	⅝	¼	7⅛	5½
×40[f2]	11.5	40.0	8.25	8¼	0.350	⅜	3/16	8.07	8⅛	0.560	9/16	0.560	9/16	3/16	7⅛	5½
×35[f2]	10.2	35.6	8.12	8⅛	0.313	5/16	3/16	8.02	8	0.500	½	0.500	½	3/16	7⅛	5½
×31[c2,f2]	9.19	31.9	8.00	8	0.280	¼	⅛	8.00	8	0.450	7/16	0.450	7/16	¼	7⅛	5½
×28[f2]	7.89	27.4	8.06	8	0.280	¼	⅛	6.54	6½	0.450	7/16	0.450	7/16	⅛	7⅛	4
×24[c2,f2]	7.11	24.7	7.93	7⅞	0.250	¼	⅛	6.50	6½	0.410	7/16	0.410	7/16	⅛	7⅛	4
×21[c2]	6.19	21.5	8.28	8¼	0.250	¼	⅛	5.27	5¼	0.410	7/16	0.410	7/16	⅛	7½	2¾[g]
×18[c2,f2]	5.17	17.9	8.14	8⅛	0.250	¼	⅛	5.25	5¼	0.313	5/16	0.313	5/16	⅛	7½	2¾[g]
×15[c2]	4.39	15.2	8.11	8⅛	0.250	¼	⅛	4.02	4	0.313	5/16	0.313	5/16	⅛	7½	2¼[g]
×13[c2,f2]	3.87	13.4	7.99	8	0.250	¼	⅛	4.00	4	0.250	¼	0.250	¼	⅛	7½	2¼[g]
×10[c1,c2,f2]	3.06	10.9	7.89	7⅞	0.188+	3/16	⅛	3.94	4	0.220	¼	0.220	¼	⅛	7½	2¼[g]
W6×25	7.19	25.0	6.38	6⅜	0.313	5/16	3/16	6.08	6⅛	0.450	7/16	0.450	7/16	3/16	5½	3½
×20[f2]	5.88	20.4	6.20	6¼	0.250	¼	⅛	6.02	6	0.375	⅜	0.375	⅜	⅛	5½	3½
×16	4.67	16.2	6.28	6¼	0.250	¼	⅛	4.03	4	0.410	7/16	0.410	7/16	⅛	5½	2¼[g]
×15[c2,f1,f2]	4.20	14.6	5.99	6	0.220	¼	⅛	5.99	6	0.250	¼	0.250	¼	⅛	5½	3½
×12[f2]	3.44	12.0	6.03	6	0.220	¼	⅛	4.00	4	0.280	¼	0.280	¼	⅛	5½	2¼[g]
×9[c2,f2]	2.71	9.58	5.90	5⅞	0.188+	3/16	⅛	3.94	4	0.220	¼	0.220	¼	⅛	5½	2¼[g]
W5×19	5.34	18.5	5.15	5⅛	0.280	¼	⅛	5.03	5	0.410	7/16	0.410	7/16	⅛	4¼	2¾[g]
×16[f2]	4.58	15.9	5.01	5	0.250	¼	⅛	5.00	5	0.350	⅜	0.350	⅜	⅛	4¼	2¾[g]
W4×13	3.81	13.2	4.16	4⅛	0.280	¼	⅛	4.06	4	0.350	⅜	0.350	⅜	⅛	3½	2¼[g]

[c1,c2] Shape is slender for compression with F_y = 30 ksi and F_y = 65 ksi, respectively.

[f1,f2] Shape exceeds compact limit for flexure with F_y = 30 ksi and F_y = 65 ksi, respectively.

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

* The values in the tables apply to sections that are continuously welded with complete-joint-penetration groove welds, including laser welds.

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note: Welded sections are available both in austenitic and duplex stainless steel.

Table 4-1 (continued)
W-Shapes (Welded)
Properties

W8–W4

Shape	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
			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
W8×67	4.14	12.5	282	62.7	3.71	73.1	94.7	22.9	2.15	34.8	2.46	8.00	5.67	1520
×58	5.48	14.5	214	48.9	3.66	55.9	69.5	16.9	2.09	25.8	2.39	8.00	2.55	1110
×48	6.49	17.7	171	40.1	3.61	45.3	55.6	13.7	2.06	20.9	2.34	7.88	1.46	862
×40	7.21	20.4	144	35.0	3.54	39.2	49.1	12.2	2.06	18.5	2.32	7.69	1.02	726
×35	8.02	22.8	126	31.0	3.51	34.5	43.0	10.7	2.05	16.3	2.30	7.62	0.727	624
×31	8.89	25.4	111	27.8	3.48	30.7	38.4	9.60	2.04	14.5	2.29	7.55	0.529	547
×28	7.27	25.6	93.9	23.3	3.45	26.0	21.0	6.42	1.63	9.76	1.85	7.61	0.440	304
×24	7.93	28.4	82.9	20.9	3.42	23.2	18.8	5.78	1.63	8.77	1.84	7.52	0.329	265
×21	6.43	29.8	75.6	18.3	3.50	20.5	10.0	3.80	1.27	5.81	1.47	7.87	0.274	155
×18	8.40	30.1	59.2	14.5	3.39	16.4	7.56	2.88	1.21	4.43	1.43	7.83	0.145	116
×15	6.43	29.9	47.0	11.6	3.27	13.3	3.40	1.69	0.880	2.65	1.07	7.80	0.120	51.7
×13	8.00	30.0	38.7	9.69	3.16	11.2	2.68	1.34	0.831	2.12	1.03	7.74	0.0810	40.1
×10	8.95	41.8	31.7	8.02	3.21	9.13	2.25	1.14	0.856	1.77	1.04	7.67	0.0419	33.0
W6×25	6.76	17.5	52.5	16.5	2.70	18.6	16.9	5.55	1.53	8.45	1.74	5.93	0.418	148
×20	8.03	21.8	41.7	13.5	2.66	15.0	13.6	4.53	1.52	6.88	1.72	5.83	0.236	116
×16	4.91	21.8	31.9	10.2	2.61	11.6	4.48	2.22	0.979	3.41	1.14	5.87	0.207	38.6
×15	12.0	25.0	27.7	9.25	2.57	10.3	8.96	2.99	1.46	4.55	1.67	5.74	0.0818	73.8
×12	7.14	24.9	21.5	7.14	2.50	8.09	2.99	1.50	0.932	2.31	1.10	5.75	0.0773	24.7
×9	8.95	30.7	16.4	5.56	2.46	6.25	2.25	1.14	0.910	1.75	1.07	5.68	0.0381	18.1
W5×19	6.13	15.5	25.1	9.76	2.17	11.1	8.70	3.46	1.28	5.27	1.45	4.74	0.257	48.9
×16	7.14	17.2	20.7	8.27	2.13	9.32	7.30	2.92	1.26	4.44	1.43	4.66	0.163	39.6
W4×13	5.80	12.4	11.3	5.44	1.72	6.25	3.91	1.93	1.01	2.95	1.17	3.81	0.140	14.2

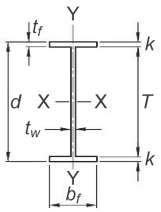


Table 4-2A
S-Shapes (Welded*)
Dimensions

Shape	Area, *A*	Nominal Wt.	Depth, *d*		Web			Flange				Distance		
					Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		*k*	*T*	Workable Gage
	in.^{2}	lb/ft	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
S24×121[c2]	33.0	114	24.5	24½	0.750	¾	⅜	8.05	8	1.00	1	1	22⅜	4
×106[c2]	29.8	103	24.5	24½	0.625	⅝	5/16	7.87	7⅞	1.00	1	1	22⅜	4
×100[c2]	31.0	108	24.0	24	0.750	¾	⅜	7.25	7¼	1.00	1	1	22¼	4
×90[c2]	28.0	97.3	24.0	24	0.625	⅝	5/16	7.13	7⅛	1.00	1	1	22¼	4
×80[c1,c2]	25.0	86.8	24.0	24	0.500	½	¼	7.00	7	1.00	1	1	22¼	4
S20×96	28.1	97.7	20.3	20¼	0.750	¾	⅜	7.20	7¼	1.00	1	1	18⅜	4
×86[c2]	25.6	88.7	20.3	20¼	0.625	⅝	5/16	7.06	7	1.00	1	1	18⅜	4
×75[c2]	21.1	73.4	20.0	20	0.625	⅝	5/16	6.39	6⅜	0.750	¾	¾	18⅜	3½[g]
×66[c2]	18.6	64.7	20.0	20	0.500	½	¼	6.26	6¼	0.750	¾	¾	18⅜	3½[g]
S18×70	21.8	75.5	18.0	18	0.750	¾	⅜	6.25	6¼	0.750	¾	¾	16⅝	3½[g]
×54.7[c1,c2]	13.1	45.5	18.0	18	0.450	7/16	¼	6.00	6	0.450	7/16	7/16	16⅝	3½[g]
S15×50	13.0	45.0	15.0	15	0.560	9/16	5/16	5.64	5⅝	0.450	7/16	7/16	13¾	3½[g]
×42.9[c2]	12.5	43.4	15.0	15	0.410	7/16	¼	5.50	5½	0.625	⅝	⅝	13¾	3½[g]
S12×50	14.9	51.8	12.0	12	0.750	¾	⅜	5.48	5½	0.625	⅝	⅝	10⅝	3[g]
×40.8	11.4	39.6	12.0	12	0.450	7/16	¼	5.25	5¼	0.625	⅝	⅝	10⅝	3[g]
×35	10.6	36.8	12.0	12	0.450	7/16	¼	5.08	5⅛	0.560	9/16	9/16	10⅞	3[g]
×31.8[c2]	9.41	32.7	12.0	12	0.350	⅜	3/16	5.00	5	0.560	9/16	9/16	10⅞	3[g]
S10×35	10.6	36.7	10.0	10	0.625	⅝	5/16	4.94	5	0.500	½	½	9	2¾[g]
×25.4[c2]	7.48	26.0	10.0	10	0.313	5/16	3/16	4.66	4⅝	0.500	½	½	9	2¾[g]
S8×23	6.65	23.1	8.00	8	0.450	7/16	¼	4.17	4⅛	0.410	7/16	7/16	7⅛	2¼[g]
×18.4	5.29	18.4	8.00	8	0.280	¼	⅛	4.00	4	0.410	7/16	7/16	7⅛	2¼[g]
S6×17.25	4.88	17.0	6.00	6	0.450	7/16	¼	3.57	3⅝	0.350	⅜	⅜	5¼	—
×12.5	3.50	12.1	6.00	6	0.220	¼	⅛	3.33	3⅜	0.350	⅜	⅜	5¼	—
S5×10	2.84	9.86	5.00	5	0.220	¼	⅛	3.00	3	0.313	5/16	5/16	4⅜	—
S4×9.5	2.64	9.18	4.00	4	0.313	5/16	3/16	2.80	2¾	0.280	¼	¼	3⅜	—
×7.7	2.10	7.42	4.00	4	0.188+	3/16	⅛	2.66	2⅝	0.280	¼	¼	3⅜	—
S3×7.5	2.13	7.40	3.00	3	0.350	⅜	3/16	2.51	2½	0.250	¼	¼	2½	—
×5.7	1.61	5.68	3.00	3	0.188+	3/16	⅛	2.33	2⅜	0.250	¼	¼	2½	—

[c1,c2] Shape is slender for compression with F_y = 30 ksi and F_y = 65 ksi, respectively.

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

* The values in the tables apply to sections that are continuously welded with complete-joint-penetration groove welds, including laser welds.

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

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note: Welded sections are available both in austenitic and duplex stainless steel.

Table 4-2A (continued)
S-Shapes (Welded)
Properties

S-SHAPES

Shape	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
			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
S24×121	4.03	30.0	2940	240	9.44	284	87.7	21.8	1.63	35.6	2.07	23.5	8.39	12100
×106	3.94	36.0	2770	226	9.64	264	81.7	20.8	1.66	33.2	2.06	23.5	6.85	11300
×100	3.63	29.3	2580	215	9.13	258	64.3	17.7	1.44	29.4	1.85	23.0	7.79	8500
×90	3.57	35.2	2440	203	9.34	240	60.9	17.1	1.47	27.6	1.85	23.0	6.32	8050
×80	3.50	44.0	2300	191	9.58	222	57.4	16.4	1.52	25.9	1.86	23.0	5.29	7590
S20×96	3.60	24.4	1730	170	7.83	202	62.9	17.5	1.49	28.5	1.89	19.3	7.23	5850
×86	3.53	29.3	1640	161	8.00	189	59.0	16.7	1.52	26.7	1.88	19.3	5.97	5500
×75	4.26	29.6	1220	122	7.59	146	33.0	10.3	1.25	17.1	1.61	19.3	3.28	3060
×66	4.17	37.0	1130	113	7.80	133	30.9	9.86	1.29	15.9	1.62	19.3	2.47	2860
S18×70	4.17	22.0	979	109	6.71	132	31.1	9.95	1.20	17.0	1.57	17.3	4.11	2310
×54.7	6.67	38.0	603	67.0	6.79	80.3	16.3	5.44	1.12	8.97	1.46	17.6	0.888	1260
S15×50	6.27	25.2	400	53.3	5.55	64.8	13.7	4.84	1.03	8.26	1.37	14.6	1.19	723
×42.9	4.40	33.5	444	59.2	5.96	68.8	17.4	6.33	1.18	10.0	1.45	14.4	1.18	899
S12×50	4.38	14.3	299	49.9	4.48	60.6	17.5	6.39	1.08	10.9	1.41	11.4	2.46	567
×40.8	4.20	23.9	259	43.2	4.77	50.3	15.2	5.77	1.15	9.16	1.41	11.4	1.16	490
×35	4.54	24.2	235	39.1	4.71	45.9	12.3	4.85	1.08	7.78	1.34	11.4	0.915	403
×31.8	4.46	31.1	221	36.8	4.85	42.4	11.7	4.68	1.12	7.33	1.35	11.4	0.719	383
S10×35	4.94	14.4	150	29.9	3.76	36.1	10.2	4.14	0.984	6.98	1.27	9.50	1.17	231
×25.4	4.66	28.8	124	24.9	4.08	28.5	8.46	3.63	1.06	5.65	1.27	9.50	0.466	191
S8×23	5.09	16.0	63.2	15.8	3.08	18.8	5.01	2.40	0.868	3.93	1.10	7.59	0.416	72.1
×18.4	4.88	25.6	55.9	14.0	3.25	16.1	4.39	2.19	0.911	3.42	1.09	7.59	0.231	63.2
S6×17.25	5.10	11.8	25.6	8.52	2.29	10.2	2.69	1.51	0.743	2.50	0.945	5.65	0.271	21.5
×12.5	4.76	24.1	21.4	7.12	2.47	8.13	2.16	1.30	0.786	2.00	0.926	5.65	0.111	17.2
S5×10	4.80	19.9	11.9	4.75	2.04	5.45	1.41	0.942	0.705	1.46	0.835	4.69	0.0752	7.76
S4×9.5	5.00	11.0	6.50	3.25	1.57	3.84	1.03	0.738	0.625	1.18	0.769	3.72	0.0777	3.57
×7.7	4.75	19.3	5.77	2.88	1.66	3.30	0.880	0.662	0.647	1.02	0.753	3.72	0.0441	3.04
S3×7.5	5.02	7.14	2.84	1.89	1.15	2.27	0.668	0.532	0.560	0.864	0.697	2.75	0.0650	1.26
×5.7	4.66	14.0	2.44	1.63	1.23	1.88	0.528	0.453	0.573	0.699	0.668	2.75	0.0284	0.999

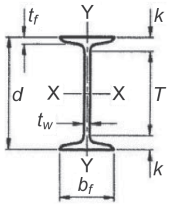


Table 4-2B
S-Shapes (Hot Rolled)
Dimensions

	Area, *A*	Nominal Wt.	Depth, *d*		Web			Flange				Distance		
					Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		*k*	*T*	Workable Gage
Shape	in.^{2}	lb/ft	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
S6×12.5	3.66	12.7	6.00	6	0.232	¼	⅛	3.33	3⅜	0.359	⅜	3⁄16	4⅜	—
S5×10	2.88	10.2	5.00	5	0.214$^+$	3⁄16	⅛	3.00	3	0.326	5⁄16	¾	3½	—
S4×7.7	2.23	7.85	4.00	4	0.193$^+$	3⁄16	⅛	2.66	2⅝	0.293	5⁄16	¾	2½	—
S3×5.7	1.64	5.76	3.00	3	0.170$^+$	3⁄16	⅛	2.33	2⅜	0.260	¼	⅝	1¾	—

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

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note: Hot-rolled sections are only available in austenitic stainless steel.

Table 4-2B (continued)
S-Shapes (Hot Rolled)
Properties

S-SHAPES

Shape	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
			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
S6×12.5	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
S5×10	4.60	17.7	12.2	4.89	2.06	5.61	1.19	0.793	0.642	1.36	0.754	4.67	0.111	6.50
S4×7.7	4.54	14.8	6.02	3.01	1.64	3.47	0.748	0.562	0.579	0.967	0.678	3.71	0.0715	2.57
S3×5.7	4.48	11.6	2.49	1.66	1.23	1.93	0.447	0.384	0.522	0.654	0.607	2.74	0.0425	0.839

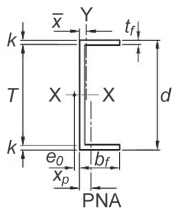


Table 4-3A
C-Shapes (Welded*)
Dimensions

Shape	Area, A	Nominal Wt.	Depth, d		Web Thickness, t_w		$\frac{t_w}{2}$	Flange Width, b_f		Flange Average Thickness, t_f		Distance k	Distance T	Distance Workable Gage	r_{ts}	h_o
	in.^{2}	lb/ft	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
C15×50	15.0	52.0	15.0	15	0.750	¾	⅜	3.72	3¾	0.625	⅝	⅝	13¾	2¼	1.21	14.4
×40[c2]	11.3	39.1	15.0	15	0.500	½	¼	3.52	3½	0.625	⅝	⅝	13¾	2	1.21	14.4
×33.9[c2]	9.89	34.3	15.0	15	0.410	7⁄16	¼	3.40	3⅜	0.625	⅝	⅝	13¾	2	1.19	14.4
C12×30	8.67	30.1	12.0	12	0.500	½	¼	3.17	3⅛	0.500	½	½	11	1¾[g]	1.08	11.5
×25[c2]	7.18	24.9	12.0	12	0.375	⅜	3⁄16	3.05	3	0.500	½	½	11	1¾[g]	1.06	11.5
×20.7[c1,c2]	6.02	20.9	12.0	12	0.280	¼	⅛	2.94	3	0.500	½	½	11	1¾[g]	1.04	11.5
C10×30	8.41	29.2	10.0	10	0.625	⅝	5⁄16	3.03	3	0.450	7⁄16	7⁄16	9¼	1¾[g]	0.992	9.55
×25	7.15	24.8	10.0	10	0.500	½	¼	2.89	2⅞	0.450	7⁄16	7⁄16	9¼	1¾[g]	0.974	9.55
×20	5.88	20.4	10.0	10	0.375	⅜	3⁄16	2.74	2¾	0.450	7⁄16	7⁄16	9¼	1½[g]	0.949	9.55
×15.3[c2]	4.62	16.0	10.0	10	0.250	¼	⅛	2.60	2⅝	0.450	7⁄16	7⁄16	9¼	1½[g]	0.919	9.55
C9×20	5.85	20.3	9.00	9	0.450	7⁄16	¼	2.65	2⅝	0.410	7⁄16	7⁄16	8⅛	1½[g]	0.897	8.59
×15[c2]	4.33	15.0	9.00	9	0.280	¼	⅛	2.49	2½	0.410	7⁄16	7⁄16	8⅛	1⅜[g]	0.875	8.59
×13.4[c2]	4.04	14.0	9.00	9	0.250	¼	⅛	2.43	2⅜	0.410	7⁄16	7⁄16	8⅛	1⅜[g]	0.857	8.59
C8×18.75	5.52	19.2	8.00	8	0.500	½	¼	2.53	2½	0.375	⅜	⅜	7¼	1½[g]	0.838	7.63
×13.75	4.17	14.5	8.00	8	0.313	5⁄16	3⁄16	2.34	2⅜	0.410	7⁄16	7⁄16	7¼	1⅜[g]	0.816	7.59
×11.5[c2]	3.29	11.4	8.00	8	0.220	¼	⅛	2.26	2¼	0.375	⅜	⅜	7¼	1⅜[g]	0.798	7.63
C7×14.75	4.19	14.6	7.00	7	0.410	7⁄16	¼	2.30	2¼	0.350	⅜	⅜	6¼	1¼[g]	0.779	6.65
×12.25	3.50	12.2	7.00	7	0.313	5⁄16	3⁄16	2.19	2¼	0.350	⅜	⅜	6¼	1¼[g]	0.760	6.65
×9.8[c2]	2.85	9.89	7.00	7	0.220	¼	⅛	2.09	2⅛	0.350	⅜	⅜	6¼	1¼[g]	0.737	6.65
C6×13	3.90	13.5	6.00	6	0.450	7⁄16	¼	2.16	2⅛	0.350	⅜	⅜	5⅜	1⅜[g]	0.724	5.65
×10.5	3.08	10.7	6.00	6	0.313	5⁄16	3⁄16	2.03	2	0.350	⅜	⅜	5⅜	1⅛[g]	0.704	5.65
×8.2	2.51	8.72	6.00	6	0.220	¼	⅛	1.92	1⅞	0.350	⅜	⅜	5⅜	1⅛[g]	0.675	5.65
C5×9	2.55	8.86	5.00	5	0.313	5⁄16	3⁄16	1.89	1⅞	0.313	5⁄16	5⁄16	4⅜	1⅛[g]	0.653	4.69
×6.7	1.88	6.66	5.00	5	0.188+	3⁄16	⅛	1.75	1¾	0.313	5⁄16	5⁄16	4⅜	—	0.616	4.69
C4×7.25	2.04	7.08	4.00	4	0.313	5⁄16	3⁄16	1.72	1¾	0.280	¼	¼	3⅜	1[g]	0.592	3.72
×6.25	1.78	6.19	4.00	4	0.250	¼	⅛	1.65	1⅝	0.280	¼	¼	3⅜	—	0.575	3.72
×5.4	1.50	5.32	4.00	4	0.188+	3⁄16	⅛	1.58	1⅝	0.280	¼	¼	3⅜	—	0.555	3.72
C3×6	1.75	6.08	3.00	3	0.350	⅜	3⁄16	1.60	1⅝	0.280	¼	¼	2½	—	0.547	2.72
×5	1.45	5.03	3.00	3	0.250	¼	⅛	1.50	1½	0.280	¼	¼	2½	—	0.522	2.72
×4.1	1.23	4.33	3.00	3	0.188+	3⁄16	⅛	1.41	1⅜	0.280	¼	¼	2½	—	0.493	2.72

[c1,c2] Shape is slender for compression with F_y = 30 ksi and F_y = 65 ksi, respectively.

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

* The values in the tables apply to sections that are continuously welded with complete-joint-penetration groove welds, including laser welds.

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

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note: Welded sections are available both in austenitic and duplex stainless steel.

Table 4-3A (continued)
C-Shapes (Welded)
Properties

C-SHAPES

Shape	Shear Ctr., e_o	Axis X-X				Axis Y-Y						Torsional Properties			H
		I	S	r	Z	I	S	r	$\bar{x}$	Z	x_p	J	C_w	$\bar{r}_o$	
	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}	in.	
C15×50	0.524	403	53.7	5.19	68.9	12.9	4.48	0.929	0.837	8.78	0.499	2.55	482	5.44	0.938
×40	0.781	336	44.8	5.46	55.3	10.8	4.03	0.979	0.839	7.34	0.376	1.11	398	5.78	0.921
×33.9	0.866	309	41.1	5.59	49.9	9.59	3.76	0.985	0.848	6.75	0.330	0.819	350	5.93	0.916
C12×30	0.631	160	26.7	4.30	33.4	6.35	2.61	0.856	0.738	4.83	0.361	0.714	150	4.59	0.911
×25	0.765	142	23.7	4.46	28.9	5.55	2.42	0.879	0.756	4.35	0.299	0.429	130	4.79	0.899
×20.7	0.872	128	21.4	4.62	25.4	4.80	2.23	0.893	0.790	4.00	0.251	0.303	111	4.99	0.889
C10×30	0.437	101	20.3	3.47	26.0	4.94	2.12	0.766	0.702	4.14	0.421	0.940	80.7	3.73	0.907
×25	0.540	90.7	18.1	3.56	22.8	4.27	1.94	0.773	0.685	3.62	0.358	0.554	69.5	3.85	0.899
×20	0.652	79.8	16.0	3.68	19.5	3.58	1.74	0.781	0.684	3.15	0.294	0.316	57.8	4.00	0.888
×15.3	0.787	69.1	13.8	3.87	16.3	2.92	1.56	0.796	0.721	2.79	0.231	0.190	46.5	4.23	0.873
C9×20	0.511	60.6	13.5	3.22	16.9	2.99	1.48	0.714	0.633	2.76	0.325	0.369	39.3	3.49	0.893
×15	0.690	50.5	11.2	3.41	13.5	2.39	1.31	0.742	0.661	2.34	0.241	0.165	30.9	3.74	0.870
×13.4	0.711	48.2	10.7	3.45	12.7	2.19	1.24	0.737	0.663	2.22	0.224	0.144	28.2	3.79	0.869
C8×18.75	0.404	43.5	10.9	2.81	13.8	2.37	1.23	0.655	0.599	2.35	0.345	0.397	24.6	3.05	0.892
×13.75	0.600	37.3	9.33	2.99	11.3	1.96	1.14	0.685	0.623	2.05	0.260	0.173	19.7	3.31	0.863
×11.5	0.688	31.6	7.91	3.10	9.35	1.58	0.974	0.694	0.636	1.75	0.206	0.0981	16.1	3.44	0.852
C7×14.75	0.442	26.4	7.53	2.51	9.42	1.63	0.942	0.624	0.568	1.75	0.300	0.211	12.8	2.77	0.868
×12.25	0.527	23.5	6.71	2.59	8.20	1.39	0.855	0.629	0.567	1.55	0.250	0.124	10.8	2.88	0.856
×9.8	0.622	20.8	5.94	2.70	7.05	1.16	0.774	0.638	0.590	1.39	0.204	0.0770	8.95	3.03	0.840
C6×13	0.370	17.7	5.89	2.13	7.43	1.30	0.814	0.579	0.557	1.54	0.325	0.226	7.30	2.39	0.850
×10.5	0.490	15.2	5.08	2.22	6.21	1.07	0.721	0.588	0.553	1.31	0.257	0.109	5.94	2.53	0.830
×8.2	0.572	13.5	4.49	2.32	5.34	0.869	0.641	0.588	0.565	1.16	0.209	0.0686	4.83	2.65	0.815
C5×9	0.441	8.69	3.48	1.85	4.27	0.758	0.554	0.545	0.522	1.01	0.255	0.0821	2.90	2.15	0.800
×6.7	0.565	7.27	2.91	1.97	3.42	0.563	0.469	0.548	0.548	0.849	0.251	0.0406	2.16	2.33	0.771
C4×7.25	0.385	4.40	2.20	1.47	2.72	0.498	0.404	0.494	0.489	0.737	0.255	0.0602	1.19	1.78	0.759
×6.25	0.434	4.05	2.03	1.51	2.46	0.432	0.372	0.492	0.488	0.671	0.223	0.0408	1.04	1.83	0.747
×5.4	0.500	3.67	1.84	1.57	2.17	0.364	0.338	0.493	0.503	0.611	0.241	0.0276	0.878	1.92	0.728
C3×6	0.335	2.09	1.39	1.09	1.74	0.371	0.335	0.460	0.495	0.611	0.292	0.0592	0.469	1.45	0.671
×5	0.406	1.86	1.24	1.13	1.51	0.299	0.295	0.454	0.487	0.531	0.242	0.0334	0.383	1.51	0.651
×4.1	0.452	1.68	1.12	1.17	1.34	0.238	0.258	0.441	0.486	0.462	0.316	0.0232	0.310	1.56	0.640

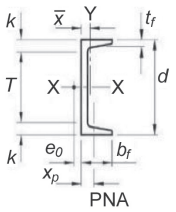


Table 4-3B
C-Shapes (Hot Rolled)

Shape	Area, A	Nominal Wt.	Depth, d		Web Thickness, t_w		$\frac{t_w}{2}$	Flange Width, b_f		Flange Average Thickness, t_f		Distance k	Distance T	Distance Workable Gage	r_{ts}	h_o
	in.^{2}	lb/ft	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
C8×18.75	5.51	19.1	8.00	8	0.487	½	¼	2.53	2½	0.390	⅜	15⁄16	6⅛	1½[g]	0.800	7.61
C6×10.5	3.07	10.7	6.00	6	0.314	5⁄16	3⁄16	2.03	2	0.343	5⁄16	13⁄16	4⅜	1⅛[g]	0.669	5.66
×8.2	2.34	8.30	6.00	6	0.200+	3⁄16	⅛	1.92	1⅞	0.343	5⁄16	13⁄16	4⅜	1⅛[g]	0.642	5.66
C5×9	2.64	9.17	5.00	5	0.325	5⁄16	3⁄16	1.89	1⅞	0.320	5⁄16	¾	3½	1⅛[g]	0.616	4.68
×6.7	1.93	6.84	5.00	5	0.190+	3⁄16	⅛	1.75	1¾	0.320	5⁄16	¾	3½	—	0.584	4.68
C4×7.25	2.13	7.40	4.00	4	0.321	5⁄16	3⁄16	1.72	1¾	0.296	5⁄16	¾	2½	1[g]	0.563	3.70
×5.4	1.55	5.49	4.00	4	0.184+	3⁄16	⅛	1.58	1⅝	0.296	5⁄16	¾	2½	—	0.528	3.70
C3×4.1	1.18	4.17	3.00	3	0.170+	3⁄16	⅛	1.41	1⅜	0.273	¼	11⁄16	1⅝	—	0.469	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.

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note: Hot-rolled sections are only available in austenitic stainless steel.

Table 4-3B (continued)

C-Shapes (Hot Rolled)

Properties

C-SHAPES

	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
Shape	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.	
C8×18.75	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
C6×10.5	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	0.615	13.0	4.33	2.36	5.10	0.682	0.487	0.540	0.519	0.986	0.239	0.0711	4.67	2.67	0.820
C5×9	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	0.566	7.42	2.97	1.96	3.51	0.466	0.370	0.492	0.490	0.757	0.245	0.0531	2.21	2.28	0.786
C4×7.25	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
×5.4	0.514	3.82	1.91	1.57	2.27	0.310	0.277	0.447	0.462	0.564	0.253	0.0386	0.916	1.90	0.737
C3×4.1	0.472	1.64	1.09	1.18	1.31	0.190	0.196	0.401	0.441	0.398	0.277	0.0261	0.306	1.54	0.650

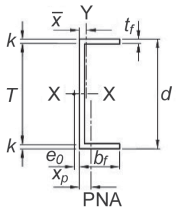


Table 4-4
MC-Shapes (Welded*)
Dimensions

Shape	Area, A	Nominal Wt.	Depth, d		Web Thickness, t_w		$\frac{t_w}{2}$	Flange Width, b_f		Flange Average Thickness, t_f		Distance k	Distance T	Distance Workable Gage	r_{ts}	h_o
	in.^{2}	lb/ft	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
MC8×19.9[c2,f1,f2]	5.72	19.9	8.00	8	0.375	3/8	3/16	4.00	4	0.375	3/8	3/8	7¼	2½	1.41	7.63
×13.5[c1,c2,f1,f2]	3.88	13.5	8.00	8	0.250	¼	⅛	4.00	4	0.250	¼	¼	7½	2½	1.42	7.75
MC6×14.6[f2]	4.22	14.6	6.00	6	0.375	3/8	3/16	3.00	3	0.375	3/8	3/8	5¼	2[g]	1.05	5.63
×10[c2,f1,f2]	2.88	9.98	6.00	6	0.250	¼	⅛	3.00	3	0.250	¼	¼	5½	2[g]	1.06	5.75
MC4×6.5[f2]]	1.88	6.51	4.00	4	0.250	¼	⅛	2.00	2	0.250	¼	¼	3½	—	0.702	3.75
×6.1[f2]	1.75	6.08	4.00	4	0.250	¼	⅛	1.75	1¾	0.250	¼	¼	3½	—	0.611	3.75
MC3×4.8	1.38	4.77	3.00	3	0.250	¼	⅛	1.50	1½	0.250	¼	¼	2½	—	0.521	2.75
×3.5[f2]	0.965	3.51	3.00	3	0.188+	3/16	⅛	1.38	1⅜	0.188+	3/16	3/16	2⅝	—	0.484	2.82
MC2×3	0.875	3.04	2.00	2	0.250	¼	⅛	1.00	1	0.250	¼	¼	1½	—	0.342	1.75
×2.4	0.651	2.37	2.00	2	0.188+	3/16	⅛	1.00	1	0.188+	3/16	3/16	1⅝	—	0.347	1.82
×1.6[f2]	0.447	1.63	2.00	2	0.125+	⅛	1/16	1.00	1	0.125+	⅛	⅛	1¾	—	0.351	1.88

[c1,c2] Shape is slender for compression with F_y = 30 ksi and F_y = 65 ksi, respectively.

[f1,f2] Shape exceeds compact limit for flexure with F_y = 30 ksi and F_y = 65 ksi, respectively.

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

* The values in the tables apply to sections that are continuously welded with complete-joint-penetration groove welds, including laser welds.

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

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note: Welded sections are available both in austenitic and duplex stainless steel.

Table 4-4 (continued)
MC-Shapes (Welded)
Properties

MC-SHAPES

Shape	Shear Ctr., e_o	Axis X-X				Axis Y-Y						Torsional Properties			H
		I	S	r	Z	I	S	r	$\bar{x}$	Z	x_p	J	C_w	$\bar{r}_o$	
	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.	
MC8×19.9	1.24	55.5	13.9	3.12	16.4	8.72	3.05	1.23	1.14	5.49	0.357	0.265	88.4	4.11	0.665
×13.5	1.33	38.8	9.71	3.17	11.3	6.08	2.09	1.25	1.09	3.77	0.242	0.0802	63.8	4.18	0.664
MC6×14.6	0.867	22.3	7.45	2.30	8.91	3.52	1.67	0.913	0.888	3.00	0.352	0.195	19.4	3.03	0.666
×10	0.953	15.9	5.29	2.35	6.20	2.49	1.15	0.930	0.842	2.08	0.240	0.0594	14.4	3.10	0.665
MC4×6.5	0.578	4.41	2.21	1.53	2.64	0.695	0.494	0.609	0.592	0.890	0.234	0.0386	1.70	2.02	0.666
×6.1	0.462	3.97	1.99	1.51	2.41	0.474	0.379	0.520	0.500	0.684	0.219	0.0359	1.16	1.86	0.733
MC3×4.8	0.391	1.75	1.16	1.13	1.42	0.277	0.268	0.449	0.466	0.483	0.229	0.0281	0.362	1.49	0.667
×3.5	0.384	1.26	0.838	1.14	1.01	0.166	0.169	0.415	0.396	0.305	0.161	0.0101	0.231	1.44	0.708
MC2×3	0.203	0.456	0.456	0.722	0.578	0.0738	0.112	0.290	0.339	0.201	0.219	0.0177	0.0384	0.948	0.673
×2.4	0.252	0.363	0.363	0.747	0.446	0.0577	0.0842	0.298	0.315	0.152	0.163	0.00678	0.0330	0.984	0.668
×1.6	0.293	0.265	0.265	0.770	0.316	0.0416	0.0589	0.305	0.294	0.106	0.112	0.00207	0.0256	1.01	0.665

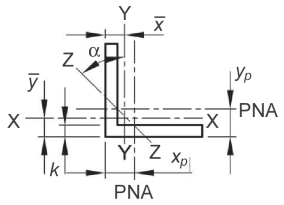


Table 4-5A
Equal-Leg Angles (Welded*)
Properties

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.
L8×8×¾[c2]	¾	39.7	11.4	69.7	12.2	2.47	2.28	22.0	0.715	2.14	10.4	4.41
×⅝[c1,c2]	⅝	33.4	9.61	59.4	10.3	2.49	2.23	18.6	0.601	1.25	6.16	4.44
×½[c1,c2]	½	26.9	7.75	48.6	8.36	2.50	2.19	15.1	0.484	0.646	3.23	4.48
×⅜[c1,c2]	⅜	20.3	5.86	37.3	6.37	2.52	2.14	11.5	0.366	0.275	1.40	4.51
×¼[c1,c2]	¼	13.7	3.94	25.5	4.31	2.54	2.09	7.76	0.246	0.0820	0.424	4.55
L6×6×¾	¾	29.3	8.44	28.2	6.66	1.83	1.78	12.0	0.703	1.58	4.17	3.25
×⅝[c2]	⅝	24.7	7.11	24.2	5.66	1.84	1.73	10.2	0.592	0.926	2.50	3.29
×½[c2]	½	20.0	5.75	19.9	4.61	1.86	1.68	8.31	0.479	0.479	1.32	3.32
×⅜[c1,c2]	⅜	15.1	4.36	15.4	3.53	1.88	1.64	6.35	0.363	0.204	0.575	3.36
×¼[c1,c2]	¼	10.2	2.94	10.6	2.40	1.90	1.59	4.32	0.245	0.0612	0.176	3.39
L5×5×¾	¾	24.1	6.94	15.7	4.53	1.51	1.52	8.16	0.694	1.30	2.32	2.68
×⅝	⅝	20.3	5.86	13.6	3.86	1.52	1.48	6.95	0.586	0.763	1.40	2.71
×½[c2]	½	16.5	4.75	11.3	3.16	1.54	1.43	5.68	0.475	0.396	0.744	2.75
×⅜[c1,c2]	⅜	12.5	3.61	8.74	2.42	1.56	1.39	4.36	0.361	0.169	0.327	2.78
×5/16[c1,c2]	5/16	10.5	3.03	7.43	2.04	1.57	1.37	3.68	0.303	0.0990	0.194	2.80
×¼[c1,c2]	¼	8.46	2.44	6.05	1.65	1.57	1.34	2.98	0.244	0.0508	0.101	2.82
L4×4×½	½	13.0	3.75	5.56	1.97	1.22	1.18	3.56	0.469	0.313	0.366	2.17
×⅜[c2]	⅜	9.93	2.86	4.36	1.52	1.23	1.14	2.74	0.357	0.134	0.162	2.20
×¼[c1,c2]	¼	6.73	1.94	3.04	1.05	1.25	1.09	1.88	0.242	0.0404	0.0505	2.24
L3½×3½×⅜[c2]	⅜	8.63	2.48	2.87	1.15	1.07	1.01	2.08	0.355	0.116	0.106	1.92
×¼[c1,c2]	¼	5.86	1.69	2.01	0.794	1.09	0.968	1.43	0.241	0.0352	0.0334	1.95
L3×3×½	½	9.55	2.75	2.22	1.07	0.898	0.932	1.93	0.458	0.229	0.144	1.59
×⅜	⅜	7.32	2.11	1.76	0.833	0.913	0.888	1.50	0.352	0.0989	0.0652	1.63
×¼[c2]	¼	4.99	1.44	1.24	0.577	0.930	0.842	1.04	0.240	0.0299	0.0206	1.66
×3/16[c1,c2] +	3/16	3.79	1.04	0.920	0.421	0.941	0.816	0.759	0.173	0.0111	0.00780	1.68
L2½×2½×⅜	⅜	6.02	1.73	0.984	0.566	0.753	0.762	1.02	0.347	0.0813	0.0362	1.34
×¼[c2]	¼	4.12	1.19	0.703	0.394	0.769	0.717	0.711	0.238	0.0247	0.0116	1.37
×3/16[c1,c2] +	3/16	3.14	0.861	0.523	0.289	0.780	0.691	0.521	0.172	0.00916	0.00443	1.39
L2×2×⅜	⅜	4.72	1.36	0.479	0.351	0.594	0.636	0.633	0.340	0.0637	0.0174	1.05
×¼	¼	3.26	0.938	0.348	0.247	0.609	0.592	0.445	0.234	0.0195	0.00572	1.08
×3/16[c2] +	3/16	2.49	0.683	0.261	0.182	0.619	0.566	0.328	0.171	0.00726	0.00221	1.10
×⅛[c1,c2] +	⅛	1.68	0.461	0.181	0.125	0.627	0.544	0.224	0.115	0.00217	0.000680	1.12

[c1,c2] Shape is slender for compression with F_y = 30 ksi and F_y = 65 ksi, respectively.

* The values in the tables apply to sections that are continuously welded with complete-joint-penetration groove welds, including laser welds.

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note 1: For workable gages, refer to Table 4-5C.

Note 2: Welded sections are available in austenitic and duplex stainless steel.

Table 4-5A (continued)

Equal-Leg Angles (Welded)

Properties

EQUAL-LEG ANGLES

	Axis Y-Y						Axis Z-Z			
	I	*S*	*r*	$\bar{x}$	*Z*	x_p	*I*	*S*	*r*	Tan
Shape	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	α
L8×8×¾	69.7	12.2	2.47	2.28	22.0	0.715	28.3	8.80	1.57	1.00
×⅝	59.4	10.3	2.49	2.23	18.6	0.601	24.0	7.62	1.58	1.00
×½	48.6	8.36	2.50	2.19	15.1	0.484	19.6	6.35	1.59	1.00
×⅜	37.3	6.37	2.52	2.14	11.5	0.366	15.0	4.96	1.60	1.00
×¼	25.5	4.31	2.54	2.09	7.76	0.246	10.2	3.43	1.61	1.00
L6×6×¾	28.2	6.66	1.83	1.78	12.0	0.703	11.7	4.64	1.18	1.00
×⅝	24.2	5.66	1.84	1.73	10.2	0.592	9.86	4.03	1.18	1.00
×½	19.9	4.61	1.86	1.68	8.31	0.479	8.11	3.40	1.19	1.00
×⅜	15.4	3.53	1.88	1.64	6.35	0.363	6.20	2.67	1.19	1.00
×¼	10.6	2.40	1.90	1.59	4.32	0.245	4.24	1.88	1.20	1.00
L5×5×¾	15.7	4.53	1.51	1.52	8.16	0.694	6.59	3.06	0.975	1.00
×⅝	13.6	3.86	1.52	1.48	6.95	0.586	5.60	2.68	0.977	1.00
×½	11.3	3.16	1.54	1.43	5.68	0.475	4.59	2.26	0.983	1.00
×⅜	8.74	2.42	1.56	1.39	4.36	0.361	3.53	1.80	0.990	1.00
×5⁄16	7.43	2.04	1.57	1.37	3.68	0.303	3.00	1.55	0.995	1.00
×¼	6.05	1.65	1.57	1.34	2.98	0.244	2.43	1.28	0.998	1.00
L4×4×½	5.56	1.97	1.22	1.18	3.56	0.469	2.29	1.37	0.782	1.00
×⅜	4.36	1.52	1.23	1.14	2.74	0.357	1.77	1.10	0.786	1.00
×¼	3.04	1.05	1.25	1.09	1.88	0.242	1.23	0.795	0.797	1.00
L3½×3½×⅜	2.87	1.15	1.07	1.01	2.08	0.355	1.18	0.820	0.688	1.00
×¼	2.01	0.794	1.09	0.968	1.43	0.241	0.810	0.592	0.693	1.00
L3×3×½	2.22	1.07	0.898	0.932	1.93	0.458	0.936	0.711	0.584	1.00
×⅜	1.76	0.833	0.913	0.888	1.50	0.352	0.730	0.581	0.588	1.00
×¼	1.24	0.577	0.930	0.842	1.04	0.240	0.504	0.423	0.592	1.00
×3⁄16	0.920	0.421	0.941	0.816	0.759	0.173	0.346	0.300	0.577	1.00
L2½×2½×⅜	0.984	0.566	0.753	0.762	1.02	0.347	0.412	0.382	0.487	1.00
×¼	0.703	0.394	0.769	0.717	0.711	0.238	0.287	0.283	0.492	1.00
×3⁄16	0.523	0.289	0.780	0.691	0.521	0.172	0.197	0.202	0.479	1.00
L2×2×⅜	0.479	0.351	0.594	0.636	0.633	0.340	0.206	0.229	0.389	1.00
×¼	0.348	0.247	0.609	0.592	0.445	0.234	0.144	0.172	0.391	1.00
×3⁄16	0.261	0.182	0.619	0.566	0.328	0.171	0.0991	0.124	0.381	1.00
×⅛	0.181	0.125	0.627	0.544	0.224	0.115	0.0683	0.0887	0.385	1.00

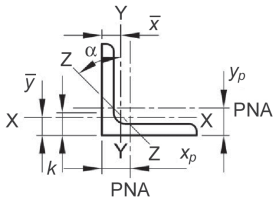


Table 4-5B
Equal-Leg Angles (Hot Rolled)
Properties

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.
L6×6×½[c2]	1	20.0	5.77	19.9	4.59	1.86	1.67	8.22	0.481	0.501	1.32	3.31
×⅜[c1,c2]	⅞	15.2	4.38	15.4	3.51	1.87	1.62	6.27	0.365	0.218	0.575	3.34
L5×5×½[c2]	1	16.6	4.79	11.3	3.15	1.53	1.42	5.66	0.479	0.417	0.744	2.73
×⅜[c1,c2]	⅞	12.7	3.65	8.76	2.41	1.55	1.37	4.33	0.365	0.183	0.327	2.76
L4×4×½	⅞	13.0	3.75	5.52	1.96	1.21	1.18	3.50	0.469	0.322	0.366	2.16
×⅜[c2]	¾	9.93	2.86	4.32	1.50	1.23	1.13	2.69	0.358	0.141	0.162	2.19
×¼[c1,c2]	⅝	6.70	1.93	3.00	1.03	1.25	1.08	1.82	0.241	0.0438	0.0505	2.22
L3½×3½×⅜[c2]	¾	8.68	2.50	2.86	1.15	1.07	1.00	2.06	0.357	0.123	0.106	1.90
×¼[c1,c2]	⅝	5.90	1.70	2.00	0.787	1.09	0.954	1.41	0.243	0.0386	0.0334	1.93
L3×3×½	⅞	9.58	2.76	2.20	1.06	0.895	0.929	1.91	0.460	0.230	0.144	1.59
×⅜	¾	7.33	2.11	1.75	0.825	0.910	0.884	1.48	0.352	0.101	0.0652	1.62
×¼[c2]	⅝	5.00	1.44	1.23	0.569	0.926	0.836	1.02	0.240	0.0313	0.0206	1.65
×3⁄16[c1,c2] +	9⁄16	3.78	1.03	0.894	0.407	0.930	0.802	0.737	0.172	0.0118	0.00775	1.66
L2½×2½×⅜	⅝	6.01	1.73	0.972	0.558	0.749	0.758	1.01	0.346	0.0833	0.0362	1.33
×¼[c2]	½	4.13	1.19	0.692	0.387	0.764	0.711	0.695	0.238	0.0261	0.0116	1.36
×3⁄16[c1,c2] +	7⁄16	3.13	0.854	0.504	0.277	0.768	0.680	0.505	0.171	0.00981	0.00440	1.38
L2×2×⅜	⅝	4.76	1.37	0.476	0.348	0.591	0.632	0.629	0.343	0.0658	0.0174	1.05
×¼	½	3.28	0.944	0.346	0.244	0.605	0.586	0.440	0.236	0.0209	0.00572	1.08
×3⁄16[c2] +	7⁄16	2.51	0.684	0.255	0.176	0.611	0.555	0.323	0.171	0.00791	0.00219	1.09
×⅛[c1,c2] +	⅜	1.70	0.467	0.179	0.121	0.620	0.525	0.219	0.117	0.00263	0.000680	1.09

[c1,c2] Shape is slender for compression with F_y = 30 ksi and F_y = 65 ksi, respectively.

\+ The design thickness is equal to 0.95 times the nominal thickness.

Note 1: For workable gages, refer to Table 4-5C.

Note 2: Hot-rolled sections are only available in austenitic stainless steel.

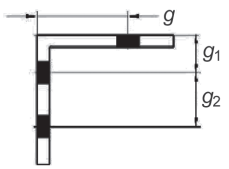
Table 4-5B (continued)

Equal-Leg Angles (Hot Rolled)
Properties

EQUAL-LEG ANGLES

	Axis Y-Y						Axis Z-Z			
	I	*S*	*r*	$\bar{x}$	*Z*	x_p	*I*	*S*	*r*	Tan
Shape	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.	α
L6×6×½	19.9	4.59	1.86	1.67	8.22	0.481	8.06	3.42	1.18	1.00
×⅜	15.4	3.51	1.87	1.62	6.27	0.365	6.21	2.71	1.19	1.00
L5×5×½	11.3	3.15	1.53	1.42	5.66	0.479	4.64	2.31	0.980	1.00
×⅜	8.76	2.41	1.55	1.37	4.33	0.365	3.55	1.83	0.986	1.00
L4×4×½	5.52	1.96	1.21	1.18	3.50	0.469	2.25	1.35	0.776	1.00
×⅜	4.32	1.50	1.23	1.13	2.69	0.358	1.73	1.08	0.779	1.00
×¼	3.00	1.03	1.25	1.08	1.82	0.241	1.19	0.778	0.783	1.00
L3½×3½×⅜	2.86	1.15	1.07	1.00	2.06	0.357	1.17	0.830	0.683	1.00
×¼	2.00	0.787	1.09	0.954	1.41	0.243	0.802	0.594	0.688	1.00
L3×3×½	2.20	1.06	0.895	0.929	1.91	0.460	0.922	0.704	0.580	1.00
×⅜	1.75	0.825	0.910	0.884	1.48	0.352	0.716	0.573	0.581	1.00
×¼	1.23	0.569	0.926	0.836	1.02	0.240	0.490	0.415	0.585	1.00
×3⁄16	0.894	0.407	0.930	0.802	0.737	0.172	0.353	0.311	0.584	1.00
L2½×2½×⅜	0.972	0.558	0.749	0.758	1.01	0.346	0.400	0.374	0.481	1.00
×¼	0.692	0.387	0.764	0.711	0.695	0.238	0.276	0.273	0.482	1.00
×3⁄16	0.504	0.277	0.768	0.680	0.505	0.171	0.197	0.205	0.480	1.00
L2×2×⅜	0.476	0.348	0.591	0.632	0.629	0.343	0.203	0.227	0.386	1.00
×¼	0.346	0.244	0.605	0.586	0.440	0.236	0.142	0.171	0.387	1.00
×3⁄16	0.255	0.176	0.611	0.555	0.323	0.171	0.103	0.131	0.387	1.00
×⅛	0.179	0.121	0.620	0.525	0.219	0.117	0.0722	0.0973	0.393	1.00

Table 4-5C
Workable Gages in Equal-Leg Angles, in.



Leg	8	6	5	4	3½	3	2½	2
g	4½	3½	3	2½	2	1¾	1⅜	1⅛
g_1	3	2¼	2	—	—	—	—	—
g_2	3	2½	2	—	—	—	—	—

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

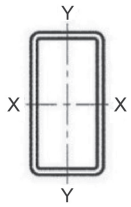


Table 4-6A
Rectangular HSS
Dimensions and Properties

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}
HSS16×8×0.500	0.475	77.6	21.3	13.8	30.7	692	86.5	5.70	108
×0.375	0.356	59.3	16.3	19.5	41.9	540	67.5	5.76	83.6
×0.312	0.296	49.8	13.6	24.0	51.1	458	57.3	5.80	70.5
×0.250*	0.238	40.2	11.1	30.6	64.2	376	47.0	5.83	57.5
HSS14×10×0.500	0.475	77.6	21.3	18.1	26.5	583	83.3	5.23	101
×0.375	0.356	59.3	16.3	25.1	36.3	455	65.0	5.29	77.7
×0.312	0.296	49.8	13.6	30.8	44.3	386	55.1	5.32	65.6
×0.250	0.238	40.2	11.1	39.0	55.8	316	45.2	5.35	53.5
HSS14×8×0.500	0.475	70.7	19.4	13.8	26.5	496	70.8	5.05	87.8
×0.375	0.356	54.1	14.8	19.5	36.3	389	55.5	5.12	68.0
×0.312	0.296	45.4	12.4	24.0	44.3	330	47.2	5.15	57.5
×0.250	0.238	36.8	10.1	30.6	55.8	271	38.8	5.18	47.0
HSS14×6×0.500	0.475	63.7	17.5	9.63	26.5	409	58.4	4.83	75.0
×0.375	0.356	48.9	13.4	13.9	36.3	322	46.1	4.90	58.3
×0.312	0.296	41.1	11.3	17.3	44.3	275	39.3	4.94	49.4
×0.250	0.238	33.3	9.15	22.2	55.8	226	32.3	4.97	40.4
HSS12×10×0.500	0.475	70.7	19.4	18.1	22.3	402	67.0	4.55	80.3
×0.375	0.356	54.1	14.8	25.1	30.7	315	52.5	4.61	62.2
×0.312	0.296	45.4	12.4	30.8	37.5	268	44.7	4.64	52.6
×0.250	0.238	36.8	10.1	39.0	47.4	220	36.7	4.67	42.9
HSS12×8×0.500	0.475	63.7	17.5	13.8	22.3	339	56.5	4.40	69.4
×0.375	0.356	48.9	13.4	19.5	30.7	267	44.5	4.46	53.9
×0.312	0.296	41.1	11.3	24.0	37.5	227	37.9	4.49	45.6
×0.250*	0.238	33.3	9.15	30.6	47.4	187	31.2	4.52	37.3
HSS12×6×0.500	0.475	56.8	15.6	9.63	22.3	276	46.0	4.20	58.4
×0.375	0.356	43.7	12.0	13.9	30.7	219	36.4	4.27	45.6
×0.312	0.296	36.8	10.1	17.3	37.5	187	31.2	4.31	38.7
×0.250	0.238	29.8	8.20	22.2	47.4	154	25.7	4.34	31.7
HSS12×4×0.375	0.356	38.5	10.6	8.24	30.7	170	28.4	4.02	37.3
×0.312	0.296	32.4	8.90	10.5	37.5	146	24.4	4.06	31.8
×0.250*	0.238	26.4	7.24	13.8	47.4	121	20.2	4.09	26.1
×0.180*	0.171	19.3	5.28	20.4	67.2	90.3	15.1	4.14	19.3

Note 1: For width-to-thickness criteria, refer to Table 4-6C.

Note 2: All sections are available in austenitic stainless steel. The sections available in duplex stainless steel are marked *.

Table 4-6A (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
HSS16×8×0.500	234	58.6	3.32	66.7	13.8	5.75	574	111	3.86
×0.375	184	46.1	3.37	51.7	14.3	6.31	444	85.0	3.90
×0.312	157	39.3	3.40	43.7	14.6	6.60	375	71.5	3.92
×0.250	129	32.3	3.42	35.7	14.9	6.88	306	58.2	3.93
HSS14×10×0.500	347	69.3	4.03	79.9	11.8	7.75	698	122	3.86
×0.375	271	54.3	4.09	61.8	12.3	8.31	538	93.5	3.90
×0.312	231	46.1	4.11	52.2	12.6	8.60	454	78.6	3.92
×0.250	189	37.9	4.14	42.6	12.9	8.88	369	63.9	3.93
HSS14×8×0.500	207	51.8	3.27	59.6	11.8	5.75	478	96.3	3.53
×0.375	164	40.9	3.32	46.3	12.3	6.31	370	74.1	3.56
×0.312	140	34.9	3.35	39.2	12.6	6.60	313	62.4	3.58
×0.250	115	28.8	3.37	32.0	12.9	6.88	256	50.8	3.60
HSS14×6×0.500	107	35.7	2.47	41.1	11.8	3.75	285	70.6	3.20
×0.375	85.5	28.5	2.52	32.1	12.3	4.31	223	54.7	3.23
×0.312	73.3	24.4	2.55	27.3	12.6	4.60	189	46.2	3.25
×0.250	60.8	20.3	2.58	22.4	12.9	4.88	155	37.7	3.27
HSS12×10×0.500	303	60.7	3.95	70.9	9.75	7.75	556	104	3.53
×0.375	238	47.7	4.01	54.9	10.3	8.31	429	79.8	3.56
×0.312	203	40.6	4.04	46.5	10.6	8.60	362	67.1	3.58
×0.250	167	33.4	4.06	38.0	10.9	8.88	295	54.6	3.60
HSS12×8×0.500	180	45.1	3.21	52.4	9.75	5.75	384	82.0	3.20
×0.375	143	35.7	3.26	40.8	10.3	6.31	298	63.2	3.23
×0.312	122	30.5	3.29	34.6	10.6	6.60	252	53.3	3.25
×0.250	101	25.2	3.32	28.3	10.9	6.88	206	43.4	3.27
HSS12×6×0.500	92.5	30.8	2.43	35.9	9.75	3.75	232	60.1	2.86
×0.375	74.1	24.7	2.49	28.1	10.3	4.31	182	46.6	2.90
×0.312	63.7	21.2	2.51	23.9	10.6	4.60	154	39.4	2.92
×0.250	52.9	17.6	2.54	19.7	10.9	4.88	127	32.2	2.93
HSS12×4×0.375	29.3	14.7	1.67	16.9	10.3	2.31	85.6	30.0	2.56
×0.312	25.5	12.8	1.69	14.4	10.6	2.60	73.6	25.6	2.58
×0.250	21.4	10.7	1.72	11.9	10.9	2.88	61.0	21.0	2.60
×0.180	16.2	8.08	1.75	8.85	11.2	3.19	45.4	15.5	2.62

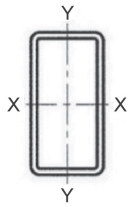


Table 4-6A (continued)
Rectangular HSS
Dimensions and Properties

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}
HSS10×8×0.500	0.475	56.8	15.6	13.8	18.1	217	43.4	3.73	52.8
×0.375	0.356	43.7	12.0	19.5	25.1	172	34.4	3.79	41.2
×0.312	0.296	36.8	10.1	24.0	30.8	147	29.4	3.82	35.0
×0.250	0.238	29.8	8.20	30.6	39.0	121	24.3	3.85	28.7
HSS10×6×0.500	0.475	49.8	13.7	9.63	18.1	174	34.8	3.56	43.7
×0.375	0.356	38.5	10.6	13.9	25.1	139	27.8	3.63	34.3
×0.312	0.296	32.4	8.90	17.3	30.8	119	23.8	3.66	29.2
×0.250*	0.238	26.4	7.24	22.2	39.0	98.8	19.8	3.69	24.0
×0.180*	0.171	19.3	5.28	32.1	55.5	73.4	14.7	3.73	17.7
HSS10×4×0.375	0.356	33.2	9.13	8.24	25.1	106	21.2	3.40	27.5
×0.312	0.296	28.1	7.71	10.5	30.8	91.3	18.3	3.44	23.5
×0.250	0.238	22.9	6.29	13.8	39.0	76.1	15.2	3.48	19.4
HSS10×2×0.250	0.238	19.4	5.34	5.40	39.0	53.4	10.7	3.16	14.7
×0.180	0.171	14.3	3.91	8.70	55.5	40.3	8.07	3.21	11.0
HSS9×5×0.500	0.475	42.9	11.8	7.53	15.9	116	25.9	3.14	33.1
×0.375	0.356	33.2	9.13	11.0	22.3	93.9	20.9	3.21	26.2
×0.250	0.238	22.9	6.29	18.0	34.8	67.4	15.0	3.27	18.4
HSS9×3×0.375	0.356	28.0	7.71	5.43	22.3	67.3	15.0	2.95	20.0
×0.250	0.238	19.4	5.34	9.61	34.8	49.1	10.9	3.03	14.3
×0.180	0.171	14.3	3.91	14.5	49.6	37.0	8.22	3.08	10.6
HSS8×6×0.500	0.475	42.9	11.8	9.63	13.8	99.7	24.9	2.90	31.0
×0.375	0.356	33.2	9.13	13.9	19.5	80.4	20.1	2.97	24.5
×0.312	0.296	28.1	7.71	17.3	24.0	69.3	17.3	3.00	20.9
×0.250	0.238	22.9	6.29	22.2	30.6	57.7	14.4	3.03	17.2
×0.180	0.171	16.8	4.60	32.1	43.8	43.1	10.8	3.06	12.7
HSS8×4×0.375	0.356	28.0	7.71	8.24	19.5	59.6	14.9	2.78	19.1
×0.312	0.296	23.8	6.53	10.5	24.0	51.7	12.9	2.81	16.4
×0.250*	0.238	19.4	5.34	13.8	30.6	43.3	10.8	2.85	13.6
×0.180*	0.171	14.3	3.91	20.4	43.8	32.6	8.14	2.89	10.1
×0.120*	0.114	9.67	2.65	32.1	67.2	22.6	5.64	2.92	6.91

Note 1: For width-to-thickness criteria, refer to Table 4-6C.
Note 2: All sections are available in austenitic stainless steel. The sections available in duplex stainless steel are marked *.

Table 4-6A (continued)

Rectangular HSS

Dimensions and Properties

HSS10–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}	ft^2/ft
HSS10×8×0.500	154	38.4	3.14	45.3	7.75	5.75	294	67.7	2.86
×0.375	122	30.5	3.19	35.4	8.31	6.31	229	52.3	2.90
×0.312	104	26.1	3.22	30.0	8.60	6.60	194	44.2	2.92
×0.250	86.3	21.6	3.25	24.6	8.88	6.88	158	36.0	2.93
HSS10×6×0.500	78.0	26.0	2.38	30.6	7.75	3.75	180	49.6	2.53
×0.375	62.7	20.9	2.44	24.1	8.31	4.31	141	38.6	2.56
×0.312	54.0	18.0	2.46	20.5	8.60	4.60	120	32.7	2.58
×0.250	44.9	15.0	2.49	16.9	8.88	4.88	98.6	26.7	2.60
×0.180	33.6	11.2	2.52	12.5	9.19	5.19	72.6	19.6	2.62
HSS10×4×0.375	24.6	12.3	1.64	14.3	8.31	2.31	67.7	24.8	2.23
×0.312	21.4	10.7	1.67	12.2	8.60	2.60	58.2	21.2	2.25
×0.250	18.0	9.02	1.69	10.1	8.88	2.88	48.3	17.4	2.27
HSS10×2×0.250	3.73	3.73	0.835	4.33	8.88	0.875	12.4	8.14	1.93
×0.180	2.93	2.93	0.865	3.29	9.19	1.19	9.62	6.13	1.95
HSS9×5×0.500	45.8	18.3	1.97	21.8	6.75	2.75	111	36.2	2.20
×0.375	37.4	14.9	2.02	17.4	7.31	3.31	88.5	28.4	2.23
×0.250	27.1	10.8	2.08	12.3	7.88	3.88	62.4	19.8	2.27
HSS9×3×0.375	11.3	7.54	1.21	8.94	7.31	1.31	33.7	16.1	1.90
×0.250	8.52	5.68	1.26	6.46	7.88	1.88	24.7	11.5	1.93
×0.180	6.54	4.36	1.29	4.85	8.19	2.19	18.6	8.52	1.95
HSS8×6×0.500	63.4	21.1	2.32	25.4	5.75	3.75	130	39.1	2.20
×0.375	51.4	17.1	2.37	20.1	6.31	4.31	102	30.5	2.23
×0.312	44.4	14.8	2.40	17.2	6.60	4.60	87.2	25.9	2.25
×0.250	37.0	12.3	2.43	14.2	6.88	4.88	71.7	21.2	2.27
×0.180	27.7	9.25	2.46	10.5	7.19	5.19	52.9	15.6	2.28
HSS8×4×0.375	19.9	9.93	1.60	11.7	6.31	2.31	50.2	19.7	1.90
×0.312	17.4	8.69	1.63	10.1	6.60	2.60	43.3	16.8	1.92
×0.250	14.7	7.34	1.66	8.36	6.88	2.88	35.9	13.8	1.93
×0.180	11.1	5.57	1.69	6.23	7.19	3.19	26.8	10.2	1.95
×0.120	7.78	3.89	1.71	4.29	7.46	3.46	18.4	6.98	1.97

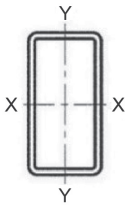


Table 4-6A (continued)
Rectangular HSS
Dimensions and Properties

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}
HSS8×2×0.312	0.296	19.4	5.34	3.76	24.0	34.1	8.53	2.53	11.8
×0.250	0.238	15.9	4.39	5.40	30.6	29.0	7.24	2.57	9.86
×0.180	0.171	11.8	3.23	8.70	43.8	22.1	5.52	2.62	7.39
×0.120	0.114	8.00	2.19	14.5	67.2	15.5	3.87	2.66	5.11
HSS7×5×0.500	0.475	36.0	9.92	7.53	11.7	61.4	17.6	2.49	22.2
×0.375	0.356	28.0	7.71	11.0	16.7	50.2	14.4	2.55	17.7
×0.250	0.238	19.4	5.34	18.0	26.4	36.5	10.4	2.61	12.6
×0.180	0.171	14.3	3.91	26.2	37.9	27.4	7.84	2.65	9.37
HSS7×4×0.375	0.356	25.4	7.00	8.24	16.7	42.4	12.1	2.46	15.4
×0.250	0.238	17.7	4.86	13.8	26.4	31.1	8.87	2.53	11.0
HSS7×3×0.375	0.356	22.8	6.29	5.43	16.7	34.5	9.86	2.34	13.0
×0.250	0.238	15.9	4.39	9.61	26.4	25.6	7.32	2.42	9.39
×0.180	0.171	11.8	3.23	14.5	37.9	19.5	5.56	2.46	7.03
HSS6×4×0.375	0.356	22.8	6.29	8.24	13.9	28.7	9.56	2.14	12.1
×0.312	0.296	19.4	5.34	10.5	17.3	25.1	8.37	2.17	10.4
×0.250*	0.238	15.9	4.39	13.8	22.2	21.2	7.08	2.20	8.69
×0.180*	0.171	11.8	3.23	20.4	32.1	16.1	5.37	2.23	6.50
×0.120*	0.114	8.00	2.19	32.1	49.6	11.3	3.75	2.26	4.48
HSS6×3×0.375	0.356	20.2	5.57	5.43	13.9	23.0	7.67	2.03	10.0
×0.312	0.296	17.3	4.75	7.14	17.3	20.3	6.77	2.07	8.73
×0.250	0.238	14.2	3.91	9.61	22.2	17.3	5.76	2.10	7.32
×0.180	0.171	10.5	2.89	14.5	32.1	13.2	4.41	2.14	5.50
×0.120	0.114	7.17	1.97	23.3	49.6	9.28	3.09	2.17	3.81
HSS6×2×0.312	0.296	15.1	4.16	3.76	17.3	15.5	5.16	1.93	7.04
×0.250	0.238	12.5	3.44	5.40	22.2	13.3	4.44	1.97	5.94
×0.180	0.171	9.26	2.54	8.70	32.1	10.3	3.44	2.01	4.51
×0.120	0.114	6.34	1.74	14.5	49.6	7.31	2.44	2.05	3.14
HSS5×4×0.375	0.356	20.2	5.57	8.24	11.0	18.1	7.25	1.80	9.09
×0.312	0.296	17.3	4.75	10.5	13.9	16.0	6.40	1.83	7.89
×0.250	0.238	14.2	3.91	13.8	18.0	13.6	5.44	1.86	6.61
×0.180	0.171	10.5	2.89	20.4	26.2	10.4	4.16	1.90	4.97
×0.120	0.114	7.17	1.97	32.1	40.9	7.30	2.92	1.93	3.44

Note 1: For width-to-thickness criteria, refer to Table 4-6C.

Note 2: All sections are available in austenitic stainless steel. The sections available in duplex stainless steel are marked *.

Table 4-6A (continued)

Rectangular HSS

Dimensions and Properties

HSS8–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
HSS8×2×0.312	3.41	3.41	0.799	4.11	6.60	0.596	11.1	7.67	1.58
×0.250	2.98	2.98	0.824	3.49	6.88	0.875	9.54	6.46	1.60
×0.180	2.35	2.35	0.854	2.66	7.19	1.19	7.38	4.88	1.62
×0.120	1.70	1.70	0.880	1.87	7.46	1.46	5.23	3.39	1.63
HSS7×5×0.500	36.1	14.4	1.91	17.5	4.75	2.75	77.3	27.6	1.86
×0.375	29.7	11.9	1.96	14.1	5.31	3.31	61.7	21.8	1.90
×0.250	21.7	8.68	2.02	10.0	5.88	3.88	43.7	15.3	1.93
×0.180	16.4	6.55	2.05	7.45	6.19	4.19	32.4	11.3	1.95
HSS7×4×0.375	17.5	8.74	1.58	10.4	5.31	2.31	41.7	17.1	1.73
×0.250	13.0	6.49	1.63	7.46	5.88	2.88	29.9	12.1	1.77
HSS7×3×0.375	8.81	5.87	1.18	7.05	5.31	1.31	24.3	12.3	1.56
×0.250	6.70	4.47	1.24	5.15	5.88	1.88	17.8	8.84	1.60
×0.180	5.17	3.45	1.27	3.88	6.19	2.19	13.5	6.59	1.62
HSS6×4×0.375	15.1	7.56	1.55	9.08	4.31	2.31	33.4	14.5	1.56
×0.312	13.3	6.65	1.58	7.86	4.60	2.60	28.9	12.4	1.58
×0.250	11.3	5.65	1.60	6.57	4.88	2.88	24.0	10.3	1.60
×0.180	8.63	4.31	1.64	4.92	5.19	3.19	18.0	7.61	1.62
×0.120	6.05	3.03	1.66	3.40	5.46	3.46	12.4	5.21	1.63
HSS6×3×0.375	7.55	5.04	1.16	6.11	4.31	1.31	19.7	10.5	1.40
×0.312	6.74	4.49	1.19	5.33	4.60	1.60	17.2	9.03	1.42
×0.250	5.79	3.86	1.22	4.49	4.88	1.88	14.5	7.52	1.43
×0.180	4.48	2.99	1.25	3.40	5.19	2.19	11.0	5.62	1.45
×0.120	3.18	2.12	1.27	2.36	5.46	2.46	7.61	3.87	1.47
HSS6×2×0.312	2.54	2.54	0.782	3.11	4.60	0.596	7.74	5.65	1.25
×0.250	2.24	2.24	0.807	2.65	4.88	0.875	6.68	4.78	1.27
×0.180	1.78	1.78	0.837	2.04	5.19	1.19	5.18	3.63	1.28
×0.120	1.29	1.29	0.862	1.44	5.46	1.46	3.67	2.53	1.30
HSS5×4×0.375	12.7	6.37	1.51	7.78	3.31	2.31	25.4	11.9	1.40
×0.312	11.3	5.64	1.54	6.76	3.60	2.60	22.0	10.2	1.42
×0.250	9.61	4.81	1.57	5.67	3.88	2.88	18.4	8.48	1.43
×0.180	7.38	3.69	1.60	4.27	4.19	3.19	13.8	6.30	1.45
×0.120	5.19	2.60	1.63	2.96	4.46	3.46	9.51	4.32	1.47

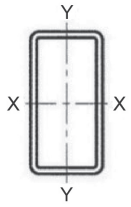


Table 4-6A (continued)
Rectangular HSS
Dimensions and Properties

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}
HSS5×3×0.375	0.356	17.6	4.86	5.43	11.0	14.3	5.71	1.71	7.44
×0.312	0.296	15.1	4.16	7.14	13.9	12.7	5.09	1.75	6.50
×0.250	0.238	12.5	3.44	9.61	18.0	10.9	4.36	1.78	5.48
×0.180	0.171	9.26	2.54	14.5	26.2	8.41	3.36	1.82	4.15
×0.120	0.114	6.34	1.74	23.3	40.9	5.94	2.38	1.85	2.89
HSS5×2×0.250	0.238	10.7	2.96	5.40	18.0	8.20	3.28	1.66	4.35
×0.180	0.171	8.01	2.20	8.70	26.2	6.41	2.56	1.71	3.32
×0.120	0.114	5.50	1.51	14.5	40.9	4.58	1.83	1.74	2.33
HSS4×3×0.250	0.238	10.7	2.96	9.61	13.8	6.24	3.12	1.45	3.88
×0.180	0.171	8.01	2.20	14.5	20.4	4.87	2.43	1.49	2.96
×0.120*	0.114	5.50	1.51	23.3	32.1	3.47	1.74	1.52	2.07
×0.0800*	0.0760	3.74	1.03	36.5	49.6	2.42	1.21	1.54	1.43
HSS4×2×0.375	0.356	12.4	3.44	2.62	8.24	5.63	2.82	1.28	3.89
×0.312	0.296	10.8	2.98	3.76	10.5	5.17	2.58	1.32	3.47
×0.250	0.238	8.99	2.48	5.40	13.8	4.55	2.28	1.35	2.98
×0.180	0.171	6.76	1.86	8.70	20.4	3.61	1.81	1.39	2.31
×0.120*	0.114	4.67	1.28	14.5	32.1	2.61	1.31	1.43	1.63
×0.0800*	0.0760	3.19	0.874	23.3	49.6	1.83	0.917	1.45	1.13
HSS4×1.5×0.180	0.171	6.14	1.69	5.77	20.4	2.99	1.49	1.33	1.98
×0.120	0.114	4.25	1.17	10.2	32.1	2.18	1.09	1.37	1.41
×0.0830	0.0789	3.01	0.827	16.0	47.7	1.59	0.796	1.39	1.01
×0.0630	0.0599	2.32	0.635	22.0	63.8	1.24	0.622	1.40	0.787
HSS3×2×0.250	0.238	7.25	2.01	5.40	9.61	2.15	1.43	1.03	1.86
×0.180	0.171	5.51	1.52	8.70	14.5	1.74	1.16	1.07	1.46
×0.120*	0.114	3.84	1.05	14.5	23.3	1.28	0.854	1.10	1.05
×0.0800*	0.0760	2.63	0.722	23.3	36.5	0.910	0.606	1.12	0.731
HSS3×1.5×0.250	0.238	6.39	1.77	3.30	9.61	1.70	1.13	0.979	1.53
×0.180	0.171	4.89	1.35	5.77	14.5	1.40	0.934	1.02	1.22
×0.120	0.114	3.42	0.941	10.2	23.3	1.04	0.696	1.05	0.882
×0.0830	0.0789	2.44	0.669	16.0	35.0	0.772	0.514	1.07	0.641
×0.0600	0.0570	1.79	0.492	23.3	49.6	0.580	0.387	1.09	0.477
HSS3×1×0.120	0.114	3.00	0.827	5.77	23.3	0.807	0.538	0.988	0.718
×0.0800*	0.0760	2.08	0.570	10.2	36.5	0.585	0.390	1.01	0.508
×0.0600*	0.0570	1.58	0.435	14.5	49.6	0.457	0.304	1.03	0.393

Note 1: For width-to-thickness criteria, refer to Table 4-6C.

Note 2: All sections are available in austenitic stainless steel. The sections available in duplex stainless steel are marked *.

Table 4-6A (continued)

Rectangular HSS

Dimensions and Properties

HSS5–HSS3

	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
Shape	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS5×3×0.375	6.30	4.20	1.14	5.17	3.31	1.31	15.2	8.57	1.23
×0.312	5.65	3.77	1.17	4.53	3.60	1.60	13.3	7.43	1.25
×0.250	4.88	3.25	1.19	3.83	3.88	1.88	11.2	6.21	1.27
×0.180	3.80	2.53	1.22	2.91	4.19	2.19	8.52	4.65	1.28
×0.120	2.71	1.80	1.25	2.03	4.46	2.46	5.93	3.21	1.30
HSS5×2×0.250	1.87	1.87	0.794	2.23	3.88	0.875	5.27	3.94	1.10
×0.180	1.49	1.49	0.824	1.73	4.19	1.19	4.10	3.00	1.12
×0.120	1.09	1.09	0.849	1.22	4.46	1.46	2.91	2.10	1.13
HSS4×3×0.250	3.97	2.65	1.16	3.18	2.88	1.88	8.11	4.89	1.10
×0.180	3.11	2.08	1.19	2.43	3.19	2.19	6.18	3.69	1.12
×0.120	2.23	1.49	1.22	1.70	3.46	2.46	4.31	2.55	1.13
×0.0800	1.56	1.04	1.23	1.18	3.64	2.64	2.96	1.74	1.14
HSS4×2×0.375	1.80	1.80	0.724	2.33	2.31	0.313	4.93	4.09	0.898
×0.312	1.67	1.67	0.750	2.10	2.60	0.596	4.48	3.64	0.915
×0.250	1.50	1.50	0.776	1.81	2.88	0.875	3.90	3.10	0.932
×0.180	1.21	1.21	0.806	1.41	3.19	1.19	3.04	2.38	0.951
×0.120	0.886	0.886	0.831	1.01	3.46	1.46	2.16	1.67	0.967
×0.0800	0.628	0.628	0.848	0.700	3.64	1.64	1.50	1.15	0.978
HSS4×1.5×0.180	0.613	0.817	0.603	0.970	3.19	0.690	1.76	1.72	0.868
×0.120	0.460	0.614	0.628	0.700	3.46	0.960	1.28	1.22	0.884
×0.0830	0.342	0.456	0.643	0.508	3.63	1.13	0.932	0.877	0.894
×0.0630	0.270	0.360	0.652	0.395	3.72	1.22	0.726	0.679	0.900
HSS3×2×0.250	1.12	1.12	0.748	1.40	1.88	0.875	2.57	2.26	0.765
×0.180	0.920	0.920	0.779	1.10	2.19	1.19	2.02	1.75	0.784
×0.120	0.683	0.683	0.805	0.791	2.46	1.46	1.45	1.24	0.801
×0.0800	0.488	0.488	0.822	0.554	2.64	1.64	1.01	0.853	0.812
HSS3×1.5×0.250	0.546	0.728	0.556	0.923	1.88	0.375	1.47	1.61	0.682
×0.180	0.461	0.615	0.585	0.742	2.19	0.690	1.20	1.27	0.701
×0.120	0.351	0.467	0.611	0.542	2.46	0.960	0.875	0.906	0.717
×0.0830	0.262	0.350	0.626	0.396	2.63	1.13	0.638	0.653	0.727
×0.0600	0.199	0.265	0.636	0.295	2.73	1.23	0.476	0.483	0.734
HSS3×1×0.120	0.136	0.272	0.406	0.321	2.46	0.460	0.405	0.577	0.634
×0.0800	0.102	0.204	0.423	0.231	2.64	0.640	0.294	0.409	0.645
×0.0600	0.0807	0.161	0.431	0.180	2.73	0.730	0.229	0.316	0.650

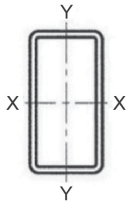


Table 4-6A (continued)
Rectangular HSS
Dimensions and Properties

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}
HSS2.5×1.5×0.180	0.171	4.26	1.18	5.77	11.6	0.872	0.697	0.861	0.904
×0.120	0.114	3.00	0.827	10.2	18.9	0.659	0.528	0.893	0.661
×0.0830	0.0789	2.15	0.590	16.0	28.7	0.492	0.393	0.913	0.483
×0.0630	0.0599	1.66	0.456	22.0	38.7	0.388	0.310	0.923	0.377
HSS2.5×1×0.120	0.114	2.59	0.713	5.77	18.9	0.497	0.398	0.835	0.525
×0.0830	0.0789	1.86	0.511	9.67	28.7	0.376	0.301	0.857	0.388
×0.0630	0.0599	1.44	0.396	13.7	38.7	0.299	0.239	0.869	0.304
HSS2×1.5×0.120	0.114	2.59	0.713	10.2	14.5	0.378	0.378	0.729	0.469
×0.0800*	0.0760	1.80	0.494	16.7	23.3	0.277	0.277	0.748	0.334
×0.0600*	0.0570	1.38	0.378	23.3	32.1	0.217	0.217	0.758	0.259
HSS2×1×0.120	0.114	2.17	0.599	5.77	14.5	0.277	0.277	0.680	0.361
×0.0800*	0.0760	1.52	0.418	10.2	23.3	0.206	0.206	0.702	0.261
×0.0600*	0.0570	1.17	0.321	14.5	32.1	0.163	0.163	0.713	0.204
HSS1.5×1×0.120	0.114	1.75	0.485	5.77	10.2	0.131	0.175	0.520	0.226
×0.0800*	0.0760	1.24	0.342	10.2	16.7	0.100	0.133	0.541	0.166
×0.0600*	0.0570	0.959	0.264	14.5	23.3	0.0801	0.107	0.551	0.131

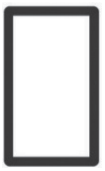
Note 1: For width-to-thickness criteria, refer to Table 4-6C.

Note 2: All sections are available in austenitic stainless steel. The sections available in duplex stainless steel are marked *.

Table 4-6A (continued)

Rectangular HSS

Dimensions and Properties



HSS2.5–HSS1.5

	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
Shape	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS2.5×1.5×0.180	0.385	0.514	0.572	0.629	1.69	0.690	0.923	1.04	0.618
×0.120	0.296	0.394	0.598	0.463	1.96	0.960	0.679	0.748	0.634
×0.0830	0.223	0.297	0.614	0.340	2.13	1.13	0.496	0.541	0.644
×0.0630	0.177	0.235	0.623	0.266	2.22	1.22	0.388	0.420	0.650
HSS2.5×1×0.120	0.114	0.227	0.399	0.270	1.96	0.460	0.320	0.476	0.551
×0.0830	0.0880	0.176	0.415	0.202	2.13	0.627	0.240	0.350	0.561
×0.0630	0.0709	0.142	0.423	0.159	2.22	0.717	0.190	0.274	0.566
HSS2×1.5×0.120	0.241	0.321	0.581	0.384	1.46	0.960	0.490	0.590	0.551
×0.0800	0.177	0.236	0.599	0.275	1.64	1.14	0.348	0.415	0.562
×0.0600	0.139	0.186	0.608	0.213	1.73	1.23	0.269	0.319	0.567
HSS2×1×0.120	0.0911	0.182	0.390	0.220	1.46	0.460	0.236	0.375	0.467
×0.0800	0.0693	0.139	0.407	0.161	1.64	0.640	0.173	0.269	0.478
×0.0600	0.0554	0.111	0.416	0.126	1.73	0.730	0.135	0.208	0.484
HSS1.5×1×0.120	0.0686	0.137	0.376	0.169	0.960	0.460	0.156	0.274	0.384
×0.0800	0.0530	0.106	0.394	0.125	1.14	0.640	0.115	0.198	0.395
×0.0600	0.0427	0.0853	0.402	0.0989	1.23	0.730	0.0905	0.154	0.400

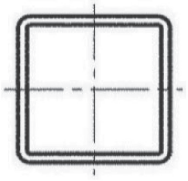


Table 4-6B
Square HSS
Dimensions and Properties

HSS12–HSS4

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
HSS12×12×0.500	0.475	77.6	21.3	22.3	22.3	465	77.5	4.67	91.3	9.75	742	126	3.86
×0.375	0.356	59.3	16.3	30.7	30.7	364	60.6	4.73	70.5	10.3	571	96.4	3.90
×0.312	0.296	49.8	13.6	37.5	37.5	309	51.4	4.76	59.5	10.6	481	81.0	3.92
×0.250*	0.238	40.2	11.1	47.4	47.4	253	42.2	4.79	48.5	10.9	392	65.8	3.93
HSS10×10×0.500	0.475	63.7	17.5	18.1	18.1	260	52.1	3.86	61.8	7.75	420	85.8	3.20
×0.375	0.356	48.9	13.4	25.1	25.1	205	41.0	3.91	48.1	8.31	326	66.0	3.23
×0.312	0.296	41.1	11.3	30.8	30.8	175	35.0	3.94	40.7	8.60	275	55.6	3.25
×0.250*	0.238	33.3	9.15	39.0	39.0	144	28.8	3.97	33.3	8.88	224	45.3	3.27
HSS8×8×0.500	0.475	49.8	13.7	13.8	13.8	127	31.6	3.04	38.1	5.75	208	53.4	2.53
×0.375	0.356	38.5	10.6	19.5	19.5	101	25.3	3.10	29.9	6.31	163	41.4	2.56
×0.312	0.296	32.4	8.90	24.0	24.0	86.8	21.7	3.12	25.5	6.60	138	35.0	2.58
×0.250*	0.238	26.4	7.24	30.6	30.6	72.0	18.0	3.15	20.9	6.88	113	28.6	2.60
×0.180*	0.171	19.3	5.28	43.8	43.8	53.5	13.4	3.18	15.4	7.19	83.1	20.9	2.62
HSS7×7×0.375	0.356	33.2	9.13	16.7	16.7	66.0	18.8	2.69	22.5	5.31	107	31.3	2.23
×0.312	0.296	28.1	7.71	20.6	20.6	56.9	16.3	2.72	19.2	5.60	91.2	26.5	2.25
×0.250	0.238	22.9	6.29	26.4	26.4	47.4	13.5	2.74	15.8	5.88	75.0	21.7	2.27
HSS6×6×0.500	0.475	36.0	9.92	9.63	9.63	48.9	16.3	2.22	20.1	3.75	82.6	28.6	1.86
×0.375	0.356	28.0	7.71	13.9	13.9	40.0	13.3	2.28	16.1	4.31	65.8	22.5	1.90
×0.312	0.296	23.8	6.53	17.3	17.3	34.8	11.6	2.31	13.8	4.60	56.3	19.2	1.92
×0.250*	0.238	19.4	5.34	22.2	22.2	29.1	9.71	2.34	11.4	4.88	46.5	15.8	1.93
×0.180*	0.171	14.3	3.91	32.1	32.1	21.9	7.31	2.37	8.49	5.19	34.4	11.6	1.95
×0.120*	0.114	9.67	2.65	49.6	49.6	15.2	5.07	2.40	5.83	5.46	23.5	7.89	1.97
HSS5×5×0.375	0.356	22.8	6.29	11.0	11.0	22.0	8.79	1.87	10.7	3.31	36.7	15.2	1.56
×0.312	0.296	19.4	5.34	13.9	13.9	19.3	7.71	1.90	9.29	3.60	31.7	13.0	1.58
×0.250*	0.238	15.9	4.39	18.0	18.0	16.3	6.52	1.93	7.75	3.88	26.3	10.7	1.60
×0.180*	0.171	11.8	3.23	26.2	26.2	12.4	4.96	1.96	5.80	4.19	19.6	7.96	1.62
×0.120*	0.114	8.00	2.19	40.9	40.9	8.66	3.47	1.99	4.00	4.46	13.5	5.44	1.63
HSS4×4×0.375	0.356	17.6	4.86	8.24	8.24	10.4	5.19	1.46	6.48	2.31	17.8	9.28	1.23
×0.312	0.296	15.1	4.16	10.5	10.5	9.24	4.62	1.49	5.66	2.60	15.5	8.02	1.25
×0.250*	0.238	12.5	3.44	13.8	13.8	7.93	3.96	1.52	4.77	2.88	13.0	6.68	1.27
×0.180*	0.171	9.26	2.54	20.4	20.4	6.12	3.06	1.55	3.61	3.19	9.81	4.99	1.28
×0.120*	0.114	6.34	1.74	32.1	32.1	4.33	2.17	1.58	2.52	3.46	6.80	3.44	1.30
×0.0830	0.0789	4.45	1.22	47.7	47.7	3.11	1.55	1.60	1.79	3.63	4.81	2.42	1.31

Note 1: For width-to-thickness criteria, refer to Table 4-6C.

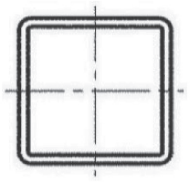
Note 2: All sections are available in austenitic stainless steel. The sections available in duplex stainless steel are marked *.

HSS3.5–HSS1

Table 4-6B (continued)

Square HSS

Dimensions and Properties



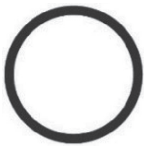
Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	*I*	*S*	*r*	*Z*	Workable Flat	Torsion		Surface Area
											J	*C*	
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}	in.	in.^{4}	in.^{3}	ft^2/ft
HSS3.5×3.5×0.250	0.238	10.7	2.96	11.7	11.7	5.11	2.92	1.31	3.56	2.38	8.51	5.01	1.10
×0.180*	0.171	8.01	2.20	17.5	17.5	3.99	2.28	1.35	2.72	2.69	6.46	3.77	1.12
×0.120*	0.114	5.50	1.51	27.7	27.7	2.85	1.63	1.37	1.90	2.96	4.51	2.61	1.13
×0.0830	0.0789	3.88	1.06	41.4	41.4	2.06	1.18	1.39	1.36	3.13	3.20	1.84	1.14
HSS3×3×0.250	0.238	8.99	2.48	9.61	9.61	3.06	2.04	1.11	2.52	1.88	5.17	3.58	0.932
×0.180	0.171	6.76	1.86	14.5	14.5	2.43	1.62	1.14	1.94	2.19	3.98	2.72	0.951
×0.120*	0.114	4.67	1.28	23.3	23.3	1.76	1.17	1.17	1.38	2.46	2.80	1.89	0.967
×0.0800*	0.0760	3.19	0.874	36.5	36.5	1.23	0.823	1.19	0.953	2.64	1.93	1.30	0.978
HSS2.5×2.5×0.250	0.238	7.25	2.01	7.50	7.50	1.65	1.32	0.905	1.66	1.38	2.84	2.38	0.765
×0.180	0.171	5.51	1.52	11.6	11.6	1.34	1.07	0.938	1.30	1.69	2.22	1.84	0.784
×0.120*	0.114	3.84	1.05	18.9	18.9	0.984	0.787	0.966	0.933	1.96	1.58	1.29	0.801
×0.0800*	0.0760	2.63	0.722	29.9	29.9	0.700	0.560	0.984	0.652	2.14	1.10	0.891	0.812
×0.0600	0.0570	2.00	0.549	40.9	40.9	0.542	0.433	0.993	0.500	2.23	0.842	0.680	0.817
HSS2×2×0.250	0.238	5.52	1.53	5.40	5.40	0.752	0.752	0.701	0.976	0.875	1.34	1.43	0.599
×0.180	0.171	4.26	1.18	8.70	8.70	0.633	0.633	0.734	0.788	1.19	1.08	1.12	0.618
×0.120	0.114	3.00	0.827	14.5	14.5	0.480	0.480	0.762	0.576	1.46	0.786	0.805	0.634
×0.0800*	0.0760	2.08	0.570	23.3	23.3	0.347	0.347	0.780	0.408	1.64	0.552	0.561	0.645
×0.0600*	0.0570	1.58	0.435	32.1	32.1	0.271	0.271	0.789	0.315	1.73	0.425	0.430	0.650
HSS1.75×1.75×0.180	0.171	3.64	1.00	7.23	7.23	0.401	0.458	0.632	0.579	0.940	0.694	0.833	0.534
×0.120	0.114	2.59	0.713	12.4	12.4	0.310	0.354	0.660	0.430	1.21	0.514	0.605	0.551
×0.0830	0.0789	1.86	0.511	19.2	19.2	0.234	0.268	0.677	0.317	1.38	0.377	0.439	0.561
×0.0630	0.0599	1.44	0.396	26.2	26.2	0.186	0.213	0.686	0.249	1.47	0.295	0.341	0.566
HSS1.5×1.5×0.180	0.171	3.01	0.834	5.77	5.77	0.233	0.311	0.529	0.401	0.690	0.413	0.585	0.451
×0.120	0.114	2.17	0.599	10.2	10.2	0.186	0.248	0.557	0.305	0.960	0.313	0.432	0.467
×0.0800*	0.0760	1.52	0.418	16.7	16.7	0.139	0.185	0.576	0.220	1.14	0.225	0.307	0.478
×0.0600*	0.0570	1.17	0.321	23.3	23.3	0.110	0.146	0.585	0.172	1.23	0.175	0.237	0.484
HSS1.25×1.25×0.120	0.114	1.75	0.485	7.96	7.96	0.100	0.161	0.455	0.201	0.710	0.172	0.289	0.384
×0.0800*	0.0760	1.24	0.342	13.4	13.4	0.0768	0.123	0.474	0.148	0.890	0.126	0.208	0.395
×0.0600*	0.0570	0.959	0.264	18.9	18.9	0.0615	0.0984	0.483	0.117	0.980	0.0991	0.162	0.400
HSS1×1×0.120	0.114	1.34	0.371	5.77	5.77	0.0461	0.0922	0.353	0.119	0.460	0.0815	0.173	0.301
×0.0800	0.0760	0.965	0.266	10.2	10.2	0.0367	0.0735	0.372	0.0903	0.640	0.0618	0.128	0.312
×0.0600*	0.0570	0.751	0.207	14.5	14.5	0.0300	0.0600	0.381	0.0720	0.730	0.0491	0.101	0.317

Note 1: For width-to-thickness criteria, refer to Table 4-6C.

Note 2: All sections are available in austenitic stainless steel. The sections available in duplex stainless steel are marked *.

Table 4-6C
Width-to-Thickness Criteria for Rectangular and Square HSS

Nominal Wall Thickness, in.	Compactness Criteria for Rectangular and Square HSS							
	Compression		Flexure				Shear	
	F_y = 30 ksi E = 28,000 ksi	F_y = 65 ksi E = 29,000 ksi	F_y = 30 ksi E = 28,000 ksi	F_y = 65 ksi E = 29,000 ksi	F_y = 30 ksi E = 28,000 ksi	F_y = 65 ksi E = 29,000 ksi	F_y = 30 ksi E = 28,000 ksi	F_y = 65 ksi E = 29,000 ksi
	Nonslender up to		Compact up to		Compact up to		C_{v2} = 1.0 up to	
	Web Height, in.		Flange Width, in.		Web Height, in.		Web Height, in.	
0.500	16	10	14	10	28	20	18	14
0.375	12	9	10	7	24	18	14	10
0.312	10	7	8	7	18	14	12	9
0.250	8	5	7	5	16	10	9	7
0.180	5	3.5	5	3.5	10	8	7	4
0.120	3.5	2.5	3.5	2.5	8	5	4	3
0.0830	2.5	1.75	2.5	1.75	5	3.5	3	2
0.0800	2.5	1.75	2	1.75	5	3.5	3	2
0.0630	1.75	1.25	1.75	1.25	3.5	2.5	2	1.75
0.0600	1.75	1.25	1.75	1.25	3.5	2.5	2	1.5



HSS7.5–HSS3.75

Table 4-7
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}
HSS7.500×0.375	0.356	29.1	7.99	21.1	51.1	13.6	2.53	18.2	102	27.3
×0.250	0.238	19.8	5.43	31.5	35.8	9.56	2.57	12.6	71.7	19.1
×0.180[f2]	0.171	14.4	3.94	43.9	26.5	7.05	2.59	9.19	52.9	14.1
×0.120[c2,f2]	0.114	9.66	2.65	65.8	18.0	4.81	2.61	6.22	36.1	9.62
HSS6.250×0.375	0.356	24.0	6.59	17.6	28.7	9.19	2.09	12.4	57.5	18.4
×0.250	0.238	16.4	4.50	26.3	20.3	6.51	2.13	8.61	40.7	13.0
×0.180[f2]	0.171	11.9	3.27	36.5	15.1	4.83	2.15	6.32	30.2	9.66
×0.120[c2,f2]	0.114	8.02	2.20	54.8	10.3	3.31	2.17	4.29	20.7	6.62
HSS5.000×0.250	0.238	13.0	3.56	21.0	10.1	4.05	1.69	5.40	20.2	8.09
×0.180	0.171	9.46	2.59	29.2	7.57	3.03	1.71	3.99	15.1	6.06
×0.120[f2]	0.114	6.39	1.75	43.9	5.22	2.09	1.73	2.72	10.4	4.18
×0.109[c2,f2]	0.104	5.82	1.60	48.1	4.80	1.92	1.73	2.49	9.59	3.84
×0.0830[c2,f2]	0.0789	4.45	1.22	63.4	3.69	1.48	1.74	1.91	7.39	2.95
HSS4.500×0.250	0.238	11.6	3.19	18.9	7.26	3.23	1.51	4.33	14.5	6.45
×0.180	0.171	8.48	2.33	26.3	5.46	2.43	1.53	3.21	10.9	4.85
×0.148	0.141	7.03	1.93	31.9	4.59	2.04	1.54	2.68	9.18	4.08
×0.120[f2]	0.114	5.73	1.57	39.5	3.78	1.68	1.55	2.19	7.56	3.36
×0.109[f2]	0.104	5.22	1.44	43.3	3.47	1.54	1.55	2.01	6.94	3.09
×0.0830[c2,f2]	0.0789	4.00	1.10	57.0	2.68	1.19	1.56	1.54	5.36	2.38
HSS4.000×0.120	0.114	5.08	1.39	35.1	2.63	1.31	1.37	1.72	5.26	2.63
×0.109[f2]	0.104	4.63	1.27	38.5	2.42	1.21	1.38	1.58	4.83	2.42
×0.0830[c2,f2]	0.0789	3.55	0.972	50.7	1.87	0.934	1.39	1.21	3.74	1.87
HSS3.750×0.250	0.238	9.54	2.63	15.8	4.07	2.17	1.24	2.94	8.13	4.34
×0.180	0.171	7.01	1.92	21.9	3.09	1.65	1.27	2.19	6.17	3.29
×0.148	0.141	5.82	1.60	26.6	2.61	1.39	1.28	1.84	5.21	2.78
×0.120	0.114	4.75	1.30	32.9	2.15	1.15	1.29	1.51	4.31	2.30
×0.109[f2]	0.104	4.33	1.19	36.1	1.98	1.06	1.29	1.38	3.96	2.11
×0.0830[c2,f2]	0.0789	3.32	0.910	47.5	1.53	0.818	1.30	1.06	3.07	1.64

[c2] Shape is slender for compression with $F_y = 65$ ksi.

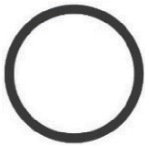
[f2] Shape exceeds compact limit for flexure with $F_y = 65$ ksi.

Note 1: All sections are available both in austenitic and duplex stainless steel.

Table 4-7 (continued)

Round HSS

Dimensions and Properties



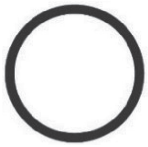
HSS3.5–HSS2.75

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}
HSS3.500×0.180	0.171	6.52	1.79	20.5	2.48	1.42	1.18	1.90	4.97	2.84
×0.148	0.141	5.41	1.49	24.8	2.10	1.20	1.19	1.59	4.20	2.40
×0.120	0.114	4.42	1.21	30.7	1.74	0.994	1.20	1.31	3.48	1.99
×0.109	0.104	4.03	1.11	33.7	1.60	0.915	1.20	1.20	3.20	1.83
×0.0830[f2]	0.0789	3.09	0.848	44.4	1.24	0.709	1.21	0.924	2.48	1.42
×0.0630[c2,f2]	0.0599	2.36	0.647	58.4	0.958	0.547	1.22	0.709	1.92	1.09
×0.0490[c2,f1,f2]	0.0466	1.84	0.506	75.1	0.754	0.431	1.22	0.556	1.51	0.862
HSS3.125×0.250	0.238	7.84	2.16	13.1	2.26	1.45	1.02	1.99	4.53	2.90
×0.180	0.171	5.78	1.59	18.3	1.74	1.11	1.05	1.49	3.47	2.22
×0.120	0.114	3.93	1.08	27.4	1.22	0.783	1.07	1.03	2.45	1.57
×0.109	0.104	3.59	0.987	30.0	1.13	0.722	1.07	0.950	2.25	1.44
×0.0830[f2]	0.0789	2.75	0.755	39.6	0.876	0.561	1.08	0.732	1.75	1.12
×0.0630[c2,f2]	0.0599	2.10	0.577	52.2	0.678	0.434	1.08	0.563	1.36	0.867
HSS3.000×0.250	0.238	7.50	2.07	12.6	1.98	1.32	0.980	1.82	3.97	2.65
×0.180	0.171	5.54	1.52	17.5	1.53	1.02	1.00	1.37	3.05	2.03
×0.148	0.141	4.60	1.27	21.3	1.30	0.865	1.01	1.15	2.59	1.73
×0.120	0.114	3.77	1.03	26.3	1.08	0.719	1.02	0.950	2.16	1.44
×0.109	0.104	3.44	0.946	28.8	0.993	0.662	1.02	0.873	1.99	1.32
×0.0830[f2]	0.0789	2.64	0.724	38.0	0.773	0.515	1.03	0.673	1.55	1.03
×0.0630[c2,f2]	0.0599	2.02	0.553	50.1	0.598	0.399	1.04	0.518	1.20	0.797
×0.0490[c2,f2]	0.0466	1.58	0.432	64.4	0.472	0.314	1.04	0.407	0.943	0.629
HSS2.875×0.180	0.171	5.29	1.45	16.8	1.33	0.927	0.958	1.25	2.67	1.85
×0.120	0.114	3.61	0.989	25.2	0.944	0.657	0.977	0.870	1.89	1.31
×0.109	0.104	3.29	0.905	27.6	0.870	0.605	0.980	0.799	1.74	1.21
×0.0830[f2]	0.0789	2.53	0.693	36.4	0.678	0.472	0.989	0.617	1.36	0.943
HSS2.750×0.250	0.238	6.82	1.88	11.6	1.49	1.09	0.892	1.51	2.99	2.17
×0.180	0.171	5.05	1.39	16.1	1.16	0.841	0.914	1.14	2.31	1.68
×0.148	0.141	4.20	1.16	19.5	0.986	0.717	0.924	0.961	1.97	1.43
×0.120	0.114	3.44	0.944	24.1	0.822	0.597	0.933	0.793	1.64	1.19
×0.109	0.104	3.14	0.865	26.4	0.758	0.551	0.936	0.729	1.52	1.10
×0.0830	0.0789	2.41	0.662	34.9	0.591	0.430	0.945	0.563	1.18	0.860
×0.0650[f2]	0.0618	1.90	0.522	44.5	0.472	0.343	0.951	0.447	0.943	0.686

[c2] Shape is slender for compression with $F_y = 65$ ksi.

[f1,f2] Shape exceeds compact limit for flexure with $F_y = 30$ ksi and $F_y = 65$ ksi, respectively.

Note 1: All sections are available both in austenitic and duplex stainless steel.



HSS2.5–HSS1.9

Table 4-7 (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}
HSS2.500×0.250	0.238	6.14	1.69	10.5	1.09	0.875	0.804	1.22	2.19	1.75
×0.180	0.171	4.56	1.25	14.6	0.853	0.682	0.826	0.929	1.71	1.36
×0.148	0.141	3.80	1.04	17.7	0.729	0.584	0.836	0.786	1.46	1.17
×0.120	0.114	3.12	0.855	21.9	0.609	0.488	0.845	0.649	1.22	0.975
×0.109	0.104	2.84	0.783	24.0	0.563	0.450	0.848	0.597	1.13	0.901
×0.0830	0.0789	2.19	0.600	31.7	0.440	0.352	0.856	0.463	0.880	0.704
×0.0630[f2]	0.0599	1.67	0.459	41.7	0.342	0.274	0.863	0.357	0.684	0.547
×0.0490[c2,f2]	0.0466	1.31	0.359	53.6	0.270	0.216	0.868	0.281	0.541	0.433
HSS2.375×0.180	0.171	4.31	1.18	13.9	0.723	0.609	0.782	0.832	1.45	1.22
×0.148	0.141	3.60	0.990	16.8	0.620	0.522	0.791	0.705	1.24	1.04
×0.120	0.114	2.95	0.810	20.8	0.519	0.437	0.800	0.583	1.04	0.874
×0.109	0.104	2.69	0.742	22.8	0.479	0.404	0.804	0.537	0.959	0.807
×0.0830	0.0789	2.08	0.569	30.1	0.376	0.316	0.812	0.416	0.751	0.632
×0.0630[f2]	0.0599	1.59	0.436	39.6	0.292	0.246	0.819	0.321	0.584	0.492
×0.0490[c2,f2]	0.0466	1.24	0.341	51.0	0.231	0.195	0.823	0.253	0.462	0.389
HSS2.250×0.180	0.171	4.06	1.12	13.2	0.608	0.540	0.738	0.741	1.22	1.08
×0.148	0.141	3.39	0.934	16.0	0.522	0.464	0.747	0.628	1.04	0.928
×0.120	0.114	2.79	0.765	19.7	0.438	0.389	0.756	0.521	0.875	0.778
×0.109	0.104	2.55	0.701	21.6	0.405	0.360	0.760	0.479	0.809	0.719
×0.0830	0.0789	1.96	0.538	28.5	0.318	0.282	0.768	0.372	0.635	0.564
×0.0630[f2]	0.0599	1.50	0.412	37.6	0.247	0.220	0.775	0.287	0.495	0.440
HSS2.000×0.180	0.171	3.57	0.983	11.7	0.414	0.414	0.649	0.574	0.829	0.829
×0.148	0.141	2.99	0.823	14.2	0.358	0.358	0.659	0.488	0.716	0.716
×0.120	0.114	2.46	0.675	17.5	0.301	0.301	0.668	0.406	0.603	0.603
×0.109	0.104	2.25	0.619	19.2	0.279	0.279	0.671	0.374	0.558	0.558
×0.0830	0.0789	1.74	0.476	25.3	0.220	0.220	0.680	0.291	0.440	0.440
×0.0630	0.0599	1.33	0.365	33.4	0.172	0.172	0.686	0.226	0.344	0.344
×0.0490[f2]	0.0466	1.04	0.286	42.9	0.136	0.136	0.691	0.178	0.273	0.273
×0.0350[c2,f2]	0.0333	0.750	0.206	60.1	0.0995	0.0995	0.695	0.129	0.199	0.199
HSS1.900×0.148	0.141	2.83	0.779	13.5	0.303	0.319	0.624	0.437	0.607	0.639
×0.120	0.114	2.33	0.640	16.7	0.256	0.270	0.633	0.364	0.512	0.539
×0.109	0.104	2.13	0.587	18.3	0.237	0.250	0.636	0.336	0.475	0.500
×0.0830	0.0789	1.65	0.451	24.1	0.187	0.197	0.644	0.262	0.375	0.395
×0.0630	0.0599	1.26	0.346	31.7	0.147	0.154	0.651	0.203	0.293	0.309
×0.0490[f2]	0.0466	0.989	0.271	40.8	0.117	0.123	0.655	0.160	0.233	0.245
×0.0350[c2,f2]	0.0333	0.712	0.195	57.1	0.0851	0.0896	0.660	0.116	0.170	0.179

[c2] Shape is slender for compression with F_y = 65 ksi.

[f2] Shape exceeds compact limit for flexure with F_y = 65 ksi.

Note 1: All sections are available both in austenitic and duplex stainless steel.

Table 4-7 (continued)

Round HSS

Dimensions and Properties

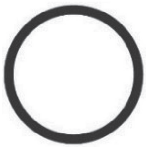
HSS1.75–HSS1

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}
HSS1.750×0.120	0.114	2.13	0.586	15.4	0.197	0.225	0.580	0.306	0.394	0.450
×0.109	0.104	1.95	0.538	16.8	0.183	0.209	0.583	0.282	0.366	0.418
×0.0830	0.0789	1.51	0.414	22.2	0.145	0.166	0.591	0.220	0.290	0.331
×0.0630	0.0599	1.16	0.318	29.2	0.114	0.130	0.598	0.171	0.227	0.260
×0.0490[f2]	0.0466	0.909	0.249	37.6	0.0905	0.103	0.602	0.135	0.181	0.207
×0.0350[c2,f2]	0.0333	0.655	0.180	52.6	0.0662	0.0756	0.607	0.0981	0.132	0.151
HSS1.660×0.148	0.141	2.44	0.673	11.8	0.196	0.236	0.539	0.326	0.391	0.472
×0.120	0.114	2.02	0.554	14.6	0.166	0.200	0.548	0.273	0.333	0.401
×0.109	0.104	1.84	0.508	16.0	0.155	0.186	0.551	0.252	0.309	0.372
×0.0830	0.0789	1.43	0.392	21.0	0.123	0.148	0.560	0.197	0.246	0.296
×0.0630	0.0599	1.10	0.301	27.7	0.0965	0.116	0.566	0.153	0.193	0.233
HSS1.500×0.120	0.114	1.81	0.496	13.2	0.120	0.160	0.492	0.219	0.240	0.320
×0.109	0.104	1.65	0.456	14.4	0.112	0.149	0.495	0.203	0.223	0.298
×0.0830	0.0789	1.28	0.352	19.0	0.0892	0.119	0.503	0.160	0.178	0.238
×0.0630	0.0599	0.988	0.271	25.0	0.0704	0.0938	0.510	0.124	0.141	0.188
×0.0490	0.0466	0.776	0.213	32.2	0.0562	0.0750	0.514	0.0985	0.112	0.150
×0.0350[c2,f2]	0.0333	0.559	0.153	45.0	0.0413	0.0550	0.519	0.0716	0.0826	0.110
HSS1.250×0.120	0.114	1.48	0.407	11.0	0.0663	0.106	0.404	0.148	0.133	0.212
×0.109	0.104	1.36	0.374	12.0	0.0620	0.0992	0.407	0.137	0.124	0.198
×0.0830	0.0789	1.06	0.290	15.8	0.0500	0.0800	0.415	0.108	0.100	0.160
×0.0630	0.0599	0.816	0.224	20.9	0.0397	0.0636	0.421	0.0849	0.0795	0.127
×0.0490	0.0466	0.642	0.176	26.8	0.0319	0.0511	0.426	0.0675	0.0639	0.102
×0.0350[f2]	0.0333	0.464	0.127	37.5	0.0236	0.0377	0.430	0.0493	0.0471	0.0754
HSS1.000×0.120	0.114	1.15	0.317	8.77	0.0317	0.0633	0.316	0.0900	0.0633	0.127
×0.109	0.104	1.06	0.293	9.62	0.0298	0.0595	0.319	0.0839	0.0595	0.119
×0.0830	0.0789	0.830	0.228	12.7	0.0244	0.0488	0.327	0.0671	0.0488	0.0976
×0.0650	0.0618	0.663	0.182	16.2	0.0201	0.0403	0.332	0.0545	0.0403	0.0805
×0.0630	0.0599	0.644	0.177	16.7	0.0196	0.0392	0.333	0.0530	0.0392	0.0785
×0.0490	0.0466	0.508	0.140	21.5	0.0159	0.0318	0.337	0.0424	0.0318	0.0636
×0.0420	0.0399	0.439	0.120	25.1	0.0139	0.0278	0.340	0.0368	0.0278	0.0556
×0.0350	0.0333	0.368	0.101	30.0	0.0118	0.0237	0.342	0.0311	0.0237	0.0473
×0.0320	0.0304	0.338	0.0926	32.9	0.0109	0.0218	0.343	0.0286	0.0218	0.0436

[c2] Shape is slender for compression with $F_y = 65$ ksi.

[f2] Shape exceeds compact limit for flexure with $F_y = 65$ ksi.

Note 1: All sections are available both in austenitic and duplex stainless steel.



PIPE

Table 4-8
Pipe
Dimensions and Properties

Shape	Nominal Wt.	Dimensions		Nominal Wall Thickness	Design Wall Thickness	Area	D/t	I	S	r	J	Z
		Outside Diameter	Inside Diameter									
	lb/ft	in.	in.	in.	in.	in.^{2}		in.^{4}	in.^{3}	in.	in.^{4}	in.^{3}
Pipe Schedule 5S												
Pipe 8 Std.[c2,f1,f2]	10.1	8.63	8.42	0.109	0.104	2.79	83.0	25.3	5.87	3.01	50.6	7.56
Pipe 6 Std.[c2,f2]	7.75	6.63	6.42	0.109	0.104	2.13	63.8	11.4	3.43	2.31	22.7	4.43
Pipe 5 Std.[c2,f2]	6.48	5.56	5.35	0.109	0.104	1.78	53.5	6.64	2.39	1.93	13.3	3.10
Pipe 4 Std.[c2,f2]	4.00	4.50	4.34	0.0830	0.0789	1.10	57.0	2.68	1.19	1.56	5.36	1.54
Pipe 3½ Std.[c2,f2]	3.55	4.00	3.84	0.0830	0.0789	0.972	50.7	1.87	0.934	1.39	3.74	1.21
Pipe 3 Std.[f2]	3.09	3.50	3.34	0.0830	0.0789	0.848	44.4	1.24	0.709	1.21	2.48	0.924
Pipe 2½ Std.[f2]	2.53	2.88	2.72	0.0830	0.0789	0.694	36.5	0.682	0.473	0.991	1.36	0.619
Pipe 2 Std.[f2]	1.64	2.38	2.26	0.0650	0.0618	0.450	38.5	0.303	0.254	0.820	0.605	0.332
Pipe 1½ Std.	1.30	1.90	1.78	0.0650	0.0618	0.357	30.7	0.151	0.159	0.650	0.302	0.209
Pipe 1¼ Std.	1.13	1.66	1.54	0.0650	0.0618	0.310	26.9	0.0992	0.120	0.565	0.198	0.158
Pipe 1 Std.	0.890	1.32	1.20	0.0650	0.0618	0.244	21.4	0.0485	0.0734	0.445	0.0969	0.0979
Pipe Schedule 10S												
Pipe 12 Std.[c2,f1,f2]	24.8	12.8	12.5	0.180	0.171	6.78	74.9	135	21.1	4.47	271	27.3
Pipe 10 Std.[c2,f2]	19.1	10.8	10.5	0.165	0.157	5.25	68.8	74.3	13.8	3.76	149	17.8
Pipe 8 Std.[c2,f2]	13.7	8.63	8.35	0.148	0.141	3.76	61.2	33.9	7.85	3.00	67.8	10.2
Pipe 6 Std.[c2,f2]	9.50	6.63	6.38	0.134	0.127	2.59	52.2	13.7	4.14	2.30	27.4	5.37
Pipe 5 Std.[f2]	7.93	5.56	5.31	0.134	0.127	2.17	43.8	8.00	2.88	1.92	16.0	3.75
Pipe 4 Std.[f2]	5.73	4.50	4.27	0.120	0.114	1.57	39.5	3.78	1.68	1.55	7.56	2.19
Pipe 3½ Std.	5.08	4.00	3.77	0.120	0.114	1.39	35.1	2.63	1.31	1.37	5.26	1.72
Pipe 3 Std.	4.42	3.50	3.27	0.120	0.114	1.21	30.7	1.74	0.994	1.20	3.48	1.31
Pipe 2½ Std.	3.61	2.88	2.65	0.120	0.114	0.991	25.3	0.949	0.659	0.979	1.90	0.873
Pipe 2 Std.	2.70	2.38	2.17	0.109	0.104	0.744	22.9	0.483	0.405	0.806	0.965	0.539
Pipe 1½ Std.	2.13	1.90	1.69	0.109	0.104	0.587	18.3	0.237	0.250	0.636	0.475	0.336
Pipe 1¼ Std.	1.84	1.66	1.45	0.109	0.104	0.508	16.0	0.155	0.186	0.551	0.309	0.252
Pipe 1 Std.	1.44	1.32	1.11	0.109	0.104	0.397	12.7	0.074	0.112	0.431	0.148	0.154

[c2] Shape is slender for compression with $F_y = 65$ ksi.

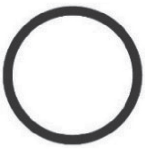
[f1,f2] Shape exceeds compact limit for flexure with $F_y = 30$ ksi and $F_y = 65$ ksi, respectively.

Note 1: All sections are available both in austenitic and duplex stainless steel.

Table 4-8 (continued)

Pipe

Dimensions and Properties



PIPE

Shape	Nominal Wt.	Dimensions		Nominal Wall Thickness	Design Wall Thickness	Area	D/t	I	S	r	J	Z
		Outside Diameter	Inside Diameter									
	lb/ft	in.	in.	in.	in.	in.^{2}		in.^{4}	in.^{3}	in.	in.^{4}	in.^{3}
Pipe Schedule 40S												
Pipe 12 Std.[f2]	50.8	12.8	12.1	0.375	0.356	13.9	36.0	270	42.1	4.40	539	55.1
Pipe 10 Std.	41.5	10.8	10.1	0.365	0.347	11.4	31.1	156	28.9	3.70	312	37.9
Pipe 8 Std.	29.2	8.63	8.02	0.322	0.306	8.00	28.2	69.4	16.1	2.94	139	21.2
Pipe 6 Std.	19.4	6.63	6.10	0.280	0.266	5.32	24.9	27.0	8.14	2.25	53.9	10.8
Pipe 5 Std.	14.9	5.56	5.07	0.258	0.245	4.09	22.7	14.5	5.21	1.88	29.0	6.93
Pipe 4 Std.	11.0	4.50	4.05	0.237	0.225	3.02	20.0	6.92	3.08	1.51	13.8	4.12
Pipe 3½ Std.	9.30	4.00	3.57	0.226	0.215	2.56	18.6	4.59	2.30	1.34	9.19	3.08
Pipe 3 Std.	7.74	3.50	3.09	0.216	0.205	2.12	17.1	2.89	1.65	1.17	5.78	2.23
Pipe 2½ Std.	5.93	2.88	2.49	0.203	0.193	1.63	14.9	1.48	1.03	0.952	2.96	1.40
Pipe 2 Std.	3.74	2.38	2.09	0.154	0.146	1.02	16.3	0.642	0.539	0.792	1.28	0.730
Pipe 1½ Std.	2.78	1.90	1.62	0.145	0.138	0.764	13.8	0.298	0.314	0.625	0.597	0.429
Pipe 1¼ Std.	2.32	1.66	1.39	0.140	0.133	0.638	12.5	0.187	0.226	0.542	0.375	0.311
Pipe 1 Std.	1.72	1.32	1.07	0.133	0.126	0.473	10.5	0.0852	0.129	0.424	0.170	0.180
Pipe Schedule 80S												
Pipe 8 Std.	44.3	8.63	7.68	0.500	0.475	12.2	18.2	102	23.5	2.89	203	31.6
Pipe 6 Std.	29.2	6.63	5.81	0.432	0.410	8.01	16.2	38.9	11.7	2.20	77.8	15.9
Pipe 5 Std.	21.2	5.56	4.85	0.375	0.356	5.82	15.6	19.8	7.12	1.84	39.6	9.66
Pipe 4 Std.	15.3	4.50	3.86	0.337	0.320	4.20	14.1	9.23	4.10	1.48	18.5	5.60
Pipe 3½ Std.	12.8	4.00	3.40	0.318	0.302	3.51	13.2	6.04	3.02	1.31	12.1	4.14
Pipe 3 Std.	10.5	3.50	2.93	0.300	0.285	2.88	12.3	3.75	2.14	1.14	7.50	2.95
Pipe 2½ Std.	7.84	2.88	2.36	0.276	0.262	2.15	11.0	1.86	1.29	0.930	3.73	1.80
Pipe 2 Std.	5.14	2.38	1.97	0.218	0.207	1.41	11.5	0.842	0.707	0.772	1.68	0.980
Pipe 1½ Std.	3.71	1.90	1.52	0.200	0.190	1.02	10.0	0.378	0.398	0.608	0.755	0.558
Pipe 1¼ Std.	3.06	1.66	1.30	0.191	0.181	0.841	9.17	0.233	0.281	0.527	0.467	0.398
Pipe 1 Std.	2.23	1.32	0.980	0.179	0.170	0.614	7.76	0.104	0.157	0.411	0.208	0.226

[f1,f2] Shape exceeds compact limit for flexure with $F_y = 30$ ksi and $F_y = 65$ ksi, respectively.

Note 1: All sections are available both in austenitic and duplex stainless steel.