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Typical Beam Nomenclature

E = Modulus of Elasticity of steel at 29,000 ksi

I = Moment of Inertia of beam, in^4

L = Total length of beam between reaction point, ft

M_{max} = Maximum moment, kip-in

M_1 = Maximum moment in left section of beam, kip-in

M_2 = Maximum moment in right section of beam, kip-in

M_3 = Maximum positive moment in beam with combined end moment conditions, kip-in

M_x = Maximum at distance x from end of beam, kip-in

P = Concentrated load, kips

P_1 = Concentrated load nearest left reaction, kips

P_2 = Concentrated load nearest right reaction and of different magnitude than P_1, kips

R = End beam reaction for any condition of symmetrical loading, kips

R_1 = Left end beam reaction, kips

R_2 = Right end or intermediate beam reaction, kips

R_3 = Right end beam reaction, kips

V = Maximum vertical shear for any condition of symmetrical loading, kips

V_1 = Maximum vertical shear in left section of beam, kips

V_2 = Vertical shear at right reaction point, or to left of intermediate reaction of beam, kips

V_3 = Vertical shear at right reaction point, or to right of intermediate reaction of beam, kips

V_x = Vertical shear at distance x from end of beam, kips

W = Total load on beam, kips

a = Measured distance along beam, in

b = Measured distance along beam which may be greater or less than a, in

l = Total length of beam between reaction points, in

w = Uniformly distributed load per unit of length, kips/in

w_1 = Uniformly distributed load per unit of length nearest left reaction, kips/in

w_2 = Uniformly distributed load per unit of length nearest right reaction and of different magnitude than w_1, kips/in

x = Any distance measured along beam from left reaction, in

x_1 = Any distance measured along overhang section of beam from nearest reaction point, in

Δ_{max} = Maximum deflection, in

Δ_a = Deflection at point of load, in

Δ_x = Deflection at point x distance from left reaction, in

Δ_{x1} = Deflection of overhang section of beam at any distance from nearest reaction point, in

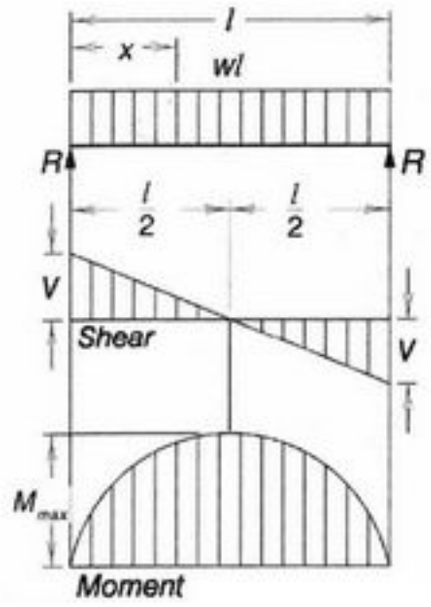
Formulas

Flexural stress at extreme fiber	$f = \frac{Mc}{I} = \frac{M}{S}$	
Flexural stress at any fiber	$f = \frac{My}{I}$	where y = distance from neutral axis to fiber
Average vertical shear	$v = \frac{V}{A} = \frac{V}{dt}$	for beams and girders
Horizontal shearing stress at any section A-A	$v = \frac{VQ}{Ib}$	where Q = statical moment about the neutral axis of the entire section of that portion of the cross-section lying outside of section A-A b = width at section A-A

Beam Diagrams and Formulas

Table 3-23
Shears, Moments and Deflections

1. SIMPLE BEAM — UNIFORMLY DISTRIBUTED LOAD



Total Equiv. Uniform Load ..... $= wl$

$R = V$ ..... $= \frac{wl}{2}$

V_x ..... $= w\left(\frac{l}{2} - x\right)$

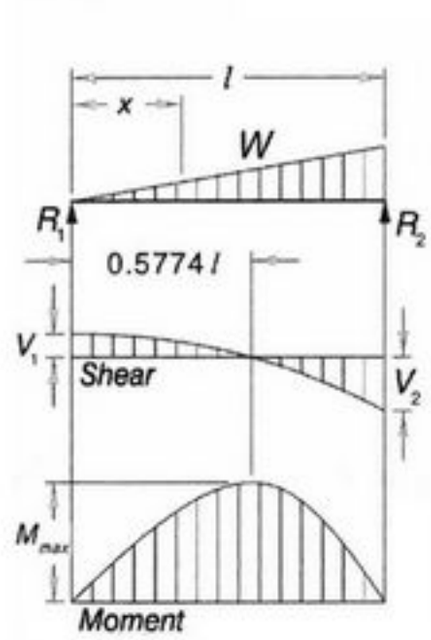
M_{max} (at center) ..... $= \frac{wl^2}{8}$

M_x ..... $= \frac{wx}{2}(l - x)$

Δ_{max} (at center) ..... $= \frac{5wl^4}{384\,EI}$

Δ_x ..... $= \frac{wx}{24\,EI}\left(l^3 - 2lx^2 + x^3\right)$

2. SIMPLE BEAM — LOAD INCREASING UNIFORMLY TO ONE END



Total Equiv. Uniform Load ..... $= \frac{16W}{9\sqrt{3}} = 1.03\,W$

$R_1 = V_1$ ..... $= \frac{W}{3}$

$R_2 = V_2 = V_{max}$ ..... $= \frac{2W}{3}$

V_x ..... $= \frac{W}{3} - \frac{Wx^2}{l^2}$

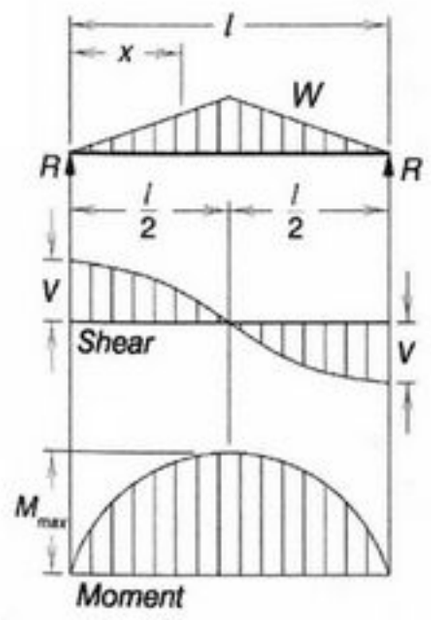
M_{max} $\left(\text{at } x = \frac{l}{\sqrt{3}} = 0.557\,l\right)$ ..... $= \frac{2Wl}{9\sqrt{3}} = 0.128\,Wl$

M_x ..... $= \frac{Wx}{3l^2}(l^2 - x_*^2)$

Δ_{max} $\left(\text{at } x = l\sqrt{1 - \sqrt{\frac{8}{15}}} = 0.519\,l\right)$ ..... $= 0.0130\,\frac{Wl^3}{EI}$

Δ_x ..... $= \frac{Wx}{180\,EIl^2}\left(3x^4 - 10l^2x^2 + 7l^4\right)$

3. SIMPLE BEAM — LOAD INCREASING UNIFORMLY TO CENTER



Total Equiv. Uniform Load ..... $= \frac{4W}{3}$

$R = V$ ..... $= \frac{W}{2}$

V_x (when $x < \frac{l}{2}$) ..... $= \frac{W}{2l^2}\left(l^2 - 4x^2\right)$

M_{max} (at center) ..... $= \frac{Wl}{6}$

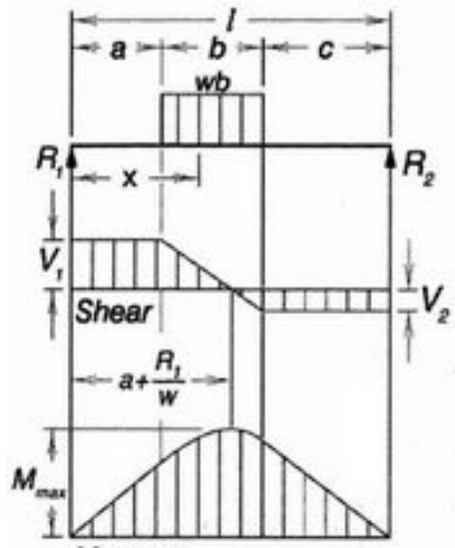
M_x (when $x < \frac{l}{2}$) ..... $= Wx\left(\frac{1}{2} - \frac{2x^2}{3l^2}\right)$

Δ_{max} (at center) ..... $= \frac{Wl^3}{60\,EI}$

Δ_x (when $x < \frac{l}{2}$) ..... $= \frac{Wx}{480\,EIl^2}\left(5l^2 - 4x^2\right)^2$

Table 3-23 (continued)
Shears, Moments and Deflections

4. SIMPLE BEAM — UNIFORM LOAD PARTIALLY DISTRIBUTED



$R_1 = V_1$ (max. when $a < c$) ..... $= \frac{wb}{2l}(2c+b)$

$R_2 = V_2$ (max. when $a > c$) ..... $= \frac{wb}{2l}(2a+b)$

V_x (when $x > a$ and $< (a+b)$) .... $= R_1 - w(x-a)$

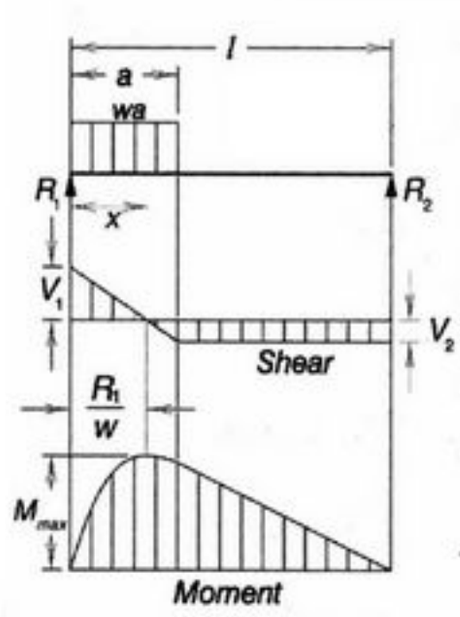
M_{max} $\left(\text{at } x = a + \frac{R_1}{w}\right)$ ..... $= R_1\left(a + \frac{R_1}{2w}\right)$

M_x (when $x < a$) ..... $= R_1 x$

M_x (when $x > a$ and $< (a+b)$) .... $= R_1 x - \frac{w}{2}(x-a)^2$

M_x (when $x > (a+b)$) ..... $= R_2(l-x)$

5. SIMPLE BEAM — UNIFORM LOAD PARTIALLY DISTRIBUTED AT ONE END



$R_1 = V_1 = V_{max}$ ..... $= \frac{wa}{2l}(2l-a)$

$R_2 = V_2$ ..... $= \frac{wa^2}{2l}$

V_x (when $x < a$) ..... $= R_1 - wx$

M_{max} $\left(\text{at } x = \frac{R_1}{w}\right)$ ..... $= \frac{R_1^2}{2w}$

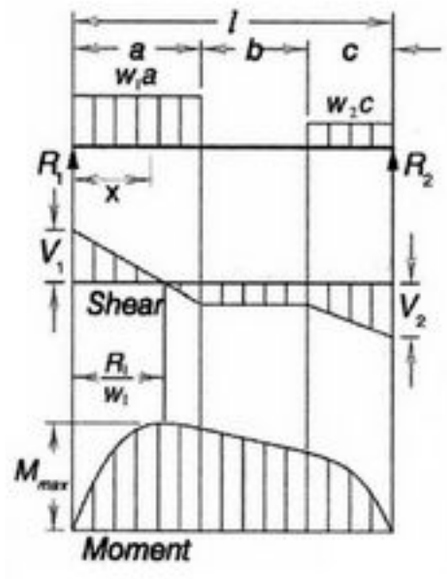
M_x (when $x < a$) ..... $= R_1 x - \frac{wx^2}{2}$

M_x (when $x > a$) ..... $= R_2(l-x)$

Δ_x (when $x < a$) ..... $= \frac{wx}{24EIl}\left(a^2(2l-a)^2 - 2ax^2(2l-a) + lx^3\right)$

Δ_x (when $x > a$) ..... $= \frac{wa^2(l-x)}{24EIl}\left(4xl - 2x^2 - a^2\right)$

6. SIMPLE BEAM — UNIFORM LOAD PARTIALLY DISTRIBUTED AT EACH END



$R_1 = V_1$ ..... $= \frac{w_1 a(2l-a) + w_2 c^2}{2l}$

$R_2 = V_2$ ..... $= \frac{w_2 c(2l-c) + w_1 a^2}{2l}$

V_x (when $x < a$) ..... $= R_1 - w_1 x$

V_x (when $a < x < (a+b)$) ..... $= R_1 - w_1 a$

V_x (when $x > (a+b)$) ..... $= R_2 - w_2(l-x)$

M_{max} $\left(\text{at } x = \frac{R_1}{w_1}, \text{when } R_1 < w_1 a\right)$ .... $= \frac{R_1^2}{2w_1}$

M_{max} $\left(\text{at } x = l - \frac{R_2}{w_2}, \text{when } R_2 < w_2 c\right)$ $= \frac{R_2^2}{2w_2}$

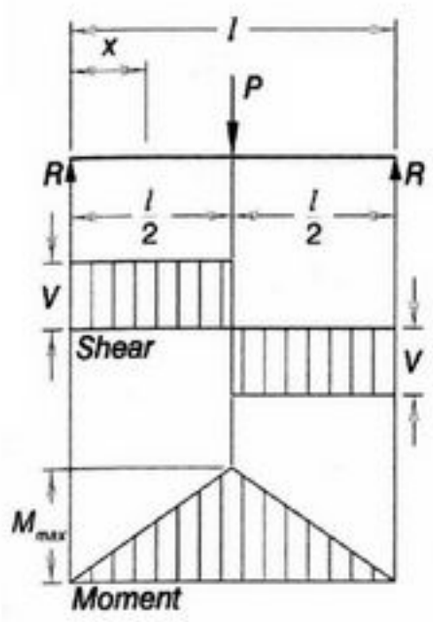
M_x (when $x < a$) ..... $= R_1 x - \frac{w_1 x^2}{2}$

M_x (when $a < x < (a+b)$) ..... $= R_1 x - \frac{w_1 a}{2}(2x-a)$

M_x (when $x > (a+b)$) ..... $= R_2(l-x) - \frac{w_2(l-x)^2}{2}$

Table 3-23 (continued)
Shears, Moments and Deflections

7. SIMPLE BEAM — CONCENTRATED LOAD AT CENTER



Total Equiv. Uniform Load ..... $= 2P$

$R = V$ ..... $= \frac{P}{2}$

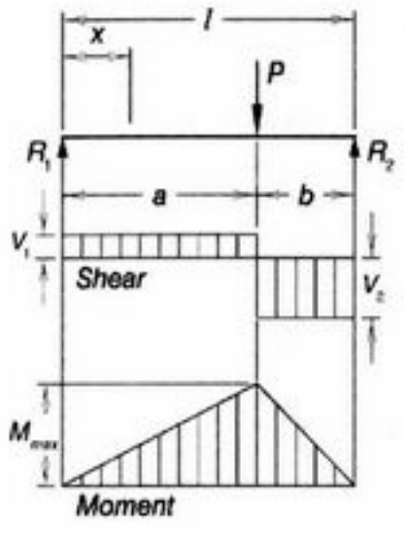
M_{max} (at point of load) ..... $= \frac{Pl}{4}$

M_x (when $x < \frac{l}{2}$) ..... $= \frac{Px}{2}$

Δ_{max} (at point of load) ..... $= \frac{Pl^3}{48\,EI}$

Δ_x (when $x < \frac{l}{2}$) ..... $= \frac{Px}{48\,EI}\left(3l^2 - 4x^2\right)$

8. SIMPLE BEAM — CONCENTRATED LOAD AT ANY POINT



Total Equiv. Uniform Load ..... $= \frac{8\,Pab}{l^2}$

$R_1 = V_1$ (= V_{max} when $a < b$) ..... $= \frac{Pb}{l}$

$R_2 = V_2$ (= V_{max} when $a > b$) ..... $= \frac{Pa}{l}$

M_{max} (at point of load) ..... $= \frac{Pab}{l}$

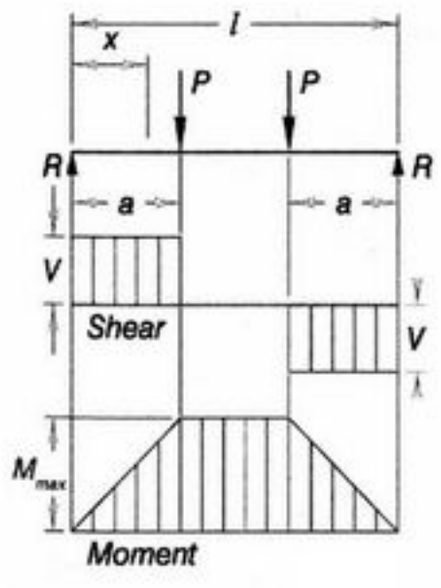
M_x (when $x < a$) ..... $= \frac{Pbx}{l}$

Δ_{max} $\left(\text{at } x = \sqrt{\frac{a(a+2b)}{3}}, \text{when } a > b\right)$ ..... $= \frac{Pab(a+2b)\sqrt{3a(a+2b)}}{27\,EIl}$

Δ_a (at point of load) ..... $= \frac{Pa^2b^2}{3\,EIl}$

Δ_x (when $x < a$) ..... $= \frac{Pbx}{6\,EIl}\left(l^2 - b^2 - x^2\right)$

9. SIMPLE BEAM — TWO EQUAL CONCENTRATED LOADS SYMMETRICALLY PLACED



Total Equiv. Uniform Load ..... $= \frac{8\,Pa}{l}$

$R = V$ ..... $= P$

M_{max} (between loads) ..... $= Pa$

M_x (when $x < a$) ..... $= Px$

Δ_{max} (at center) ..... $= \frac{Pa}{24\,EI}\left(3l^2 - 4a^2\right)$

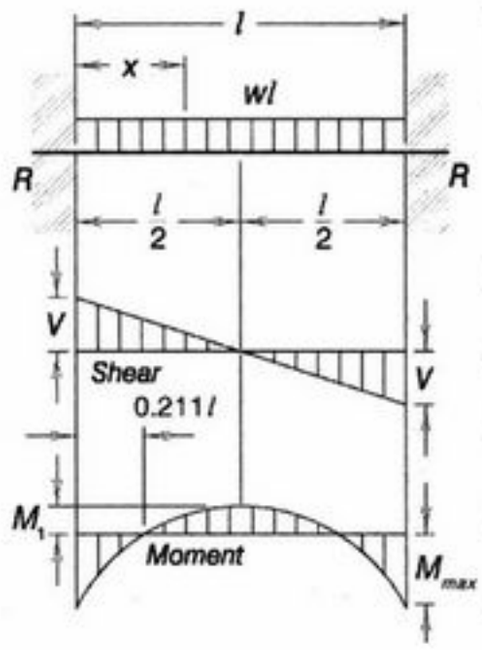
Δ_{max} (when $a = \frac{l}{3}$) ..... $= \frac{23\,Pl^3}{648\,EI}$

Δ_x (when $x < a$) ..... $= \frac{Px}{6\,EI}\left(3la - 3a^2 - x^2\right)$

Δ_x (when $a < x < (l - a)$) ..... $= \frac{Pa}{6\,EI}\left(3lx - 3x^2 - a^2\right)$

Table 3-23 (continued)
Shears, Moments and Deflections

15. BEAM FIXED AT BOTH ENDS — UNIFORMLY DISTRIBUTED LOADS



Total Equiv. Uniform Load ..... $= \frac{2wl}{3}$

$R = V$ ..... $= \frac{wl}{2}$

V_x ..... $= w\left(\frac{l}{2} - x\right)$

M_{max} (at ends) ..... $= \frac{wl^2}{12}$

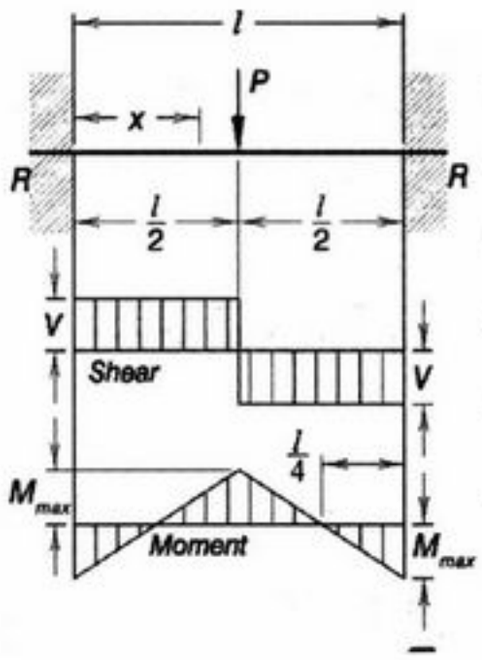
M_1 (at center) ..... $= \frac{wl^2}{24}$

M_x ..... $= \frac{w}{12}\left(6lx - l^2 - 6x^2\right)$

Δ_{max} (at center) ..... $= \frac{wl^4}{384\,EI}$

Δ_x ..... $= \frac{wx^2}{24\,EI}(l - x)^2$

16. BEAM FIXED AT BOTH ENDS — CONCENTRATED LOAD AT CENTER



Total Equiv. Uniform Load ..... $= P$

$R = V$ ..... $= \frac{P}{2}$

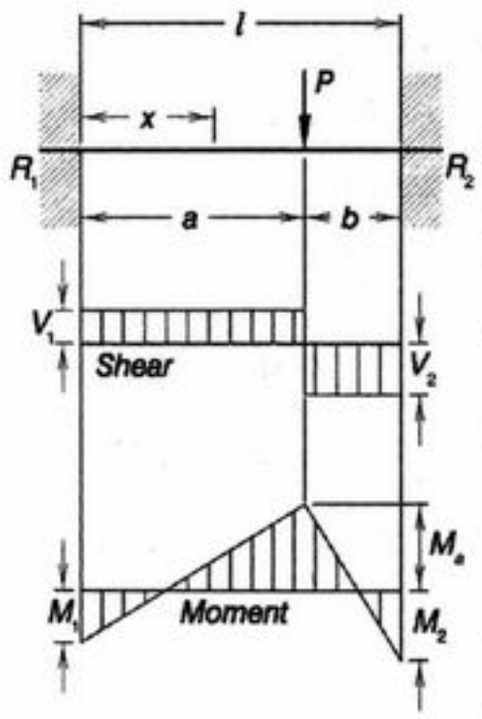
M_{max} (at center and ends) ..... $= \frac{Pl}{8}$

M_x (when $x < \frac{l}{2}$) ..... $= \frac{P}{8}(4x - l)$

Δ_{max} (at center) ..... $= \frac{Pl^3}{192\,EI}$

Δ_x (when $x < \frac{l}{2}$) ..... $= \frac{Px^2}{48\,EI}(3l - 4x)$

17. BEAM FIXED AT BOTH ENDS — CONCENTRATED LOAD AT ANY POINT



$R_1 = V_1$ (= V_{max} when $a < b$) ..... $= \frac{Pb^2}{l^3}(3a + b)$

$R_2 = V_2$ (= V_{max} when $a > b$) ..... $= \frac{Pa^2}{l^3}(a + 3b)$

M_1 (= M_{max} when $a < b$) ..... $= \frac{Pab^2}{l^2}$

M_2 (= M_{max} when $a > b$) ..... $= \frac{Pa^2b}{l^2}$

M_a (at point of load) ..... $= \frac{2Pa^2b^2}{l^3}$

M_x (when $x < a$) ..... $= R_1x - \frac{Pab^2}{l^2}$

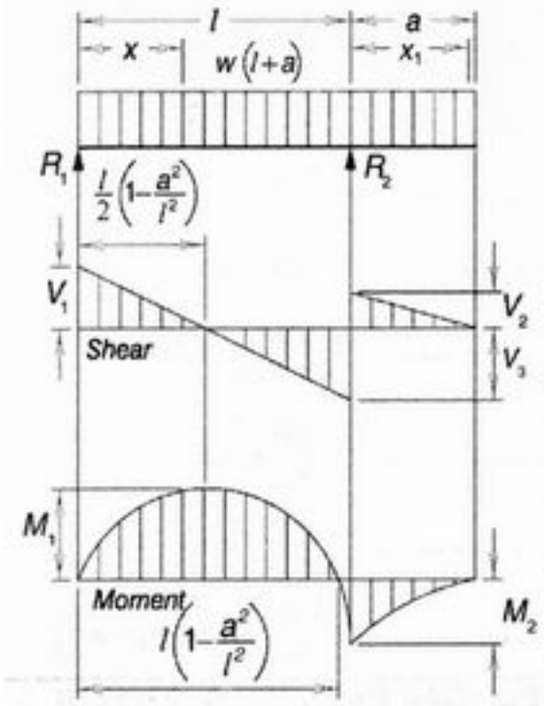
Δ_{max} (when $a > b$ at $x = \frac{2al}{3a + b}$) ..... $= \frac{2Pa^3b^2}{3EI(3a + b)^2}$

Δ_a (at point of load) ..... $= \frac{Pa^3b^3}{3EIl^3}$

Δ_x (when $x < a$) ..... $= \frac{Pb^2x^2}{6EIl^3}(3al - 3ax - bx)$

Table 3-23 (continued)
Shears, Moments and Deflections

24. BEAM OVERHANGING ONE SUPPORT — UNIFORMLY DISTRIBUTED LOAD



$R_1 = V_1$ ..... $= \frac{w}{2l}\left(l^2 - a^2\right)$

$R_2 = V_2 + V_3$ ..... $= \frac{w}{2l}(l+a)^2$

V_2 ..... $= wa$

V_3 ..... $= \frac{w}{2l}\left(l^2 + a^2\right)$

V_x (between supports) ..... $= R_1 - wx$

V_{x_1} (for overhang) ..... $= w(a - x_1)$

M_1 $\left(\text{at } x = \frac{l}{2}\left[1 - \frac{a^2}{l^2}\right]\right)$ ..... $= \frac{w}{8l^2}(l+a)^2\,(l-a)^2$

M_2 (at R_2) ..... $= \frac{wa^2}{2}$

M_x (between supports) ..... $= \frac{wx}{2l}\left(l^2 - a^2 - xl\right)$

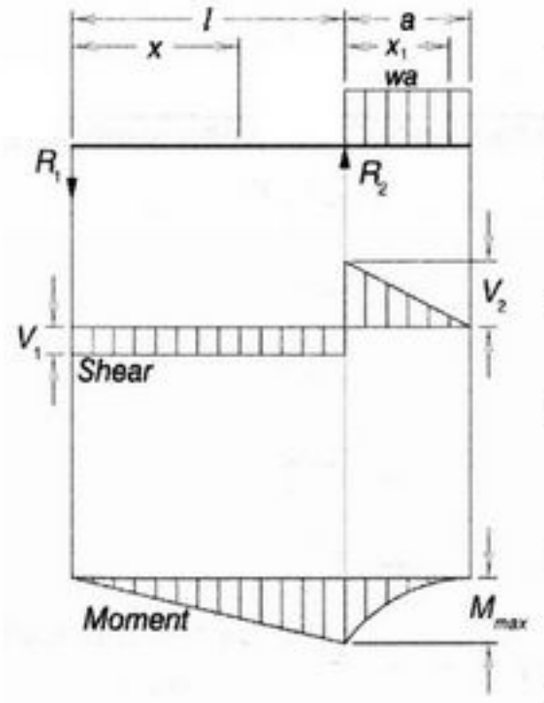
M_{x_1} (for overhang) ..... $= \frac{w}{2}(a - x_1)^2$

Δ_x (between supports) ..... $= \frac{wx}{24\,EIl}\left(l^4 - 2l^2x^2 + lx^3 - 2a^2l^2 + 2a^2x^2\right)$

Δ_{x_1} (for overhang) ..... $= \frac{wx_1}{24\,EI}\left(4a^2l - l^3 + 6a^2x_1 - 4ax_1^2 + x_1^3\right)$

NOTE: For a negative value of Δ_x, deflection is upward.

25. BEAM OVERHANGING ONE SUPPORT — UNIFORMLY DISTRIBUTED LOAD ON OVERHANG



$R_1 = V_1$ ..... $= \frac{wa^2}{2l}$

$R_2 = V_1 + V_2$ ..... $= \frac{wa}{2l}(2l+a)$

V_2 ..... $= wa$

V_{x_1} (for overhang) ..... $= w(a - x_1)$

M_{max} (at R_2) ..... $= \frac{wa^2}{2}$

M_x (between supports) ..... $= \frac{wa^2x}{2l}$

M_{x_1} (for overhang) ..... $= \frac{w}{2}(a - x_1)^2$

Δ_{max} $\left(\text{between supports at } x = \frac{l}{\sqrt{3}}\right) = \frac{wa^2l^2}{18\sqrt{3}EI} = 0.0321\frac{wa^2l^2}{EI}$

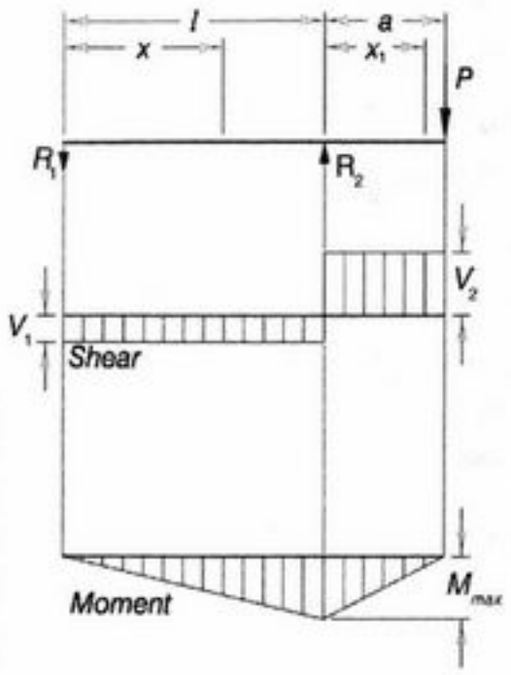
Δ_{max} (for overhang at $x_1 = a$) ..... $= \frac{wa^3}{24EI}(4l+3a)$

Δ_x (between supports) ..... $= \frac{wa^2x}{12EIl}\left(l^2 - x^2\right)$

Δ_{x_1} (for overhang) ..... $= \frac{wx_1}{24EI}\left(4a^2l + 6a^2x_1 - 4ax_1^2 + x_1^3\right)$

Table 3-23 (continued)
Shears, Moments and Deflections

26. BEAM OVERHANGING ONE SUPPORT — CONCENTRATED LOAD AT END OF OVERHANG



$R_1 = V_1$ ..... $= \frac{Pa}{l}$

$R_2 = V_1 + V_2$ ..... $= \frac{P}{l}(l+a)$

V_2 ..... $= P$

M_{max} (at R_2) ..... $= Pa$

M_x (between supports) ..... $= \frac{Pax}{l}$

M_{x_1} (for overhang) ..... $= P(a - x_1)$

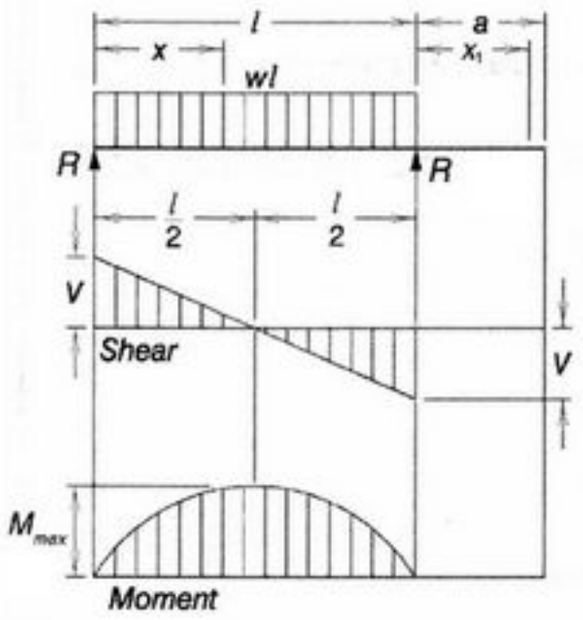
Δ_{max} $\left(\text{between supports at } x = \frac{l}{\sqrt{3}}\right)$ ..... $= \frac{Pal^2}{9\sqrt{3}EI} = 0.0642\frac{Pal^2}{EI}$

Δ_{max} (for overhang at $x_1 = a$) ..... $= \frac{Pa^2}{3EI}(l+a)$

Δ_x (between supports) ..... $= \frac{Pax}{6EIl}\left(l^2 - x^2\right)$

Δ_{x_1} (for overhang) ..... $= \frac{Px_1}{6EI}\left(2al + 3ax_1 - x_1^2\right)$

27. BEAM OVERHANGING ONE SUPPORT — UNIFORMLY DISTRIBUTED LOAD BETWEEN SUPPORTS



Total Equiv. Uniform Load ..... $= wl$

$R = V$ ..... $= \frac{wl}{2}$

V_x ..... $= w\left(\frac{l}{2} - x\right)$

M_{max} (at center) ..... $= \frac{wl^2}{8}$

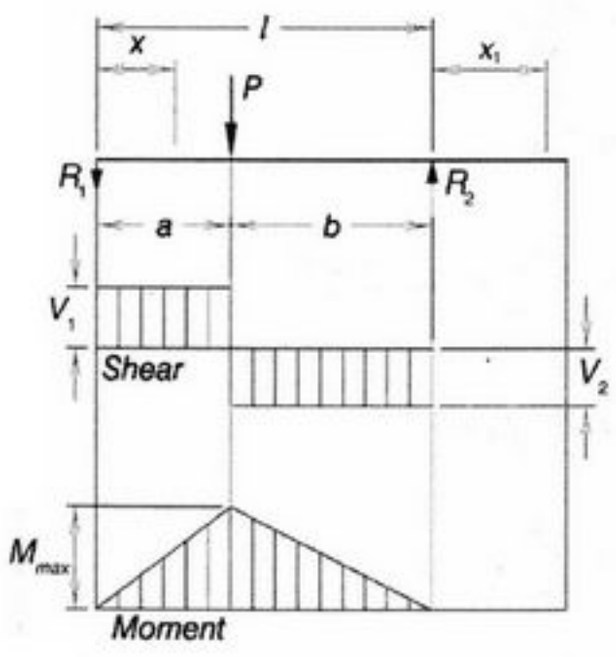
M_x ..... $= \frac{wx}{2}(l - x)$

Δ_{max} (at center) ..... $= \frac{5wl^4}{384\,EI}$

Δ_x ..... $= \frac{wx}{24\,EI}\left(l^3 - 2lx^2 + x^3\right)$

Δ_{x_1} ..... $= \frac{wl^3 x_1}{24\,EI}$

28. BEAM OVERHANGING ONE SUPPORT — CONCENTRATED LOAD AT ANY POINT BETWEEN SUPPORTS



Total Equiv. Uniform Load ..... $= \frac{8Pab}{l^2}$

$R_1 = V_1$ (= V_{max} when $a < b$) ..... $= \frac{Pb}{l}$

$R_2 = V_2$ (= V_{max} when $a > b$) ..... $= \frac{Pa}{l}$

M_{max} (at point of load) ..... $= \frac{Pab}{l}$

M_x (when $x < a$) ..... $= \frac{Pbx}{l}$

Δ_{max} $\left(\text{at } x = \sqrt{\frac{a(a+2b)}{3}} \text{ when } a > b\right)$ ..... $= \frac{Pab(a+2b)\sqrt{3a(a+2b)}}{27\,EIl}$

Δ_a (at point of load) ..... $= \frac{Pa^2b^2}{3\,EIl}$

Δ_x (when $x < a$) ..... $= \frac{Pbx}{6\,EIl}\left(l^2 - b^2 - x^2\right)$

Δ_x (when $x > a$) ..... $= \frac{Pa(l-x)}{6\,EIl}\left(2lx - x^2 - a^2\right)$

Δ_{x_1} ..... $= \frac{Pabx_1}{6\,EIl}(l+a)$

Dimensions and Properties

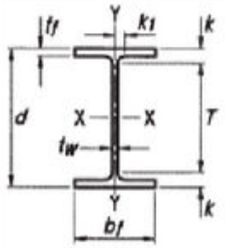


Table 1–1
W Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance				
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k		k_1	T	Workable Gage
											k_{des}	k_{det}			
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W44×335[c]	98.5	44.0	44	1.03	1	1/2	15.9	16	1.77	1 3/4	2.56	2 5/8	1 5/16	38 3/4	5 1/2
×290[c]	85.4	43.6	43 5/8	0.865	7/8	7/16	15.8	15 7/8	1.58	1 9/16	2.36	2 3/16	1 1/4		
×262[c]	76.9	43.3	43 1/4	0.785	13/16	7/16	15.8	1 3/4	1.42	1 7/16	2.20	2 1/4	1 3/16		
×230[c,v]	67.7	42.9	42 7/8	0.710	11/16	3/8	15.8	15 3/4	1.22	1 1/4	2.01	2 1/16	1 3/16		
W40×593[h]	174	43.0	43	1.79	1 13/16	15/16	16.7	16 3/4	3.23	3 1/4	4.41	4 1/2	2 1/8	34	7 1/2
×503[h]	148	42.1	42	1.54	1 9/16	13/16	16.4	16 3/8	2.76	2 3/4	3.94	4	2		
×431[h]	127	41.3	41 1/4	1.34	1 5/16	11/16	16.2	16 1/4	2.36	2 3/8	3.54	3 5/8	1 7/8		
×397[h]	117	41.0	41	1.22	1 1/4	5/8	16.1	16 1/8	2.20	2 3/16	3.38	3 1/2	1 13/16		
×372[h]	109	40.6	40 5/8	1.16	1 3/16	5/8	16.1	16 1/8	2.05	2 1/16	3.23	3 5/16	1 13/16		
×362[h]	107	40.6	40 1/2	1.12	1 1/8	9/16	16.0	16	2.01	2	3.19	3 1/4	1 3/4		
×324	95.3	40.2	40 1/8	1.00	1	1/2	15.9	15 7/8	1.81	1 13/16	2.99	3 1/16	1 11/16		
×297[c]	87.4	39.8	39 7/8	0.930	15/16	1/2	15.8	15 7/8	1.65	1 5/8	2.83	2 15/16	1 11/16		
×277[c]	81.4	39.7	39 3/4	0.830	13/16	7/16	15.8	15 7/8	1.58	1 9/16	2.76	2 7/8	1 5/8		
×249[c]	73.3	39.4	39 3/8	0.750	3/4	3/8	15.8	15 3/4	1.42	1 7/16	2.60	2 11/16	1 9/16		
×215[c]	63.4	39.0	39	0.650	5/8	5/16	15.8	15 3/4	1.22	1 1/4	2.40	2 1/2	1 9/16		
×199[c]	58.5	38.7	38 5/8	0.650	5/8	5/16	15.8	15 3/4	1.07	1 1/16	2.25	2 5/16	1 9/16		
W40×392[h]	115	41.6	41 5/8	1.42	1 7/16	3/4	12.4	12 3/8	2.52	2 1/2	3.70	3 13/16	1 15/16	34	7 1/2
×331[h]	97.5	40.8	40 3/4	1.22	1 1/4	5/8	12.2	12 1/8	2.13	2 1/8	3.31	3 3/8	1 13/16		
×327[h]	96.0	40.8	40 3/4	1.18	1 3/16	5/8	12.1	12 1/8	2.13	2 1/8	3.31	3 3/8	1 13/16		
×294	86.3	40.4	40 3/8	1.06	1 1/16	9/16	12.0	12	1.93	1 15/16	3.11	3 3/16	1 3/4		
×278	82.0	40.2	40 1/8	1.03	1	1/2	12.0	12	1.81	1 13/16	2.99	3 1/16	1 3/4		
×264	77.6	40.0	40	0.960	15/16	1/2	11.9	11 7/8	1.73	1 3/4	2.91	3	1 11/16		
×235[c]	69.0	39.7	39 3/4	0.830	13/16	7/16	11.9	11 7/8	1.58	1 9/16	2.76	2 7/8	1 5/8		
×211[c]	62.0	39.4	39 3/8	0.750	3/4	3/8	11.8	11 3/4	1.42	1 7/16	2.60	2 11/16	1 9/16		
×183[c]	53.3	39.0	39	0.650	5/8	5/16	11.8	11 3/4	1.20	1 3/16	2.38	2 1/2	1 9/16		
×167[c]	49.2	38.6	38 5/8	0.650	5/8	5/16	11.8	11 3/4	1.03	1	2.21	2 5/16	1 9/16		
×149[c,v]	43.8	38.2	38 1/4	0.630	5/8	5/16	11.8	11 3/4	0.830	13/16	2.01	2 1/8	1 1/2		

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

Table 1–1 (continued)
W Shapes
Properties

W44 – W40

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
335	4.50	38.0	31100	1410	17.8	1620	1200	150	3.49	236	4.24	42.3	74.7	535000
290	5.02	45.0	27000	1240	17.8	1410	1040	132	3.49	205	4.21	42.0	50.9	461000
262	5.57	49.6	24100	1110	17.7	1270	923	117	3.47	182	4.17	41.9	37.3	405000
230	6.45	54.8	20800	971	17.5	1100	796	101	3.43	157	4.13	41.7	24.9	346000
593	2.58	19.1	50400	2340	17.0	2760	2520	302	3.80	481	4.63	39.8	445	997000
503	2.98	22.3	41600	1980	16.8	2310	2040	249	3.72	394	4.50	39.3	277	789000
431	3.44	25.5	34800	1690	16.6	1960	1690	208	3.65	328	4.41	38.9	177	638000
397	3.66	28.0	32000	1560	16.6	1800	1540	191	3.64	300	4.37	38.8	142	579000
372	3.93	29.5	29600	1460	16.5	1680	1420	177	3.60	277	4.34	38.6	116	528000
362	3.99	30.5	28900	1420	16.5	1640	1380	173	3.60	270	4.33	38.5	109	513000
324	4.40	34.2	25600	1280	16.4	1460	1220	153	3.58	239	4.28	38.4	79.4	448000
297	4.80	36.8	23200	1170	16.3	1330	1090	138	3.54	215	4.23	38.2	61.2	399000
277	5.03	41.2	21900	1100	16.4	1250	1040	132	3.58	204	4.25	38.1	51.5	379000
249	5.55	45.6	19600	993	16.3	1120	926	118	3.55	182	4.21	38.0	38.1	334000
215	6.45	52.6	16700	859	16.2	964	796	101	3.54	156	4.18	37.8	24.8	284000
199	7.39	52.6	14900	770	16.0	869	695	88.2	3.45	137	4.12	37.6	18.3	246000
392	2.45	24.1	29900	1440	16.1	1710	803	130	2.64	212	3.30	39.1	172	306000
331	2.86	28.0	24700	1210	15.9	1430	644	106	2.57	172	3.21	38.7	105	241000
327	2.85	29.0	24500	1200	16.0	1410	640	105	2.58	170	3.21	38.7	103	239000
294	3.11	32.2	21900	1080	15.9	1270	562	93.5	2.55	150	3.16	38.5	76.6	208000
278	3.31	33.3	20500	1020	15.8	1190	521	87.1	2.52	140	3.13	38.4	65.0	192000
264	3.45	35.6	19400	971	15.8	1130	493	82.6	2.52	132	3.12	38.3	56.1	181000
235	3.77	41.2	17400	875	15.9	1010	444	74.6	2.54	118	3.11	38.1	41.3	161000
211	4.17	45.6	15500	786	15.8	906	390	66.1	2.51	105	3.07	38.0	30.4	141000
183	4.92	52.6	13200	675	15.7	774	331	56.0	2.49	88.3	3.04	37.8	19.3	118000
167	5.76	52.6	11600	600	15.3	693	283	47.9	2.40	76.0	2.98	37.6	14.0	99700
149	7.11	54.3	9800	513	15.0	598	229	38.8	2.29	62.2	2.89	37.4	9.36	80000

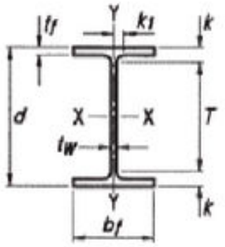


Table 1–1 (continued)
W Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance				
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k		k_1	T	Workable Gage
											k_{des}	k_{det}			
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W36×800[h]	236	42.6	42 1/2	2.38	2 3/8	1 3/16	18.0	18	4.29	4 5/16	5.24	5 9/16	2 3/8	31 3/8	7 1/2
×652[h]	192	41.1	41	1.97	2	1	17.6	17 5/8	3.54	3 9/16	4.49	4 13/16	2 3/16		
×529[h]	156	39.8	39 3/4	1.61	1 5/8	13/16	17.2	17 1/4	2.91	2 15/16	3.86	4 3/16	2		
×487[h]	143	39.3	39 3/8	1.50	1 1/2	3/4	17.1	17 1/8	2.68	2 11/16	3.63	4	1 15/16		
×441[h]	130	38.9	38 7/8	1.36	1 3/8	11/16	17.0	17	2.44	2 7/16	3.39	3 3/4	1 7/8		
×395[h]	116	38.4	38 3/8	1.22	1 1/4	5/8	16.8	16 7/8	2.20	2 3/16	3.15	3 7/16	1 13/16		
×361[h]	106	38.0	38	1.12	1 1/8	9/16	16.7	16 3/4	2.01	2	2.96	3 5/16	1 3/4		
×330	97.0	37.7	37 5/8	1.02	1	1/2	16.6	16 5/8	1.85	1 7/8	2.80	3 1/8	1 3/4		
×302	88.8	37.3	37 3/8	0.945	15/16	1/2	16.7	16 5/8	1.68	1 11/16	2.63	3	1 11/16		
×282[c]	82.9	37.1	37 1/8	0.885	7/8	7/16	16.6	16 5/8	1.57	1 9/16	2.52	2 7/8	1 5/8		
×262[c]	77.0	36.9	36 7/8	0.840	13/16	7/16	16.6	16 1/2	1.44	1 7/16	2.39	2 3/4	1 5/8		
×247[c]	72.5	36.7	36 5/8	0.800	13/16	7/16	16.5	16 1/2	1.35	1 3/8	2.30	2 5/8	1 5/8		
×231[c]	68.1	36.5	36 1/2	0.760	3/4	3/8	16.5	16 1/2	1.26	1 1/4	2.21	2 9/16	1 9/16		
W36×256	75.4	37.4	37 3/8	0.960	15/16	1/2	12.2	12 1/4	1.73	1 3/4	2.48	2 5/8	1 5/16	32 1/8	5 1/2
×232[c]	68.1	37.1	37 1/8	0.870	7/8	7/16	12.1	12 1/8	1.57	1 9/16	2.32	2 7/16	1 1/4		
×210[c]	61.8	36.7	36 3/4	0.830	13/16	7/16	12.2	12 1/8	1.36	1 3/8	2.11	2 5/16	1 1/4		
×194[c]	57.0	36.5	36 1/2	0.765	3/4	3/8	12.1	12 1/8	1.26	1 1/4	2.01	2 3/16	1 3/16		
×182[c]	53.6	36.3	36 3/8	0.725	3/4	3/8	12.1	12 1/8	1.18	1 3/16	1.93	2 1/8	1 3/16		
×170[c]	50.1	36.2	36 1/8	0.680	11/16	3/8	12.0	12	1.10	1 1/8	1.85	2	1 3/16		
×160[c]	47.0	36.0	36	0.650	5/8	5/16	12.0	12	1.02	1	1.77	1 15/16	1 1/8		
×150[c]	44.2	35.9	35 7/8	0.625	5/8	5/16	12.0	12	0.940	15/16	1.69	1 7/8	1 1/8		
×135[c,v]	39.7	35.6	35 1/2	0.600	5/8	5/16	12.0	12	0.790	13/16	1.54	1 11/16	1 1/8		
W33×387[h]	114	36.0	36	1.26	1 1/4	5/8	16.2	16 1/4	2.28	2 1/4	3.07	3 3/16	1 7/16	29 5/8	5 1/2
×354[h]	104	35.6	35 1/2	1.16	1 3/16	5/8	16.1	16 1/8	2.09	2 1/16	2.88	2 15/16	1 3/8		
×318	93.6	35.2	35 1/8	1.04	1 1/16	9/16	16.0	16	1.89	1 7/8	2.68	2 3/4	1 5/16		
×291	85.7	34.8	34 7/8	0.960	15/16	1/2	15.9	15 7/8	1.73	1 3/4	2.52	2 5/8	1 5/16		
×263	77.5	34.5	34 1/2	0.870	7/8	7/16	15.8	15 3/4	1.57	1 9/16	2.36	2 7/16	1 1/4		
×241[c]	71.0	34.2	34 1/8	0.830	13/16	7/16	15.9	15 7/8	1.40	1 3/8	2.19	2 1/4	1 1/4		
×221[c]	65.2	33.9	33 7/8	0.775	3/4	3/8	15.8	15 3/4	1.28	1 1/4	2.06	2 1/8	1 3/16		
×201[c]	59.2	33.7	33 5/8	0.715	11/16	3/8	15.7	15 3/4	1.15	1 1/8	1.94	2	1 3/16		
W33×169[c]	49.5	33.8	33 7/8	0.670	11/16	3/8	11.5	11 1/2	1.22	1 1/4	1.92	2 1/8	1 3/16	29 5/8	5 1/2
×152[c]	44.8	33.5	33 1/2	0.635	5/8	5/16	11.6	11 5/8	1.06	1 1/16	1.76	1 15/16	1 1/8		
×141[c]	41.6	33.3	33 1/4	0.605	5/8	5/16	11.5	11 1/2	0.960	15/16	1.66	1 13/16	1 1/8		
×130[c]	38.3	33.1	33 1/8	0.580	9/16	5/16	11.5	11 1/2	0.855	7/8	1.56	1 3/4	1 1/8		
×118[c,v]	34.7	32.9	32 7/8	0.550	9/16	5/16	11.5	11 1/2	0.740	3/4	1.44	1 5/8	1 1/8		

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

Table 1–1 (continued)
W Shapes
Properties

W36 – W33

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
800	2.10	13.5	64700	3040	16.6	3650	4200	467	4.22	743	5.14	38.3	1060	1540000
652	2.48	16.3	50600	2460	16.2	2910	3230	367	4.10	581	4.96	37.5	593	1130000
529	2.96	19.9	39600	1990	16.0	2330	2490	289	4.00	454	4.80	36.9	327	846000
487	3.19	21.4	36000	1830	15.8	2130	2250	263	3.96	412	4.74	36.7	258	754000
441	3.48	23.6	32100	1650	15.7	1910	1990	235	3.92	368	4.69	36.4	194	661000
395	3.83	26.3	28500	1490	15.7	1710	1750	208	3.88	325	4.61	36.2	142	575000
361	4.16	28.6	25700	1350	15.6	1550	1570	188	3.85	293	4.58	36.0	109	509000
330	4.49	31.4	23300	1240	15.5	1410	1420	171	3.83	265	4.53	35.8	84.3	456000
302	4.96	33.9	21100	1130	15.4	1280	1300	156	3.82	241	4.53	35.7	64.3	412000
282	5.29	36.2	19600	1050	15.4	1190	1200	144	3.80	223	4.50	35.5	52.7	378000
262	5.75	38.2	17900	972	15.3	1100	1090	132	3.76	204	4.46	35.4	41.6	342000
247	6.11	40.1	16700	913	15.2	1030	1010	123	3.74	190	4.42	35.3	34.7	316000
231	6.54	42.2	15600	854	15.1	963	940	114	3.71	176	4.40	35.2	28.7	292000
256	3.53	33.8	16800	895	14.9	1040	528	86.5	2.65	137	3.25	35.7	52.9	168000
232	3.86	37.3	15000	809	14.8	936	468	77.2	2.62	122	3.21	35.6	39.6	148000
210	4.48	39.1	13200	719	14.6	833	411	67.5	2.58	107	3.18	35.3	28.0	128000
194	4.81	42.4	12100	664	14.6	767	375	61.9	2.56	97.7	3.15	35.2	22.2	116000
182	5.12	44.8	11300	623	14.5	718	347	57.6	2.55	90.7	3.13	35.2	18.5	107000
170	5.47	47.7	10500	581	14.5	668	320	53.2	2.53	83.8	3.11	35.1	15.1	98500
160	5.88	49.9	9760	542	14.4	624	295	49.1	2.50	77.3	3.08	35.0	12.4	90200
150	6.37	51.9	9040	504	14.3	581	270	45.1	2.47	70.9	3.06	34.9	10.1	82200
135	7.56	54.1	7800	439	14.0	509	225	37.7	2.38	59.7	2.99	34.8	7.00	68100
387	3.55	23.7	24300	1350	14.6	1560	1620	200	3.77	312	4.49	33.7	148	459000
354	3.85	25.7	22000	1240	14.5	1420	1460	181	3.74	282	4.44	33.5	115	408000
318	4.23	28.7	19500	1110	14.5	1270	1290	161	3.71	250	4.39	33.3	84.4	357000
291	4.60	31.0	17700	1020	14.4	1160	1160	146	3.68	226	4.35	33.1	65.1	319000
263	5.03	34.3	15900	919	14.3	1040	1040	131	3.66	202	4.31	33.0	48.7	281000
241	5.66	35.9	14200	831	14.1	940	933	118	3.62	182	4.29	32.8	36.2	251000
221	6.20	38.5	12900	759	14.1	857	840	106	3.59	164	4.25	32.7	27.8	224000
201	6.85	41.7	11600	686	14.0	773	749	95.2	3.56	147	4.21	32.5	20.8	198000
169	4.71	44.7	9290	549	13.7	629	310	53.9	2.50	84.4	3.03	32.6	17.7	82400
152	5.48	47.2	8160	487	13.5	559	273	47.2	2.47	73.9	3.01	32.4	12.4	71700
141	6.01	49.6	7450	448	13.4	514	246	42.7	2.43	66.9	2.98	32.3	9.70	64400
130	6.73	51.7	6710	406	13.2	467	218	37.9	2.39	59.5	2.94	32.2	7.37	56600
118	7.76	54.5	5900	359	13.0	415	187	32.6	2.32	51.3	2.89	32.1	5.30	48300

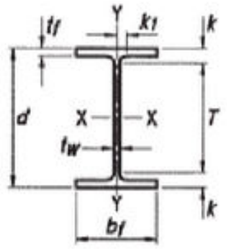


Table 1–1 (continued)
W Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance				
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k		k_1	T	Workable Gage
											k_{des}	k_{det}			
	in.²	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W30×391[h]	115	33.2	33 1/4	1.36	1 3/8	11/16	15.6	15 5/8	2.44	2 7/16	3.23	3 3/8	1 1/2	26 1/2	5 1/2
×357[h]	105	32.8	32 3/4	1.24	1 1/4	5/8	15.5	15 1/2	2.24	2 1/4	3.03	3 1/8	1 7/16		
×326[h]	95.8	32.4	32 3/8	1.14	1 1/8	9/16	15.4	15 3/8	2.05	2 1/16	2.84	2 15/16	1 3/8		
×292	85.9	32.0	32	1.02	1	1/2	15.3	15 1/4	1.85	1 7/8	2.64	2 3/4	1 5/16		
×261	76.9	31.6	31 5/8	0.930	15/16	1/2	15.2	15 1/8	1.65	1 5/8	2.44	2 9/16	1 5/16		
×235	69.2	31.3	31 1/4	0.830	13/16	7/16	15.1	15	1.50	1 1/2	2.29	2 3/8	1 1/4		
×211	62.2	30.9	31	0.775	3/4	3/8	15.1	15 1/8	1.32	1 5/16	2.10	2 1/4	1 3/16		
×191[c]	56.3	30.7	30 5/8	0.710	11/16	3/8	15.0	15	1.19	1 3/16	1.97	2 1/16	1 3/16		
×173[c]	51.0	30.4	30 1/2	0.655	5/8	5/16	15.0	15	1.07	1 1/16	1.85	2	1 1/8		
W30×148[c]	43.5	30.7	30 5/8	0.650	5/8	5/16	10.5	10 1/2	1.18	1 3/16	1.83	2 1/16	1 1/8	26 1/2	5 1/2
×132[c]	38.9	30.3	30 1/4	0.615	5/8	5/16	10.5	10 1/2	1.00	1	1.65	1 7/8	1 1/8		
×124[c]	36.5	30.2	30 1/8	0.585	9/16	5/16	10.5	10 1/2	0.930	15/16	1.58	1 13/16	1 1/8		
×116[c]	34.2	30.0	30	0.565	9/16	5/16	10.5	10 1/2	0.850	7/8	1.50	1 3/4	1 1/8		
×108[c]	31.7	29.8	29 7/8	0.545	9/16	5/16	10.5	10 1/2	0.760	3/4	1.41	1 11/16	1 1/8		
×99[c]	29.1	29.7	29 5/8	0.520	1/2	1/4	10.5	10 1/2	0.670	11/16	1.32	1 9/16	1 1/16		
×90[c,v]	26.4	29.5	29 1/2	0.470	1/2	1/4	10.4	10 3/8	0.610	5/8	1.26	1 1/2	1 1/16		
W27×539[h]	159	32.5	32 1/2	1.97	2	1	15.3	15 1/4	3.54	3 9/16	4.33	4 7/16	1 13/16	23 5/8	5 1/2[g]
×368[h]	108	30.4	30 3/8	1.38	1 3/8	11/16	14.7	14 5/8	2.48	2 1/2	3.27	3 3/8	1 1/2		5 1/2
×336[h]	98.9	30.0	30	1.26	1 1/4	5/8	14.6	14 1/2	2.28	2 1/4	3.07	3 3/16	1 7/16		
×307[h]	90.4	29.6	29 5/8	1.16	1 3/16	5/8	14.4	14 1/2	2.09	2 1/16	2.88	3	1 7/16		
×281	82.9	29.3	29 1/4	1.06	1 1/16	9/16	14.4	14 3/8	1.93	1 15/16	2.72	2 13/16	1 3/8		
×258	76.0	29.0	29	0.980	1 1/2	1	14.3	14 1/4	1.77	1 3/4	2.56	2 11/16	1 5/16		
×235	69.4	28.7	28 5/8	0.910	15/16	1/2	14.2	14 1/4	1.61	1 5/8	2.40	2 1/2	1 5/16		
×217	64.0	28.4	28 3/8	0.830	13/16	7/16	14.1	14 1/8	1.50	1 1/2	2.29	2 3/8	1 1/4		
×194	57.2	28.1	28 1/8	0.750	3/4	3/8	14.0	14	1.34	1 5/16	2.13	2 1/4	1 3/16		
×178	52.5	27.8	27 3/4	0.725	3/4	3/8	14.1	14 1/8	1.19	1 3/16	1.98	2 1/16	1 3/16		
×161[c]	47.6	27.6	27 5/8	0.660	11/16	3/8	14.0	14	1.08	1 1/16	1.87	2	1 3/16		
×146[c]	43.1	27.4	27 3/8	0.605	5/8	5/16	14.0	14	0.975	1	1.76	1 7/8	1 1/8		
W27×129[c]	37.8	27.6	27 5/8	0.610	5/8	5/16	10.0	10	1.10	1 1/8	1.70	2	1 1/8	23 5/8	5 1/2
×114[c]	33.5	27.3	27 1/4	0.570	9/16	5/16	10.1	10 1/8	0.930	15/16	1.53	1 13/16	1 1/8		
×102[c]	30.0	27.1	27 1/8	0.515	1/2	1/4	10.0	10	0.830	13/16	1.43	1 3/4	1 1/16		
×94[c]	27.7	26.9	26 7/8	0.490	1/2	1/4	10.0	10	0.745	3/4	1.34	1 5/8	1 1/16		
×84[c]	24.8	26.7	26 3/4	0.460	7/16	1/4	10.0	10	0.640	5/8	1.24	1 9/16	1 1/16		

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

Table 1–1 (continued)
W Shapes
Properties

W30 – W27

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.⁶
391	3.19	19.7	20700	1250	13.4	1450	1550	198	3.67	310	4.37	30.8	173	366000
357	3.45	21.6	18700	1140	13.3	1320	1390	179	3.64	279	4.32	30.6	134	324000
326	3.75	23.4	16800	1040	13.2	1190	1240	162	3.60	252	4.27	30.4	103	287000
292	4.12	26.2	14900	930	13.2	1060	1100	144	3.58	223	4.22	30.2	75.2	250000
261	4.59	28.7	13100	829	13.1	943	959	127	3.53	196	4.16	30.0	54.1	215000
235	5.02	32.2	11700	748	13.0	847	855	114	3.51	175	4.13	29.8	40.3	190000
211	5.74	34.5	10300	665	12.9	751	757	100	3.49	155	4.10	29.6	28.4	166000
191	6.35	37.7	9200	600	12.8	675	673	89.5	3.46	138	4.07	29.5	21.0	146000
173	7.04	40.8	8230	541	12.7	607	598	79.8	3.42	123	4.03	29.4	15.6	129000
148	4.44	41.6	6680	436	12.4	500	227	43.3	2.28	68.0	2.77	29.5	14.5	49400
132	5.27	43.9	5770	380	12.2	437	196	37.2	2.25	58.4	2.75	29.3	9.72	42100
124	5.65	46.2	5360	355	12.1	408	181	34.4	2.23	54.0	2.73	29.2	7.99	38600
116	6.17	47.8	4930	329	12.0	378	164	31.3	2.19	49.2	2.70	29.2	6.43	34900
108	6.89	49.6	4470	299	11.9	346	146	27.9	2.15	43.9	2.66	29.1	4.99	30900
99	7.80	51.9	3990	269	11.7	312	128	24.5	2.10	38.6	2.62	29.0	3.77	26800
90	8.52	57.5	3610	245	11.7	283	115	22.1	2.09	34.7	2.60	28.9	2.84	24000
539	2.15	12.1	25600	1570	12.7	1890	2110	277	3.65	437	4.41	29.0	496	443000
368	2.96	17.3	16200	1060	12.2	1240	1310	179	3.48	279	4.14	27.9	170	255000
336	3.19	18.9	14600	972	12.1	1130	1180	162	3.45	252	4.09	27.7	131	226000
307	3.46	20.6	13100	887	12.0	1030	1050	146	3.41	227	4.04	27.5	101	199000
281	3.72	22.5	11900	814	12.0	936	953	133	3.39	206	4.00	27.4	79.5	178000
258	4.03	24.4	10800	745	11.9	852	859	120	3.36	187	3.96	27.2	61.6	159000
235	4.41	26.2	9700	677	11.8	772	769	108	3.33	168	3.92	27.1	47.0	141000
217	4.71	28.7	8910	627	11.8	711	704	100	3.32	154	3.89	26.9	37.6	128000
194	5.24	31.8	7860	559	11.7	631	619	88.1	3.29	136	3.85	26.8	27.1	111000
178	5.92	32.9	7020	505	11.6	570	555	78.8	3.25	122	3.83	26.6	20.1	98400
161	6.49	36.1	6310	458	11.5	515	497	70.9	3.23	109	3.79	26.5	15.1	87300
146	7.16	39.4	5660	414	11.5	464	443	63.5	3.20	97.7	3.76	26.4	11.3	77200
129	4.55	39.7	4760	345	11.2	395	184	36.8	2.21	57.6	2.66	26.5	11.1	32500
114	5.41	42.5	4080	299	11.0	343	159	31.5	2.18	49.3	2.64	26.4	7.33	27600
102	6.03	47.1	3620	267	11.0	305	139	27.8	2.15	43.4	2.62	26.3	5.28	24000
94	6.70	49.5	3270	243	10.9	278	124	24.8	2.12	38.8	2.59	26.2	4.03	21300
84	7.78	52.7	2850	213	10.7	244	106	21.2	2.07	33.2	2.54	26.1	2.81	17900

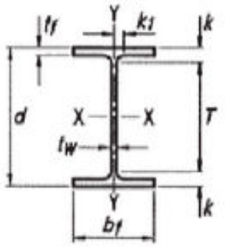


Table 1–1 (continued)
W Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance				
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k		k_1	T	Work-able Gage
											k_{des}	k_{det}			
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W24×370[h]	109	28.0	28	1.52	1 1/2	3/4	13.7	13 5/8	2.72	2 3/4	3.22	3 5/8	1 9/16	20 3/4	5 1/2
×335[h]	98.4	27.5	27 1/2	1.38	1 3/8	11/16	13.5	13 1/2	2.48	2 1/2	2.98	3 3/8	1 1/2		
×306[h]	89.8	27.1	27 1/8	1.26	1 1/4	5/8	13.4	13 3/8	2.28	2 1/4	2.78	3 3/16	1 7/16		
x279[h]	82.0	26.7	26 3/4	1.16	1 3/16	5/8	13.3	13 1/4	2.09	2 1/16	2.59	3	1 7/16		
×250	73.5	26.3	26 3/8	1.04	1 1/16	9/16	13.2	13 1/8	1.89	1 7/8	2.39	2 13/16	1 3/8		
×229	67.2	26.0	26	0.960	15/16	1/2	13.1	13 1/8	1.73	1 3/4	2.23	2 5/8	1 5/16		
×207	60.7	25.7	25 3/4	0.870	7/8	7/16	13.0	13	1.57	1 9/16	2.07	2 1/2	1 1/4		
×192	56.3	25.5	25 1/2	0.810	13/16	7/16	13.0	13	1.46	1 7/16	1.96	2 3/8	1 1/4		
×176	51.7	25.2	25 1/4	0.750	3/4	3/8	12.9	12 7/8	1.34	1 5/16	1.84	2 1/4	1 3/16		
×162	47.7	25.0	25	0.705	11/16	3/8	13.0	13	1.22	1 1/4	1.72	2 1/8	1 3/16		
×146	43.0	24.7	24 3/4	0.650	5/8	5/16	12.9	12 7/8	1.09	1 1/16	1.59	2	1 1/8		
×131	38.5	24.5	24 1/2	0.605	5/8	5/16	12.9	12 7/8	0.960	15/16	1.46	1 7/8	1 1/8		
×117[c]	34.4	24.3	24 1/4	0.550	9/16	5/16	12.8	12 3/4	0.850	7/8	1.35	1 3/4	1 1/8		
×104[c]	30.6	24.1	24	0.500	1/2	1/4	12.8	12 3/4	0.750	3/4	1.25	1 5/8	1 1/16		
W24×103[c]	30.3	24.5	24 1/2	0.550	9/16	5/16	9.00	9	0.980	1	1.48	1 7/8	1 1/8	20 3/4	5 1/2
×94[c]	27.7	24.3	24 1/4	0.515	1/2	1/4	9.07	9 1/8	0.875	7/8	1.38	1 3/4	1 1/16		
×84[c]	24.7	24.1	24 1/8	0.470	1/2	1/4	9.02	9	0.770	3/4	1.27	1 11/16	1 1/16		
×76[c]	22.4	23.9	23 7/8	0.440	7/16	1/4	8.99	9	0.680	11/16	1.18	1 9/16	1 1/16		
×68[c]	20.1	23.7	23 3/4	0.415	7/16	1/4	8.97	9	0.585	9/16	1.09	1 1/2	1 1/16		
W24×62[c]	18.2	23.7	23 3/4	0.430	7/16	1/4	7.04	7	0.590	9/16	1.09	1 1/2	1 1/16	20 3/4	3 1/2[g]
×55[c,y]	16.2	23.6	23 5/8	0.395	3/8	3/16	7.01	7	0.505	1/2	1.01	1 7/16	1	20 3/4	3 1/2[g]
W21×201	59.2	23.0	23	0.910	15/16	1/2	12.6	12 5/8	1.63	1 5/8	2.13	2 1/2	1 5/16	18	5 1/2
×182	53.6	22.7	22 3/4	0.830	13/16	7/16	12.5	12 1/2	1.48	1 1/2	1.98	2 3/8	1 1/4		
×166	48.8	22.5	22 1/2	0.750	3/4	3/8	12.4	12 3/8	1.36	1 3/8	1.86	2 1/4	1 3/16		
×147	43.2	22.1	22	0.720	3/4	3/8	12.5	12 1/2	1.15	1 1/8	1.65	2	1 3/16		
×132	38.8	21.8	21 7/8	0.650	5/8	5/16	12.4	12 1/2	1.04	1 1/16	1.54	1 15/16	1 1/8		
×122	35.9	21.7	21 5/8	0.600	5/8	5/16	12.4	12 3/8	0.960	15/16	1.46	1 13/16	1 1/8		
×111	32.7	21.5	21 1/2	0.550	9/16	5/16	12.3	12 3/8	0.875	7/8	1.38	1 3/4	1 1/8		
×101[c]	29.8	21.4	21 3/8	0.500	1/2	1/4	12.3	12 1/4	0.800	13/16	1.30	1 11/16	1 1/16		

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

Table 1–1 (continued)
W Shapes
Properties

W24 – W21

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
370	2.51	14.2	13400	957	11.1	1130	1160	170	3.27	267	3.92	25.3	201	186000
335	2.73	15.6	11900	864	11.0	1020	1030	152	3.23	238	3.86	25.0	152	161000
306	2.94	17.1	10700	789	10.9	922	919	137	3.20	214	3.81	24.9	117	142000
279	3.18	18.6	9600	718	10.8	835	823	124	3.17	193	3.76	24.6	90.5	125000
250	3.49	20.7	8490	644	10.7	744	724	110	3.14	171	3.71	24.5	66.6	106000
229	3.79	22.5	7650	588	10.7	675	651	99.4	3.11	154	3.67	24.3	51.3	96100
207	4.14	24.8	6820	531	10.6	606	578	88.8	3.08	137	3.62	24.1	38.3	84100
192	4.43	26.6	6260	491	10.5	559	530	81.8	3.07	126	3.60	24.0	30.8	76300
176	4.81	28.7	5680	450	10.5	511	479	74.3	3.04	115	3.57	23.9	23.9	68400
162	5.31	30.6	5170	414	10.4	468	443	68.4	3.05	105	3.57	23.8	18.5	62600
146	5.92	33.2	4580	371	10.3	418	391	60.5	3.01	93.2	3.53	23.7	13.4	54600
131	6.70	35.6	4020	329	10.2	370	340	53.0	2.97	81.5	3.49	23.5	9.50	47100
117	7.53	39.2	3540	291	10.1	327	297	46.5	2.94	71.4	3.46	23.4	6.72	40800
104	8.50	43.1	3100	258	10.1	289	259	40.7	2.91	62.4	3.42	23.3	4.72	35200
103	4.59	39.2	3000	245	10.0	280	119	26.5	1.99	41.5	2.40	23.6	7.07	16600
94	5.18	41.9	2700	222	9.87	254	109	24.0	1.98	37.5	2.40	23.4	5.26	15000
84	5.86	45.9	2370	196	9.79	224	94.4	20.9	1.95	32.6	2.37	23.3	3.70	12800
76	6.61	49.0	2100	176	9.69	200	82.5	18.4	1.92	28.6	2.34	23.2	2.68	11100
68	7.66	52.0	1830	154	9.55	177	70.4	15.7	1.87	24.5	2.30	23.1	1.87	9430
62	5.97	50.1	1550	131	9.23	153	34.5	9.80	1.38	15.7	1.75	23.2	1.71	4620
55	6.94	54.6	1350	114	9.11	134	29.1	8.30	1.34	13.3	1.71	23.1	1.18	3870
201	3.86	20.6	5310	461	9.47	530	542	86.1	3.02	133	3.55	21.4	40.9	62000
182	4.22	22.6	4730	417	9.40	476	483	77.2	3.00	119	3.51	21.2	30.7	54400
166	4.57	25.0	4280	380	9.36	432	435	70.0	2.99	108	3.48	21.1	23.6	48500
147	5.44	26.1	3630	329	9.17	373	376	60.1	2.95	92.6	3.45	20.9	15.4	41100
132	6.01	28.9	3220	295	9.12	333	333	53.5	2.93	82.3	3.42	20.8	11.3	36000
122	6.45	31.3	2960	273	9.09	307	305	49.2	2.92	75.6	3.40	20.7	8.98	32700
111	7.05	34.1	2670	249	9.05	279	274	44.5	2.90	68.2	3.37	20.6	6.83	29200
101	7.68	37.5	2420	227	9.02	253	248	40.3	2.89	61.7	3.35	20.6	5.21	26200

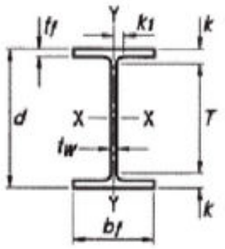


Table 1–1 (continued)
W Shapes
Dimensions

Shape	Area, A	Depth, d	Web			Flange				Distance				
			Thickness, tw		tw/2	Width, bf		Thickness, tf		k		k1	T	Work-able Gage
										kdes	kdet			
	in.²	in.	in.		in.	in.		in.		in.	in.	in.	in.	in.
W21×93	27.3	21.6	0.580	9/16	5/16	8.42	8 3/8	0.930	15/16	1.43	1 5/8	15/16	18 3/8	5 1/2
×83[c]	24.3	21.4	0.515	1/2	1/4	8.36	8 3/8	0.835	13/16	1.34	1 1/2	7/8		
×73[c]	21.5	21.2	0.455	7/16	1/4	8.30	8 1/4	0.740	3/4	1.24	1 7/16	7/8		
×68[c]	20.0	21.1	0.430	7/16	1/4	8.27	8 1/4	0.685	11/16	1.19	1 3/8	7/8		
×62[c]	18.3	21.0	0.400	3/8	3/16	8.24	8 1/4	0.615	5/8	1.12	1 5/16	13/16		
×55[c]	16.2	20.8	0.375	3/8	3/16	8.22	8 1/4	0.522	1/2	1.02	1 3/16	13/16		
×48[c,f]	14.1	20.6	0.350	3/8	3/16	8.14	8 1/8	0.430	7/16	0.930	1 1/8	13/16		
W21×57[c]	16.7	21.1	21	0.405	3/8	3/16	6.56	6 1/2	0.650	5/8	1.15	1 5/16	13/16	18 3/8	3 1/2
×50[c]	14.7	20.8	20 7/8	0.380	3/8	3/16	6.53	6 1/2	0.535	9/16	1.04	1 1/4	13/16		
×44[c]	13.0	20.7	20 5/8	0.350	3/8	3/16	6.50	6 1/2	0.450	7/16	0.950	1 1/8	13/16		
W18×311[h]	91.6	22.3	22 3/8	1.52	1 1/2	3/4	12.0	12	2.74	2 3/4	3.24	3 7/16	1 3/8	15 1/2	5 1/2
×283[h]	83.3	21.9	21 7/8	1.40	1 3/8	11/16	11.9	11 7/8	2.50	2 1/2	3.00	3 3/16	1 5/16		
×258[h]	75.9	21.5	21 1/2	1.28	1 1/4	5/8	11.8	11 3/4	2.30	2 5/16	2.70	3	1 1/4		
×234[h]	68.8	21.1	21	1.16	1 3/16	5/8	11.7	11 5/8	2.11	2 1/8	2.51	2 3/4	1 3/16		
×211	62.1	20.7	20 5/8	1.06	1 1/16	9/16	11.6	11 1/2	1.91	1 15/16	2.31	2 9/16	1 3/16		
×192	56.4	20.4	20 3/8	0.960	15/16	1/2	11.5	11 1/2	1.75	1 3/4	2.15	2 7/16	1 1/8		
×175	51.3	20.0	20	0.890	7/8	7/16	11.4	11 3/8	1.59	1 9/16	1.99	2 1/16	1 1/4	15 1/8	
×158	46.3	19.7	19 3/4	0.810	13/16	7/16	11.3	11 1/4	1.44	1 7/16	1.84	2 3/8	1 1/4		
×143	42.1	19.5	19 1/2	0.730	3/4	3/8	11.2	11 1/4	1.32	1 5/16	1.72	2 3/16	1 3/16		
×130	38.2	19.3	19 1/4	0.670	11/16	3/8	11.2	11 1/8	1.20	1 3/16	1.60	2 1/16	1 3/16		
×119	35.1	19.0	19	0.655	5/8	5/16	11.3	11 1/4	1.06	1 1/16	1.46	1 15/16	1 3/16		
×106	31.1	18.7	18 3/4	0.590	9/16	5/16	11.2	11 1/4	0.940	15/16	1.34	1 13/16	1 1/8		
×97	28.5	18.6	18 5/8	0.535	9/16	5/16	11.1	11 1/8	0.870	7/8	1.27	1 3/4	1 1/8		
×86	25.3	18.4	18 3/8	0.480	1/2	1/4	11.1	11 1/8	0.770	3/4	1.17	1 5/8	1 1/16		
×76[c]	22.3	18.2	18 1/4	0.425	7/16	1/4	11.0	11	0.680	11/16	1.08	1 9/16	1 1/16		
W18×71	20.8	18.5	18 1/2	0.495	1/2	1/4	7.64	7 5/8	0.810	13/16	1.21	1 1/2	7/8	15 1/2	3 1/2[g]
×65	19.1	18.4	18 3/8	0.450	7/16	1/4	7.59	7 5/8	0.750	3/4	1.15	1 7/16	7/8		
×60[c]	17.6	18.2	18 1/4	0.415	7/16	1/4	7.56	7 1/2	0.695	11/16	1.10	1 3/8	13/16		
×55[c]	16.2	18.1	18 1/8	0.390	3/8	3/16	7.53	7 1/2	0.630	5/8	1.03	1 5/16	13/16		
×50[c]	14.7	18.0	18	0.355	3/8	3/16	7.50	7 1/2	0.570	9/16	0.972	1 1/4	13/16		
W18×46[c]	13.5	18.1	18	0.360	3/8	3/16	6.06	6	0.605	5/8	1.01	1 1/4	13/16	15 1/2	3 1/2[g]
×40[c]	11.8	17.9	17 7/8	0.315	5/16	3/16	6.02	6	0.525	1/2	0.927	1 3/16	13/16		
×35[c]	10.3	17.7	17 3/4	0.300	5/16	3/16	6.00	6	0.425	7/16	0.827	1 1/8	3/4		

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

Table 1–1 (continued)
W Shapes
Properties

W21 – W18

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				rts	ho	Torsional Properties	
	bf/2tf	h/tw	I	S	r	Z	I	S	r	Z			J	Cw
lb/ft			in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.⁶
93	4.53	32.3	2070	192	8.70	221	92.9	22.1	1.84	34.7	2.24	20.7	6.03	9940
83	5.00	36.4	1830	171	8.67	196	81.4	19.5	1.83	30.5	2.21	20.6	4.34	8630
73	5.60	41.2	1600	151	8.64	172	70.6	17.0	1.81	26.6	2.19	20.5	3.02	7410
68	6.04	43.6	1480	140	8.60	160	64.7	15.7	1.80	24.4	2.17	20.4	2.45	6760
62	6.70	46.9	1330	127	8.54	144	57.5	14.0	1.77	21.7	2.15	20.4	1.83	5960
55	7.87	50.0	1140	110	8.40	126	48.4	11.8	1.73	18.4	2.11	20.3	1.24	4980
48	9.47	53.6	959	93.0	8.24	107	38.7	9.52	1.66	14.9	2.05	20.2	0.803	3950
57	5.04	46.3	1170	111	8.36	129	30.6	9.35	1.35	14.8	1.68	20.4	1.77	3190
50	6.10	49.4	984	94.5	8.18	110	24.9	7.64	1.30	12.2	1.64	20.3	1.14	2570
44	7.22	53.6	843	81.6	8.06	95.4	20.7	6.37	1.26	10.2	1.60	20.2	0.770	2110
311	2.19	10.4	6970	624	8.72	754	795	132	2.95	207	3.53	19.6	176	76200
283	2.38	11.3	6170	565	8.61	676	704	118	2.91	185	3.47	19.4	134	65900
258	2.56	12.5	5510	514	8.53	611	628	107	2.88	166	3.42	19.2	103	57600
234	2.76	13.8	4900	466	8.44	549	558	95.8	2.85	149	3.37	19.0	78.7	50100
211	3.02	15.1	4330	419	8.35	490	493	85.3	2.82	132	3.32	18.8	58.6	43400
192	3.27	16.7	3870	380	8.28	442	440	76.8	2.79	119	3.28	18.6	44.7	38000
175	3.58	18.0	3450	344	8.20	398	391	68.8	2.76	106	3.24	18.5	33.8	33300
158	3.92	19.8	3060	310	8.12	356	347	61.4	2.74	94.8	3.20	18.3	25.2	29000
143	4.25	22.0	2750	282	8.09	322	311	55.5	2.72	85.4	3.17	18.2	19.2	25700
130	4.65	23.9	2460	256	8.03	290	278	49.9	2.70	76.7	3.13	18.1	14.5	22700
119	5.31	24.5	2190	231	7.90	262	253	44.9	2.69	69.1	3.13	17.9	10.6	20300
106	5.96	27.2	1910	204	7.84	230	220	39.4	2.66	60.5	3.10	17.8	7.48	17400
97	6.41	30.0	1750	188	7.82	211	201	36.1	2.65	55.3	3.08	17.7	5.86	15800
86	7.20	33.4	1530	166	7.77	186	175	31.6	2.63	48.4	3.05	17.6	4.10	13600
76	8.11	37.8	1330	146	7.73	163	152	27.6	2.61	42.2	3.02	17.5	2.83	11700
71	4.71	32.4	1170	127	7.50	146	60.3	15.8	1.70	24.7	2.05	17.7	3.49	4700
65	5.06	35.7	1070	117	7.49	133	54.8	14.4	1.69	22.5	2.03	17.6	2.73	4240
60	5.44	38.7	984	108	7.47	123	50.1	13.3	1.68	20.6	2.02	17.5	2.17	3850
55	5.98	41.1	890	98.3	7.41	112	44.9	11.9	1.67	18.5	2.00	17.5	1.66	3430
50	6.57	45.2	800	88.9	7.38	101	40.1	10.7	1.65	16.6	1.98	17.4	1.24	3040
46	5.01	44.6	712	78.8	7.25	90.7	22.5	7.43	1.29	11.7	1.58	17.5	1.22	1720
40	5.73	50.9	612	68.4	7.21	78.4	19.1	6.35	1.27	10.0	1.56	17.4	0.810	1440
35	7.06	53.5	510	57.6	7.04	66.5	15.3	5.12	1.22	8.06	1.52	17.3	0.506	1140

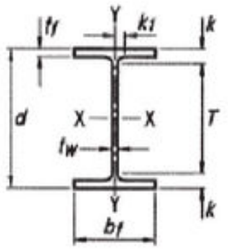


Table 1–1 (continued)
W Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance				
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k		k_1	T	Work-able Gage
											k_{des}	k_{det}			
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W16×100	29.5	17.0	17	0.585	9/16	5/16	10.4	10 3/8	0.985	1	1.39	1 7/8	1 7/8	13 1/4	5 1/2
×89	26.2	16.8	16 3/4	0.525	1/2	1/4	10.4	10 3/8	0.875	7/8	1.28	1 3/4	1 11/16		
×77	22.6	16.5	16 1/2	0.455	7/16	1/4	10.3	10 1/4	0.760	3/4	1.16	1 5/8	1 11/16		
×67[c]	19.7	16.3	16 3/8	0.395	3/8	3/16	10.2	10 1/4	0.665	11/16	1.07	1 9/16	1		
W16×57	16.8	16.4	16 3/8	0.430	7/16	1/4	7.12	7 1/8	0.715	11/16	1.12	1 3/8	7/8	13 5/8	3 1/2 [g]
×50[c]	14.7	16.3	16 1/4	0.380	3/8	3/16	7.07	7 1/8	0.630	5/8	1.03	1 5/16	13/16		
×45[c]	13.3	16.1	16 1/8	0.345	3/8	3/16	7.04	7	0.565	9/16	0.967	1 1/4	13/16		
×40[c]	11.8	16.0	16	0.305	5/16	3/16	7.00	7	0.505	1/2	0.907	1 3/16	13/16		
×36[c]	10.6	15.9	15 7/8	0.295	5/16	3/16	6.99	7	0.430	7/16	0.832	1 1/8	3/4		
W16×31[c]	9.13	15.9	15 7/8	0.275	1/4	1/8	5.53	5 1/2	0.440	7/16	0.842	1 1/8	3/4	13 5/8	3 1/2
×26[c,v]	7.68	15.7	15 3/4	0.250	1/4	1/8	5.50	5 1/2	0.345	3/8	0.747	1 1/16	3/4	13 5/8	3 1/2
W14×730[h]	215	22.4	22 3/8	3.07	3 1/16	1 9/16	17.9	17 7/8	4.91	4 15/16	5.51	6 3/16	2 3/4	10	3-7 1/2-3 [g]
×665[h]	196	21.6	21 5/8	2.83	2 13/16	1 7/16	17.7	17 5/8	4.52	4 1/2	5.12	5 13/16	2 5/8		3-7 1/2-3 [g]
×605[h]	178	20.9	20 7/8	2.60	2 5/8	1 5/16	17.4	17 3/8	4.16	4 3/16	4.76	5 7/16	2 1/2		3-7 1/2-3
×550[h]	162	20.2	20 1/4	2.38	2 3/8	1 3/16	17.2	17 1/4	3.82	3 13/16	4.42	5 1/8	2 3/8		
×500[h]	147	19.6	19 5/8	2.19	2 3/16	1 1/8	17.0	17	3.50	3 1/2	4.10	4 13/16	2 5/16		
×455[h]	134	19.0	19	2.02	2	1	16.8	16 7/8	3.21	3 3/16	3.81	4 1/2	2 1/4		
×426[h]	125	18.7	18 5/8	1.88	1 7/8	15/16	16.7	16 3/4	3.04	3 1/16	3.63	4 5/16	2 1/8		
×398[h]	117	18.3	18 1/4	1.77	1 3/4	7/8	16.6	16 5/8	2.85	2 7/8	3.44	4 1/8	2 1/8		
×370[h]	109	17.9	17 7/8	1.66	1 5/8	13/16	16.5	16 1/2	2.66	2 11/16	3.26	3 15/16	2 1/16		
×342[h]	101	17.5	17 1/2	1.54	1 9/16	13/16	16.4	16 3/8	2.47	2 1/2	3.07	3 3/4	2		
×311[h]	91.4	17.1	17 1/8	1.41	1 7/16	3/4	16.2	16 1/4	2.26	2 1/4	2.86	3 9/16	1 15/16		
×283[h]	83.3	16.7	16 3/4	1.29	1 5/16	11/16	16.1	16 1/8	2.07	2 1/16	2.67	3 3/8	1 7/8		
×257	75.6	16.4	16 3/8	1.18	1 3/16	5/8	16.0	16	1.89	1 7/8	2.49	3 3/16	1 13/16		
×233	68.5	16.0	16	1.07	1 1/16	9/16	15.9	15 7/8	1.72	1 3/4	2.32	3	1 3/4		
×211	62.0	15.7	15 3/4	0.980	1	1/2	15.8	15 3/4	1.56	1 9/16	2.16	2 7/8	1 11/16		
×193	56.8	15.5	15 1/2	0.890	7/8	7/16	15.7	15 3/4	1.44	1 7/16	2.04	2 3/4	1 11/16		
×176	51.8	15.2	15 1/4	0.830	13/16	7/16	15.7	15 5/8	1.31	1 5/16	1.91	2 5/8	1 5/8		
×159	46.7	15.0	15	0.745	3/4	3/8	15.6	15 5/8	1.19	1 3/16	1.79	2 1/2	1 9/16		
×145	42.7	14.8	14 3/4	0.680	11/16	3/8	15.5	15 1/2	1.09	1 1/16	1.69	2 3/8	1 9/16		

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

Table 1–1 (continued)
W Shapes
Properties

W16 – W14

Nom-inal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
100	5.29	24.3	1490	175	7.10	198	186	35.7	2.51	54.9	2.92	16.0	7.73	11900
89	5.92	27.0	1300	155	7.05	175	163	31.4	2.49	48.1	2.88	15.9	5.45	10200
77	6.77	31.2	1110	134	7.00	150	138	26.9	2.47	41.1	2.85	15.8	3.57	8590
67	7.70	35.9	954	117	6.96	130	119	23.2	2.46	35.5	2.82	15.7	2.39	7300
57	4.98	33.0	758	92.2	6.72	105	43.1	12.1	1.60	18.9	1.92	15.7	2.22	2660
50	5.61	37.4	659	81.0	6.68	92.0	37.2	10.5	1.59	16.3	1.89	15.6	1.52	2270
45	6.23	41.1	586	72.7	6.65	82.3	32.8	9.34	1.57	14.5	1.88	15.6	1.11	1990
40	6.93	46.5	518	64.7	6.63	73.0	28.9	8.25	1.57	12.7	1.86	15.5	0.794	1730
36	8.12	48.1	448	56.5	6.51	64.0	24.5	7.00	1.52	10.8	1.83	15.4	0.545	1460
31	6.28	51.6	375	47.2	6.41	54.0	12.4	4.49	1.17	7.03	1.42	15.4	0.461	739
26	7.97	56.8	301	38.4	6.26	44.2	9.59	3.49	1.12	5.48	1.38	15.3	0.262	565
730	1.82	3.71	14300	1280	8.17	1660	4720	527	4.69	816	5.68	17.5	1450	362000
665	1.95	4.03	12400	1150	7.98	1480	4170	472	4.62	730	5.57	17.1	1120	305000
605	2.09	4.39	10800	1040	7.80	1320	3680	423	4.55	652	5.46	16.8	869	258000
550	2.25	4.79	9430	931	7.63	1180	3250	378	4.49	583	5.36	16.4	669	219000
500	2.43	5.21	8210	838	7.48	1050	2880	339	4.43	522	5.26	16.1	514	187000
455	2.62	5.66	7190	756	7.33	936	2560	304	4.38	468	5.17	15.8	395	160000
426	2.75	6.08	6600	706	7.26	869	2360	283	4.34	434	5.11	15.6	331	144000
398	2.92	6.44	6000	656	7.16	801	2170	262	4.31	402	5.06	15.4	273	129000
370	3.10	6.89	5440	607	7.07	736	1990	241	4.27	370	5.00	15.3	222	116000
342	3.31	7.41	4900	558	6.98	672	1810	221	4.24	338	4.94	15.1	178	103000
311	3.59	8.09	4330	506	6.88	603	1610	199	4.20	304	4.87	14.9	136	89100
283	3.89	8.84	3840	459	6.79	542	1440	179	4.17	274	4.81	14.7	104	77700
257	4.23	9.71	3400	415	6.71	487	1290	161	4.13	246	4.75	14.5	79.1	67800
233	4.62	10.7	3010	375	6.63	436	1150	145	4.10	221	4.69	14.3	59.5	59000
211	5.06	11.6	2660	338	6.55	390	1030	130	4.07	198	4.64	14.2	44.6	51500
193	5.45	12.8	2400	310	6.50	355	931	119	4.05	180	4.59	14.0	34.8	45900
176	5.97	13.7	2140	281	6.43	320	838	107	4.02	163	4.55	13.9	26.5	40500
159	6.54	15.3	1900	254	6.38	287	748	96.2	4.00	146	4.51	13.8	19.7	35600
145	7.11	16.8	1710	232	6.33	260	677	87.3	3.98	133	4.47	13.7	15.2	31700

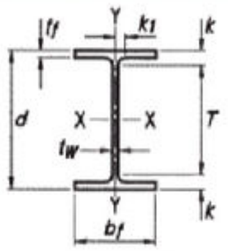


Table 1–1 (continued)
W Shapes
Dimensions

Shape	Area, A	Depth, d		Web		tw/2	Flange				Distance				
				Thickness, tw			Width, bf		Thickness, tf		k		k1	T	Work-able Gage
											kdes	kdet			
	in.²	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W14×132	38.8	14.7	14 5/8	0.645	5/8	5/16	14.7	14 3/4	1.03	1	1.63	2 5/16	1 9/16	10	5 1/2
×120	35.3	14.5	14 1/2	0.590	9/16	5/16	14.7	14 5/8	0.940	15/16	1.54	2 1/4	1 1/2		
×109	32.0	14.3	14 3/8	0.525	1/2	1/4	14.6	14 5/8	0.860	7/8	1.46	2 3/16	1 1/2		
×99[f]	29.1	14.2	14 1/8	0.485	1/2	1/4	14.6	14 5/8	0.780	3/4	1.38	2 1/16	1 7/16		
×90[f]	26.5	14.0	14	0.440	7/16	1/4	14.5	14 1/2	0.710	11/16	1.31	2	1 7/16		
W14×82	24.0	14.3	14 1/4	0.510	1/2	1/4	10.1	10 1/8	0.855	7/8	1.45	1 11/16	1 1/16	10 7/8	5 1/2
×74	21.8	14.2	14 1/8	0.450	7/16	1/4	10.1	10 1/8	0.785	13/16	1.38	1 5/8	1 1/16		
×68	20.0	14.0	14	0.415	7/16	1/4	10.0	10	0.720	3/4	1.31	1 9/16	1 1/16		
×61	17.9	13.9	13 7/8	0.375	3/8	3/16	10.0	10	0.645	5/8	1.24	1 1/2	1		
W14×53	15.6	13.9	13 7/8	0.370	3/8	3/16	8.06	8	0.660	11/16	1.25	1 1/2	1	10 7/8	5 1/2
×48	14.1	13.8	13 3/4	0.340	5/16	3/16	8.03	8	0.595	5/8	1.19	1 7/16	1		
×43[c]	12.6	13.7	13 5/8	0.305	5/16	3/16	8.00	8	0.530	1/2	1.12	1 3/8	1		
W14×38[c]	11.2	14.1	14 1/8	0.310	5/16	3/16	6.77	6 3/4	0.515	1/2	0.915	1 1/4	13/16	11 5/8	3 1/2[g]
×34[c]	10.0	14.0	14	0.285	5/16	3/16	6.75	6 3/4	0.455	7/16	0.855	1 3/16	3/4		3 1/2
×30[c]	8.85	13.8	13 7/8	0.270	1/4	1/8	6.73	6 3/4	0.385	3/8	0.785	1 1/8	3/4		3 1/2
W14×26[c]	7.69	13.9	13 7/8	0.255	1/4	1/8	5.03	5	0.420	7/16	0.820	1 1/8	3/4	11 5/8	2 3/4[g]
×22[c]	6.49	13.7	13 3/4	0.230	1/4	1/8	5.00	5	0.335	5/16	0.735	1 1/16	3/4	11 5/8	2 3/4[g]
W12×336[h]	98.8	16.8	16 7/8	1.78	1 3/4	7/8	13.4	13 3/8	2.96	2 15/16	3.55	3 7/8	1 11/16	9 1/8	5 1/2
×305[h]	89.6	16.3	16 3/8	1.63	1 5/8	13/16	13.2	13 1/4	2.71	2 11/16	3.30	3 5/8	1 5/8		
×279[h]	81.9	15.9	15 7/8	1.53	1 1/2	3/4	13.1	13 1/8	2.47	2 1/2	3.07	3 3/8	1 5/8		
×252[h]	74.0	15.4	15 3/8	1.40	1 3/8	11/16	13.0	13	2.25	2 1/4	2.85	3 1/8	1 1/2		
×230[h]	67.7	15.1	15	1.29	1 5/16	11/16	12.9	12 7/8	2.07	2 1/16	2.67	2 5/16	1 1/2		
×210	61.8	14.7	14 3/4	1.18	1 3/16	5/8	12.8	12 3/4	1.90	1 7/8	2.50	2 13/16	1 7/16		
×190	55.8	14.4	14 3/8	1.06	1 1/16	9/16	12.7	12 5/8	1.74	1 3/4	2.33	2 5/8	1 3/8		
×170	50.0	14.0	14	0.960	15/16	1/2	12.6	12 5/8	1.56	1 9/16	2.16	2 7/16	1 5/16		
×152	44.7	13.7	13 3/4	0.870	7/8	7/16	12.5	12 1/2	1.40	1 3/8	2.00	2 5/16	1 1/4		
×136	39.9	13.4	13 3/8	0.790	13/16	7/16	12.4	12 3/8	1.25	1 1/4	1.85	2 1/8	1 1/4		
×120	35.3	13.1	13 1/8	0.710	11/16	3/8	12.3	12 3/8	1.11	1 1/8	1.70	2	1 3/16		
×106	31.2	12.9	12 7/8	0.610	5/8	5/16	12.2	12 1/4	0.990	1	1.59	1 7/8	1 1/8		
×96	28.2	12.7	12 3/4	0.550	9/16	5/16	12.2	12 1/8	0.900	7/8	1.50	1 13/16	1 1/8		
×87	25.6	12.5	12 1/2	0.515	1/2	1/4	12.1	12 1/8	0.810	13/16	1.41	1 11/16	1 1/16		
×79	23.2	12.4	12 3/8	0.470	1/2	1/4	12.1	12 1/8	0.735	3/4	1.33	1 5/8	1 1/16		
×72	21.1	12.3	12 1/4	0.430	7/16	1/4	12.0	12	0.670	11/16	1.27	1 9/16	1 1/16		
×65[f]	19.1	12.1	12 1/8	0.390	3/8	3/16	12.0	12	0.605	5/8	1.20	1 1/2	1		

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

Table 1–1 (continued)
W Shapes
Properties

W14 – W12

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				rts	ho	Torsional Properties	
	bf/2tf	h/tw	I	S	r	Z	I	S	r	Z			J	Cw
lb/ft			in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.⁶
132	7.15	17.7	1530	209	6.28	234	548	74.5	3.76	113	4.23	13.6	12.3	25500
120	7.80	19.3	1380	190	6.24	212	495	67.5	3.74	102	4.20	13.5	9.37	22700
109	8.49	21.7	1240	173	6.22	192	447	61.2	3.73	92.7	4.17	13.5	7.12	20200
99	9.34	23.5	1110	157	6.17	173	402	55.2	3.71	83.6	4.14	13.4	5.37	18000
90	10.2	25.9	999	143	6.14	157	362	49.9	3.70	75.6	4.11	13.3	4.06	16000
82	5.92	22.4	881	123	6.05	139	148	29.3	2.48	44.8	2.85	13.5	5.07	6710
74	6.41	25.4	795	112	6.04	126	134	26.6	2.48	40.5	2.82	13.4	3.87	5990
68	6.97	27.5	722	103	6.01	115	121	24.2	2.46	36.9	2.80	13.3	3.01	5380
61	7.75	30.4	640	92.1	5.98	102	107	21.5	2.45	32.8	2.78	13.2	2.19	4710
53	6.11	30.9	541	77.8	5.89	87.1	57.7	14.3	1.92	22.0	2.22	13.3	1.94	2540
48	6.75	33.6	484	70.2	5.85	78.4	51.4	12.8	1.91	19.6	2.20	13.2	1.45	2240
43	7.54	37.4	428	62.6	5.82	69.6	45.2	11.3	1.89	17.3	2.18	13.1	1.05	1950
38	6.57	39.6	385	54.6	5.87	61.5	26.7	7.88	1.55	12.1	1.82	13.6	0.798	1230
34	7.41	43.1	340	48.6	5.83	54.6	23.3	6.91	1.53	10.6	1.80	13.5	0.569	1070
30	8.74	45.4	291	42.0	5.73	47.3	19.6	5.82	1.49	8.99	1.77	13.5	0.380	887
26	5.98	48.1	245	35.3	5.65	40.2	8.91	3.55	1.08	5.54	1.31	13.5	0.358	405
22	7.46	53.3	199	29.0	5.54	33.2	7.00	2.80	1.04	4.39	1.27	13.4	0.208	314
336	2.26	5.47	4060	483	6.41	603	1190	177	3.47	274	4.13	13.9	243	57000
305	2.45	5.98	3550	435	6.29	537	1050	159	3.42	244	4.05	13.6	185	48600
279	2.66	6.35	3110	393	6.16	481	937	143	3.38	220	4.00	13.4	143	42000
252	2.89	6.96	2720	353	6.06	428	828	127	3.34	196	3.93	13.2	108	35800
230	3.11	7.56	2420	321	5.97	386	742	115	3.31	177	3.87	13.0	83.8	31200
210	3.37	8.23	2140	292	5.89	348	664	104	3.28	159	3.82	12.8	64.7	27200
190	3.65	9.16	1890	263	5.82	311	589	93.0	3.25	143	3.76	12.6	48.8	23600
170	4.03	10.1	1650	235	5.74	275	517	82.3	3.22	126	3.71	12.5	35.6	20100
152	4.46	11.2	1430	209	5.66	243	454	72.8	3.19	111	3.66	12.3	25.8	17200
136	4.96	12.3	1240	186	5.58	214	398	64.2	3.16	98.0	3.61	12.2	18.5	14700
120	5.57	13.7	1070	163	5.51	186	345	56.0	3.13	85.4	3.56	12.0	12.9	12400
106	6.17	15.9	933	145	5.47	164	301	49.3	3.11	75.1	3.52	11.9	9.13	10700
96	6.76	17.7	833	131	5.44	147	270	44.4	3.09	67.5	3.49	11.8	6.85	9410
87	7.48	18.9	740	118	5.38	132	241	39.7	3.07	60.4	3.46	11.7	5.10	8270
79	8.22	20.7	662	107	5.34	119	216	35.8	3.05	54.3	3.43	11.6	3.84	7330
72	8.99	22.6	597	97.4	5.31	108	195	32.4	3.04	49.2	3.40	11.6	2.93	6540
65	9.92	24.9	533	87.9	5.28	96.8	174	29.1	3.02	44.1	3.38	11.5	2.18	5780

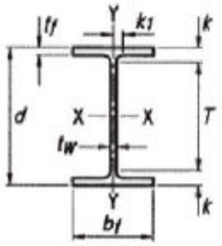


Table 1–1 (continued)
W Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance				
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k		k_1	T	Workable Gage
											k_{des}	k_{det}			
	in.^{2}	in.		in.		in.	in.		in.		in.		in.	in.	in.
W12×58	17.0	12.2	12 1/4	0.360	3/8	3/16	10.0	10	0.640	5/8	1.24	1 1/2	15/16	9 1/4	5 1/2
×53	15.6	12.1	12	0.345	3/8	3/16	10.0	10	0.575	9/16	1.18	1 3/8	15/16	9 1/4	5 1/2
W12×50	14.6	12.2	12 1/4	0.370	3/8	3/16	8.08	8 1/8	0.640	5/8	1.14	1 1/2	15/16	9 1/4	5 1/2
×45	13.1	12.1	12	0.335	5/16	3/16	8.05	8	0.575	9/16	1.08	1 3/8	15/16	↓	↓
×40	11.7	11.9	12	0.295	5/16	3/16	8.01	8	0.515	1/2	1.02	1 3/8	7/8	↓	↓
W12×35[c]	10.3	12.5	12 1/2	0.300	5/16	3/16	6.56	6 1/2	0.520	1/2	0.820	1 3/16	3/4	10 1/8	3 1/2
×30[c]	8.79	12.3	12 3/8	0.260	1/4	1/8	6.52	6 1/2	0.440	7/16	0.740	1 1/8	3/4	↓	↓
×26[c]	7.65	12.2	12 1/4	0.230	1/4	1/8	6.49	6 1/2	0.380	3/8	0.680	1 1/16	3/4	↓	↓
W12×22[c]	6.48	12.3	12 1/4	0.260	1/4	1/8	4.03	4	0.425	7/16	0.725	15/16	5/8	10 3/8	2 1/4[g]
×19[c]	5.57	12.2	12 1/8	0.235	1/4	1/8	4.01	4	0.350	3/8	0.650	7/8	9/16	↓	↓
×16[c]	4.71	12.0	12	0.220	1/4	1/8	3.99	4	0.265	1/4	0.565	13/16	9/16	↓	↓
×14[c,v]	4.16	11.9	11 7/8	0.200	3/16	1/8	3.97	4	0.225	1/4	0.525	3/4	9/16	↓	↓
W10×112	32.9	11.4	11 3/8	0.755	3/4	3/8	10.4	10 3/8	1.25	1 1/4	1.75	1 15/16	1	7 1/2	5 1/2
×100	29.4	11.1	11 1/8	0.680	11/16	3/8	10.3	10 3/8	1.12	1 1/8	1.62	1 13/16	1	↓	↓
×88	25.9	10.8	10 7/8	0.605	5/8	5/16	10.3	10 1/4	0.990	1	1.49	1 11/16	15/16	↓	↓
×77	22.6	10.6	10 5/8	0.530	1/2	1/4	10.2	10 1/4	0.870	7/8	1.37	1 9/16	7/8	↓	↓
×68	20.0	10.4	10 3/8	0.470	1/2	1/4	10.1	10 1/8	0.770	3/4	1.27	1 7/16	7/8	↓	↓
×60	17.6	10.2	10 1/4	0.420	7/16	1/4	10.1	10 1/8	0.680	11/16	1.18	1 3/8	13/16	↓	↓
×54	15.8	10.1	10 1/8	0.370	3/8	3/16	10.0	10	0.615	5/8	1.12	1 5/16	13/16	↓	↓
×49	14.4	10.0	10	0.340	5/16	3/16	10.0	10	0.560	9/16	1.06	1 1/4	13/16	↓	↓
W10×45	13.3	10.1	10 1/8	0.350	3/8	3/16	8.02	8	0.620	5/8	1.12	1 5/16	13/16	7 1/2	5 1/2
×39	11.5	9.92	9 7/8	0.315	5/16	3/16	7.99	8	0.530	1/2	1.03	1 3/16	13/16	↓	↓
×33	9.71	9.73	9 3/4	0.290	5/16	3/16	7.96	8	0.435	7/16	0.935	1 1/8	3/4	↓	↓
W10×30	8.84	10.5	10 1/2	0.300	5/16	3/16	5.81	5 3/4	0.510	1/2	0.810	1 1/8	11/16	8 1/4	2 3/4[g]
×26	7.61	10.3	10 3/8	0.260	1/4	1/8	5.77	5 3/4	0.440	7/16	0.740	1 1/16	11/16	↓	↓
×22[c]	6.49	10.2	10 1/8	0.240	1/4	1/8	5.75	5 3/4	0.360	3/8	0.660	15/16	5/8	↓	↓
W10×19	5.62	10.2	10 1/4	0.250	1/4	1/8	4.02	4	0.395	3/8	0.695	15/16	5/8	8 3/8	2 1/4[g]
×17[c]	4.99	10.1	10 1/8	0.240	1/4	1/8	4.01	4	0.330	5/16	0.630	7/8	9/16	↓	↓
×15[c]	4.41	10.0	10	0.230	1/4	1/8	4.00	4	0.270	1/4	0.570	13/16	9/16	↓	↓
×12[c,f]	3.54	9.87	9 7/8	0.190	3/16	1/8	3.96	4	0.210	3/16	0.510	3/4	9/16	↓	↓

[c] Shape is slender for compression with $F_y = 50$ ksi.
[f] Shape exceeds compact limit for flexure with $F_y = 50$ ksi.
[g] The actual size, combination, and orientation of fastener components should be compared with the geometry of the cross-section to ensure compatibility.
[v] Shape does not meet the h/t_w limit for shear in Specification Section G2.1a with $F_y = 50$ ksi.

Table 1–1 (continued)
W Shapes
Properties

W12 – W10

Nominal Wt.	Compact Section Criteria		Axis X-X				Axis Y-Y				r_{ts}	h_o	Torsional Properties	
	$\frac{b_f}{2t_f}$	$\frac{h}{t_w}$	I	S	r	Z	I	S	r	Z			J	C_w
lb/ft			in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{6}
58	7.82	27.0	475	78.0	5.28	86.4	107	21.4	2.51	32.5	2.82	11.6	2.10	3570
53	8.69	28.1	425	70.6	5.23	77.9	95.8	19.2	2.48	29.1	2.79	11.5	1.58	3160
50	6.31	26.8	391	64.2	5.18	71.9	56.3	13.9	1.96	21.3	2.25	11.6	1.71	1880
45	7.00	29.6	348	57.7	5.15	64.2	50.0	12.4	1.95	19.0	2.23	11.5	1.26	1650
40	7.77	33.6	307	51.5	5.13	57.0	44.1	11.0	1.94	16.8	2.21	11.4	0.906	1440
35	6.31	36.2	285	45.6	5.25	51.2	24.5	7.47	1.54	11.5	1.79	12.0	0.741	879
30	7.41	41.8	238	38.6	5.21	43.1	20.3	6.24	1.52	9.56	1.77	11.9	0.457	720
26	8.54	47.2	204	33.4	5.17	37.2	17.3	5.34	1.51	8.17	1.75	11.8	0.300	607
22	4.74	41.8	156	25.4	4.91	29.3	4.66	2.31	0.848	3.66	1.04	11.9	0.293	164
19	5.72	46.2	130	21.3	4.82	24.7	3.76	1.88	0.822	2.98	1.02	11.8	0.180	131
16	7.53	49.4	103	17.1	4.67	20.1	2.82	1.41	0.773	2.26	0.982	11.7	0.103	96.9
14	8.82	54.3	88.6	14.9	4.62	17.4	2.36	1.19	0.753	1.90	0.962	11.7	0.0704	80.4
112	4.17	10.4	716	126	4.66	147	236	45.3	2.68	69.2	3.07	10.1	15.1	6020
100	4.62	11.6	623	112	4.60	130	207	40.0	2.65	61.0	3.03	10.0	10.9	5150
88	5.18	13.0	534	98.5	4.54	113	179	34.8	2.63	53.1	2.99	9.85	7.53	4330
77	5.86	14.8	455	85.9	4.49	97.6	154	30.1	2.60	45.9	2.95	9.73	5.11	3630
68	6.58	16.7	394	75.7	4.44	85.3	134	26.4	2.59	40.1	2.91	9.63	3.56	3100
60	7.41	18.7	341	66.7	4.39	74.6	116	23.0	2.57	35.0	2.88	9.54	2.48	2640
54	8.15	21.2	303	60.0	4.37	66.6	103	20.6	2.56	31.3	2.86	9.48	1.82	2320
49	8.93	23.1	272	54.6	4.35	60.4	93.4	18.7	2.54	28.3	2.84	9.42	1.39	2070
45	6.47	22.5	248	49.1	4.32	54.9	53.4	13.3	2.01	20.3	2.27	9.48	1.51	1200
39	7.53	25.0	209	42.1	4.27	46.8	45.0	11.3	1.98	17.2	2.24	9.39	0.976	992
33	9.15	27.1	171	35.0	4.19	38.8	36.6	9.20	1.94	14.0	2.20	9.30	0.583	791
30	5.70	29.5	170	32.4	4.38	36.6	16.7	5.75	1.37	8.84	1.60	10.0	0.622	414
26	6.56	34.0	144	27.9	4.35	31.3	14.1	4.89	1.36	7.50	1.58	9.89	0.402	345
22	7.99	36.9	118	23.2	4.27	26.0	11.4	3.97	1.33	6.10	1.55	9.81	0.239	275
19	5.09	35.4	96.3	18.8	4.14	21.6	4.29	2.14	0.874	3.35	1.06	9.85	0.233	104
17	6.08	36.9	81.9	16.2	4.05	18.7	3.56	1.78	0.845	2.80	1.04	9.78	0.156	85.1
15	7.41	38.5	68.9	13.8	3.95	16.0	2.89	1.45	0.810	2.30	1.01	9.72	0.104	68.3
12	9.43	46.6	53.8	10.9	3.90	12.6	2.18	1.10	0.785	1.74	0.983	9.66	0.0547	50.9

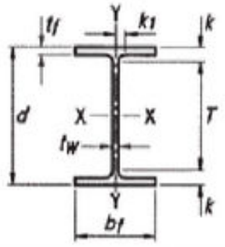


Table 1–1 (continued)
W Shapes
Dimensions

Shape	Area, A	Depth, d		Web Thickness, tw		tw/2	Flange Width, bf		Flange Thickness, tf		Distance k kdes	Distance k kdet	Distance k1	Distance T	Distance Workable Gage
	in.²	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
W8×67	19.7	9.00	9	0.570	9/16	5/16	8.28	8 1/4	0.935	15/16	1.33	1 5/8	15/16	5 3/4	5 1/2
×58	17.1	8.75	8 3/4	0.510	1/2	1/4	8.22	8 1/4	0.810	13/16	1.20	1 1/2	7/8		
×48	14.1	8.50	8 1/2	0.400	3/8	3/16	8.11	8 1/8	0.685	11/16	1.08	1 3/8	13/16		
×40	11.7	8.25	8 1/4	0.360	3/8	3/16	8.07	8 1/8	0.560	9/16	0.954	1 1/4	13/16		
×35	10.3	8.12	8 1/8	0.310	5/16	3/16	8.02	8	0.495	1/2	0.889	1 3/16	13/16		
×31[f]	9.12	8.00	8	0.285	5/16	3/16	8.00	8	0.435	7/16	0.829	1 1/8	3/4		
W8×28	8.24	8.06	8	0.285	5/16	3/16	6.54	6 1/2	0.465	7/16	0.859	15/16	5/8	6 1/8	4
×24	7.08	7.93	7 7/8	0.245	1/4	1/8	6.50	6 1/2	0.400	3/8	0.794	7/8	9/16	6 1/8	4
W8×21	6.16	8.28	8 1/4	0.250	1/4	1/8	5.27	5 1/4	0.400	3/8	0.700	7/8	9/16	6 1/2	2 3/4[g]
×18	5.26	8.14	8 1/8	0.230	1/4	1/8	5.25	5 1/4	0.330	5/16	0.630	13/16	9/16	6 1/2	2 3/4[g]
W8×15	4.44	8.11	8 1/8	0.245	1/4	1/8	4.02	4	0.315	5/16	0.615	13/16	9/16	6 1/2	2 1/4[g]
×13	3.84	7.99	8	0.230	1/4	1/8	4.00	4	0.255	1/4	0.555	3/4	9/16		
×10[c,f]	2.96	7.89	7 7/8	0.170	3/16	1/8	3.94	4	0.205	3/16	0.505	11/16	1/2		
W6×25	7.34	6.38	6 3/8	0.320	5/16	3/16	6.08	6 1/8	0.455	7/16	0.705	15/16	9/16	4 1/2	3 1/2
×20	5.87	6.20	6 1/4	0.260	1/4	1/8	6.02	6	0.365	3/8	0.615	7/8	9/16		
×15[f]	4.43	5.99	6	0.230	1/4	1/8	5.99	6	0.260	1/4	0.510	3/4	9/16		
W6×16	4.74	6.28	6 1/4	0.260	1/4	1/8	4.03	4	0.405	3/8	0.655	7/8	9/16	4 1/2	2 1/4[g]
×12	3.55	6.03	6	0.230	1/4	1/8	4.00	4	0.280	1/4	0.530	3/4	9/16		
×9[f]	2.68	5.90	5 7/8	0.170	3/16	1/8	3.94	4	0.215	3/16	0.465	11/16	1/2		
×8.5[f]	2.52	5.83	5 7/8	0.170	3/16	1/8	3.94	4	0.195	3/16	0.445	11/16	1/2		
W5×19	5.56	5.15	5 1/8	0.270	1/4	1/8	5.03	5	0.430	7/16	0.730	13/16	7/16	3 1/2	2 3/4[g]
×16	4.71	5.01	5	0.240	1/4	1/8	5.00	5	0.360	3/8	0.660	3/4	7/16	3 1/2	2 3/4[g]
W4×13	3.83	4.16	4 1/8	0.280	1/4	1/8	4.06	4	0.345	3/8	0.595	3/4	1/2	2 5/8	2 1/4[g]

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

Table 1–1 (continued)
W Shapes
Properties

W8 – W4

Nominal Wt.	Compact Section Criteria bf/2tf	Compact Section Criteria h/tw	Axis X-X I	Axis X-X S	Axis X-X r	Axis X-X Z	Axis Y-Y I	Axis Y-Y S	Axis Y-Y r	Axis Y-Y Z	rts	ho	Torsional Properties J	Torsional Properties Cw
lb/ft	2tf	tw	in.⁴	in.³	in.	in.³	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.⁶
67	4.43	11.1	272	60.4	3.72	70.1	88.6	21.4	2.12	32.7	2.43	8.07	5.05	1440
58	5.07	12.4	228	52.0	3.65	59.8	75.1	18.3	2.10	27.9	2.39	7.94	3.33	1180
48	5.92	15.9	184	43.2	3.61	49.0	60.9	15.0	2.08	22.9	2.35	7.82	1.96	931
40	7.21	17.6	146	35.5	3.53	39.8	49.1	12.2	2.04	18.5	2.31	7.69	1.12	726
35	8.10	20.5	127	31.2	3.51	34.7	42.6	10.6	2.03	16.1	2.28	7.63	0.769	619
31	9.19	22.3	110	27.5	3.47	30.4	37.1	9.27	2.02	14.1	2.26	7.57	0.536	530
28	7.03	22.3	98.0	24.3	3.45	27.2	21.7	6.63	1.62	10.1	1.84	7.60	0.537	312
24	8.12	25.9	82.7	20.9	3.42	23.1	18.3	5.63	1.61	8.57	1.82	7.53	0.346	259
21	6.59	27.5	75.3	18.2	3.49	20.4	9.77	3.71	1.26	5.69	1.46	7.88	0.282	152
18	7.95	29.9	61.9	15.2	3.43	17.0	7.97	3.04	1.23	4.66	1.43	7.81	0.172	122
15	6.37	28.1	48.0	11.8	3.29	13.6	3.41	1.70	0.876	2.67	1.06	7.80	0.137	51.8
13	7.84	29.9	39.6	9.91	3.21	11.4	2.73	1.37	0.843	2.15	1.03	7.74	0.0871	40.8
10	9.61	40.5	30.8	7.81	3.22	8.87	2.09	1.06	0.841	1.66	1.01	7.69	0.0426	30.9
25	6.68	15.5	53.4	16.7	2.70	18.9	17.1	5.61	1.52	8.56	1.74	5.93	0.461	150
20	8.25	19.1	41.4	13.4	2.66	14.9	13.3	4.41	1.50	6.72	1.70	5.84	0.240	113
15	11.5	21.6	29.1	9.72	2.56	10.8	9.32	3.11	1.45	4.75	1.66	5.73	0.101	76.5
16	4.98	19.1	32.1	10.2	2.60	11.7	4.43	2.20	0.967	3.39	1.13	5.88	0.223	38.2
12	7.14	21.6	22.1	7.31	2.49	8.30	2.99	1.50	0.918	2.32	1.08	5.75	0.0903	24.7
9	9.16	29.2	16.4	5.56	2.47	6.23	2.20	1.11	0.905	1.72	1.06	5.69	0.0405	17.7
8.5	10.1	29.1	14.9	5.10	2.43	5.73	1.99	1.01	0.890	1.56	1.05	5.64	0.0333	15.8
19	5.85	13.7	26.3	10.2	2.17	11.6	9.13	3.63	1.28	5.53	1.45	4.72	0.316	50.9
16	6.94	15.4	21.4	8.55	2.13	9.63	7.51	3.00	1.26	4.58	1.43	4.65	0.192	40.6
13	5.88	10.6	11.3	5.46	1.72	6.28	3.86	1.90	1.00	2.92	1.16	3.82	0.151	14.0

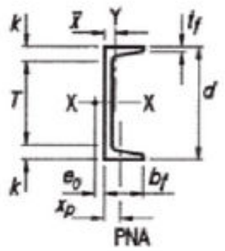


Table 1–5
C Shapes
Dimensions

Shape	Area, A	Depth, d		Web			Flange				Distance			r_{ts}	h_o
				Thickness, t_w		$\frac{t_w}{2}$	Width, b_f		Thickness, t_f		k	T	Workable Gage		
	in.^{2}	in.		in.		in.	in.		in.		in.	in.	in.	in.	in.
C15×50	14.7	15.0	15	0.716	11/16	3/8	3.72	3 3/4	0.650	5/8	1 7/16	12 1/8	2 1/4	1.17	14.4
×40	11.8	15.0	15	0.520	1/2	1/4	3.52	3 1/2	0.650	5/8	1 7/16	12 1/8	2	1.15	14.4
×33.9	10.0	15.0	15	0.400	3/8	3/16	3.40	3 3/8	0.650	5/8	1 7/16	12 1/8	2	1.13	14.4
C12×30	8.81	12.0	12	0.510	1/2	1/4	3.17	3 1/8	0.501	1/2	1 1/8	9 3/4	1 3/4[9]	1.01	11.5
×25	7.34	12.0	12	0.387	3/8	3/16	3.05	3	0.501	1/2	1 1/8	9 3/4	1 3/4[9]	1.00	11.5
×20.7	6.08	12.0	12	0.282	5/16	3/16	2.94	3	0.501	1/2	1 1/8	9 3/4	1 3/4[9]	0.983	11.5
C10×30	8.81	10.0	10	0.673	11/16	3/8	3.03	3	0.436	7/16	1	8	1 3/4[9]	0.925	9.56
×25	7.34	10.0	10	0.526	1/2	1/4	2.89	2 7/8	0.436	7/16	1	8	1 3/4[9]	0.911	9.56
×20	5.87	10.0	10	0.379	3/8	3/16	2.74	2 3/4	0.436	7/16	1	8	1 1/2[9]	0.894	9.56
×15.3	4.48	10.0	10	0.240	1/4	1/8	2.60	2 5/8	0.436	7/16	1	8	1 1/2[9]	0.869	9.56
C9×20	5.87	9.00	9	0.448	7/16	1/4	2.65	2 5/8	0.413	7/16	1	7	1 1/2[9]	0.848	8.59
×15	4.41	9.00	9	0.285	5/16	3/16	2.49	2 1/2	0.413	7/16	1	7	1 3/8[9]	0.824	8.59
×13.4	3.94	9.00	9	0.233	1/4	1/8	2.43	2 3/8	0.413	7/16	1	7	1 3/8[9]	0.813	8.59
C8×18.7	5.51	8.00	8	0.487	1/2	1/4	2.53	2 1/2	0.390	3/8	15/16	6 1/8	1 1/2[9]	0.800	7.61
×13.7	4.04	8.00	8	0.303	5/16	3/16	2.34	2 3/8	0.390	3/8	15/16	6 1/8	1 3/8[9]	0.774	7.61
×11.5	3.37	8.00	8	0.220	1/4	1/8	2.26	2 1/4	0.390	3/8	15/16	6 1/8	1 3/8[9]	0.756	7.61
C7×14.7	4.33	7.00	7	0.419	7/16	1/4	2.30	2 1/4	0.366	3/8	7/8	5 1/4	1 1/4[9]	0.738	6.63
×12.2	3.60	7.00	7	0.314	5/16	3/16	2.19	2 1/4	0.366	3/8	7/8	5 1/4	1 1/4[9]	0.721	6.63
×9.8	2.87	7.00	7	0.210	3/16	1/8	2.09	2 1/8	0.366	3/8	7/8	5 1/4	1 1/4[9]	0.698	6.63
C6×13	3.81	6.00	6	0.437	7/16	1/4	2.16	2 1/8	0.343	5/16	13/16	4 /8	1 3/8[9]	0.689	5.66
×10.5	3.08	6.00	6	0.314	5/16	3/16	2.03	2	0.343	5/16	13/16	4 3/8	1 1/8[9]	0.669	5.66
×8.2	2.39	6.00	6	0.200	3/16	1/8	1.92	1 7/8	0.343	5/16	13/16	4 3/8	1 1/8[9]	0.643	5.66
C5×9	2.64	5.00	5	0.325	5/16	3/16	1.89	1 7/8	0.320	5/16	3/4	3 1/2	1 1/8[9]	0.617	4.68
×6.7	1.97	5.00	5	0.190	3/16	1/8	1.75	1 3/4	0.320	5/16	3/4	3 1/2	—	0.584	4.68
C4×7.2	2.13	4.00	4	0.321	5/16	3/16	1.72	1 3/4	0.296	5/16	3/4	2 1/2	1[9]	0.563	3.70
×5.4	1.58	4.00	4	0.184	3/16	1/8	1.58	1 5/8	0.296	5/16	3/4	2 1/2	—	0.528	3.70
×4.5	1.38	4.00	4	0.125	1/8	1/16	1.58	1 5/8	0.296	5/16	3/4	2 1/2	—	0.524	3.70
C3×6	1.76	3.00	3	0.356	3/8	3/16	1.60	1 5/8	0.273	1/4	11/16	1 5/8	—	0.519	2.73
×5	1.47	3.00	3	0.258	1/4	1/8	1.50	1 1/2	0.273	1/4	11/16	1 5/8	—	0.495	2.73
×4.1	1.20	3.00	3	0.170	3/16	1/8	1.41	1 3/8	0.273	1/4	11/16	1 5/8	—	0.469	2.73
×3.5	1.09	3.00	3	0.132	1/8	1/16	1.37	1 3/8	0.273	1/4	11/16	1 5/8	—	0.455	2.73

[9] The actual size, combination, and orientation of fastener components should be compared with the geometry of the cross-section to ensure compatibility.
— Flange is too narrow to establish a workable gage.

Table 1–5 (continued)
C Shapes
Properties

C SHAPES

Nominal Wt.	Shear Ctr, e_o	Axis X-X				Axis Y-Y						Torsional Properties			
		I	S	r	Z	I	S	r	$\bar{x}$	Z	x_p	J	C_w	$\bar{r}_o$	H
lb/ft	in.	in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.	
50	0.583	404	53.8	5.24	68.5	11.0	3.77	0.865	0.799	8.14	0.490	2.65	492	5.49	0.937
40	0.767	348	46.5	5.45	57.5	9.17	3.34	0.883	0.778	6.84	0.392	1.45	410	5.73	0.927
33.9	0.896	315	42.0	5.62	50.8	8.07	3.09	0.901	0.788	6.19	0.332	1.01	358	5.94	0.920
30	0.618	162	27.0	4.29	33.8	5.12	2.05	0.762	0.674	4.32	0.367	0.861	151	4.54	0.919
25	0.746	144	24.0	4.43	29.4	4.45	1.87	0.779	0.674	3.82	0.306	0.538	130	4.72	0.909
20.7	0.870	129	21.5	4.61	25.6	3.86	1.72	0.797	0.698	3.47	0.253	0.369	112	4.93	0.899
30	0.368	103	20.7	3.42	26.7	3.93	1.65	0.668	0.649	3.78	0.441	1.22	79.5	3.63	0.922
25	0.494	91.1	18.2	3.52	23.1	3.34	1.47	0.675	0.617	3.18	0.367	0.687	68.3	3.75	0.912
20	0.636	78.9	15.8	3.66	19.4	2.80	1.31	0.690	0.606	2.70	0.294	0.368	56.9	3.93	0.900
15.3	0.796	67.3	13.5	3.87	15.9	2.27	1.15	0.711	0.634	2.34	0.224	0.209	45.5	4.19	0.884
20	0.515	60.9	13.5	3.22	16.9	2.41	1.17	0.640	0.583	2.46	0.326	0.427	39.4	3.46	0.899
15	0.681	51.0	11.3	3.40	13.6	1.91	1.01	0.659	0.586	2.04	0.245	0.208	31.0	3.69	0.882
13.4	0.742	47.8	10.6	3.49	12.6	1.75	0.954	0.666	0.601	1.94	0.219	0.168	28.2	3.79	0.875
18.7	0.431	43.9	11.0	2.82	13.9	1.97	1.01	0.598	0.565	2.17	0.344	0.434	25.1	3.05	0.894
13.7	0.604	36.1	9.02	2.99	11.0	1.52	0.848	0.613	0.554	1.73	0.252	0.186	19.2	3.26	0.874
11.5	0.697	32.5	8.14	3.11	9.63	1.31	0.775	0.623	0.572	1.57	0.211	0.130	16.5	3.41	0.862
14.7	0.441	27.2	7.78	2.51	9.75	1.37	0.772	0.561	0.532	1.63	0.309	0.267	13.1	2.75	0.875
12.2	0.538	24.2	6.92	2.60	8.46	1.16	0.696	0.568	0.525	1.42	0.257	0.161	11.2	2.86	0.862
9.8	0.647	21.2	6.07	2.72	7.19	0.957	0.617	0.578	0.541	1.26	0.205	0.0996	9.15	3.03	0.846
13	0.380	17.3	5.78	2.13	7.29	1.05	0.638	0.524	0.514	1.35	0.318	0.237	7.19	2.37	0.858
10.5	0.486	15.1	5.04	2.22	6.18	0.860	0.561	0.529	0.500	1.14	0.256	0.128	5.91	2.48	0.842
8.2	0.599	13.1	4.35	2.34	5.16	0.687	0.488	0.536	0.512	0.987	0.199	0.0736	4.70	2.64	0.823
9	0.427	8.89	3.56	1.83	4.39	0.624	0.444	0.486	0.478	0.913	0.264	0.109	2.93	2.10	0.815
6.7	0.552	7.48	2.99	1.95	3.55	0.470	0.372	0.489	0.484	0.757	0.215	0.0549	2.22	2.26	0.791
7.2	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	0.501	3.85	1.92	1.56	2.29	0.312	0.277	0.444	0.457	0.565	0.231	0.0399	0.921	1.88	0.741
4.5	0.587	3.65	1.83	1.63	2.12	0.289	0.265	0.457	0.493	0.531	0.321	0.0322	0.871	2.00	0.710
6	0.322	2.07	1.38	1.08	1.74	0.300	0.263	0.413	0.455	0.543	0.294	0.0725	0.462	1.40	0.690
5	0.392	1.85	1.23	1.12	1.52	0.241	0.228	0.405	0.439	0.464	0.245	0.0425	0.379	1.45	0.674
4.1	0.461	1.65	1.10	1.17	1.32	0.191	0.196	0.398	0.437	0.399	0.262	0.0269	0.307	1.53	0.655
3.5	0.493	1.57	1.04	1.20	1.24	0.169	0.182	0.394	0.443	0.364	0.296	0.0226	0.276	1.57	0.645

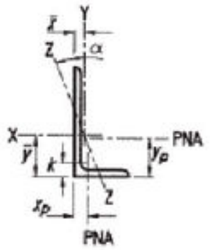


Table 1–7
Angles
Properties

Shape	k	Wt.	Area, A	Axis X-X						Flexural-Torsional Properties		
				I	S	r	$\bar{y}$	Z	y_p	J	C_w	$\bar{r}_o$
	in.	lb/ft	in.^{2}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.
L8×8×1 1/8	1 3/4	56.9	16.7	98.1	17.5	2.41	2.40	31.6	1.05	7.13	32.5	4.29
×1	1 5/8	51.0	15.0	89.1	15.8	2.43	2.36	28.5	0.943	5.08	23.4	4.32
×7/8	1 1/2	45.0	13.2	79.7	14.0	2.45	2.31	25.3	0.832	3.46	16.1	4.36
×3/4	1 3/8	38.9	11.4	69.9	12.2	2.46	2.26	22.0	0.720	2.21	10.4	4.39
×5/8	1 1/4	32.7	9.61	59.6	10.3	2.48	2.21	18.6	0.606	1.30	6.16	4.42
×9/16	1 3/16	29.6	8.68	54.2	9.33	2.49	2.19	16.8	0.548	0.961	4.55	4.43
×1/2	1 1/8	26.4	7.75	48.8	8.36	2.49	2.17	15.1	0.490	0.683	3.23	4.45
L8×6×1	1 1/2	44.2	13.0	80.9	15.1	2.49	2.65	27.3	1.47	4.34	16.3	3.88
×7/8	1 3/8	39.1	11.5	72.4	13.4	2.50	2.60	24.3	1.41	2.96	11.3	3.92
×3/4	1 1/4	33.8	9.94	63.5	11.7	2.52	2.55	21.1	1.34	1.90	7.28	3.95
×5/8	1 1/8	28.5	8.36	54.2	9.86	2.54	2.50	17.9	1.27	1.12	4.33	3.98
×9/16	1 1/16	25.7	7.56	49.4	8.94	2.55	2.48	16.2	1.23	0.823	3.20	3.99
×1/2	1	23.0	6.75	44.4	8.01	2.55	2.46	14.6	1.20	0.584	2.28	4.01
×7/16	15/16	20.2	5.93	39.3	7.06	2.56	2.43	12.9	1.16	0.396	1.55	4.02
L8×4×1	1 1/2	37.4	11.0	69.7	14.0	2.51	3.03	24.3	2.47	3.68	12.9	3.75
×7/8	1 3/8	33.1	9.73	62.6	12.5	2.53	2.99	21.7	2.41	2.51	8.89	3.78
×3/4	1 1/4	28.7	8.44	55.0	10.9	2.55	2.94	18.9	2.34	1.61	5.75	3.80
×5/8	1 1/8	24.2	7.11	47.0	9.20	2.56	2.89	16.1	2.27	0.955	3.42	3.83
×9/16	1 1/16	21.9	6.43	42.9	8.34	2.57	2.86	14.6	2.23	0.704	2.53	3.84
×1/2	1	19.6	5.75	38.6	7.48	2.58	2.84	13.1	2.20	0.501	1.80	3.86
×7/16	15/16	17.2	5.06	34.2	6.59	2.59	2.81	11.6	2.16	0.340	1.22	3.87
L7×4×3/4	1 1/4	26.2	7.69	37.8	8.39	2.21	2.50	14.8	1.87	1.47	3.97	3.31
×5/8	1 1/8	22.1	6.48	32.4	7.12	2.23	2.45	12.5	1.80	0.868	2.37	3.34
×1/2	1	17.9	5.25	26.6	5.79	2.25	2.40	10.2	1.74	0.456	1.25	3.37
×7/16	15/16	15.7	4.62	23.6	5.11	2.26	2.38	9.03	1.70	0.310	0.851	3.38
×3/8	7/8	13.6	3.98	20.5	4.42	2.27	2.35	7.81	1.67	0.198	0.544	3.40
L6×6×1	1 1/2	37.4	11.0	35.4	8.55	1.79	1.86	15.4	0.918	3.68	9.24	3.18
×7/8	1 3/8	33.1	9.75	31.9	7.61	1.81	1.81	13.7	0.813	2.51	6.41	3.21
×3/4	1 1/4	28.7	8.46	28.1	6.64	1.82	1.77	11.9	0.705	1.61	4.17	3.24
×5/8	1 1/8	24.2	7.13	24.1	5.64	1.84	1.72	10.1	0.594	0.955	2.50	3.28
×9/16	1 1/16	21.9	6.45	22.0	5.12	1.85	1.70	9.18	0.538	0.704	1.85	3.29
×1/2	1	19.6	5.77	19.9	4.59	1.86	1.67	8.22	0.481	0.501	1.32	3.31
×7/16	15/16	17.2	5.08	17.6	4.06	1.86	1.65	7.25	0.423	0.340	0.899	3.32
×3/8	7/8	14.9	4.38	15.4	3.51	1.87	1.62	6.27	0.365	0.218	0.575	3.34
×5/16	13/16	12.4	3.67	13.0	2.95	1.88	1.60	5.26	0.306	0.129	0.338	3.35

Note: For compactness criteria, refer to the end of Table 1–7.

Table 1–7 (continued)
Angles
Properties

L8-L6

Shape	Axis Y-Y						Axis Z-Z				Q_s
	I	S	r	$\bar{x}$	Z	x_p	I	S	r	Tan α	F_y = 36 ksi
	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.		
L8×8×1/8	98.1	17.5	2.41	2.40	31.6	1.05	40.9	7.23	1.56	1.00	1.00
×1	89.1	15.8	2.43	2.36	28.5	0.943	36.8	6.51	1.56	1.00	1.00
×7/8	79.7	14.0	2.45	2.31	25.3	0.832	32.7	5.78	1.57	1.00	1.00
×3/4	69.9	12.2	2.46	2.26	22.0	0.720	28.5	5.04	1.57	1.00	1.00
×5/8	59.6	10.3	2.48	2.21	18.6	0.606	24.2	4.27	1.58	1.00	0.997
×9/16	54.2	9.33	2.49	2.19	16.8	0.548	22.0	3.88	1.58	1.00	0.959
×1/2	48.8	8.36	2.49	2.17	15.1	0.490	19.7	3.49	1.59	1.00	0.912
L8×6×1	38.8	8.92	1.72	1.65	16.2	0.816	21.3	4.84	1.28	0.542	1.00
×7/8	34.9	7.94	1.74	1.60	14.4	0.721	18.9	4.31	1.28	0.546	1.00
×3/4	30.8	6.92	1.75	1.56	12.5	0.624	16.5	3.78	1.29	0.550	1.00
×5/8	26.4	5.88	1.77	1.51	10.5	0.526	14.1	3.22	1.29	0.554	0.997
×9/16	24.1	5.34	1.78	1.49	9.52	0.476	12.8	2.94	1.30	0.556	0.959
×1/2	21.7	4.79	1.79	1.46	8.52	0.425	11.5	2.64	1.30	0.557	0.912
×7/16	19.3	4.23	1.80	1.44	7.50	0.374	10.2	2.35	1.31	0.559	0.850
L8×4×1	11.6	3.94	1.03	1.04	7.73	0.691	7.87	2.15	0.844	0.247	1.00
×7/8	10.5	3.51	1.04	0.997	6.77	0.612	7.01	1.93	0.846	0.252	1.00
×3/4	9.37	3.07	1.05	0.949	5.82	0.531	6.13	1.70	0.850	0.257	1.00
×5/8	8.11	2.62	1.06	0.902	4.86	0.448	5.24	1.47	0.856	0.262	0.997
×9/16	7.44	2.38	1.07	0.878	4.39	0.405	4.79	1.34	0.859	0.264	0.959
×1/2	6.75	2.15	1.08	0.854	3.91	0.363	4.32	1.22	0.863	0.266	0.912
×7/16	6.03	1.90	1.09	0.829	3.42	0.320	3.84	1.09	0.867	0.268	0.850
L7×4×3/4	9.00	3.01	1.08	1.00	5.60	0.550	5.64	1.71	0.855	0.324	1.00
×5/8	7.79	2.56	1.10	0.958	4.69	0.464	4.80	1.47	0.860	0.329	1.00
×1/2	6.48	2.10	1.11	0.910	3.77	0.376	3.95	1.21	0.866	0.334	0.965
×7/16	5.79	1.86	1.12	0.886	3.31	0.331	3.50	1.08	0.869	0.337	0.912
×3/8	5.06	1.61	1.12	0.861	2.84	0.286	3.05	0.942	0.873	0.339	0.840
L6×6×1	35.4	8.55	1.79	1.86	15.4	0.918	15.0	3.53	1.17	1.00	1.00
×7/8	31.9	7.61	1.81	1.81	13.7	0.813	13.3	3.13	1.17	1.00	1.00
×3/4	28.1	6.64	1.82	1.77	11.9	0.705	11.6	2.73	1.17	1.00	1.00
×5/8	24.1	5.64	1.84	1.72	10.1	0.594	9.83	2.32	1.17	1.00	1.00
×9/16	22.0	5.12	1.85	1.70	9.17	0.538	8.94	2.11	1.18	1.00	1.00
×1/2	19.9	4.59	1.86	1.67	8.22	0.481	8.04	1.89	1.18	1.00	1.00
×7/16	17.6	4.06	1.86	1.65	7.25	0.423	7.11	1.68	1.18	1.00	0.973
×3/8	15.4	3.51	1.87	1.62	6.26	0.365	6.17	1.45	1.19	1.00	0.912
×5/16	13.0	2.95	1.88	1.60	5.26	0.306	5.20	1.23	1.19	1.00	0.826

Note: For compactness criteria, refer to the end of Table 1–7.

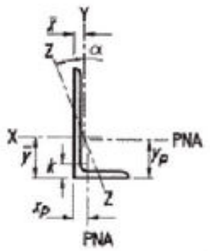


Table 1–7 (continued)
Angles
Properties

Shape	k	Wt.	Area, A	Axis X-X						Flexural-Torsional Properties		
				I	S	r	$\bar{y}$	Z	y_p	J	C_w	$\bar{r}_o$
	in.	lb/ft	in.^{2}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.
L6×4×7/8	1 3/8	27.2	7.98	27.7	7.13	1.86	2.12	12.7	1.44	2.03	4.04	2.82
×3/4	1 1/4	23.6	6.94	24.5	6.23	1.88	2.07	11.1	1.38	1.31	2.64	2.85
×5/8	1 1/8	20.0	5.86	21.0	5.29	1.89	2.03	9.44	1.31	0.775	1.59	2.88
×9/16	1 1/16	18.1	5.31	19.2	4.81	1.90	2.00	8.59	1.28	0.572	1.18	2.90
×1/2	1	16.2	4.75	17.3	4.31	1.91	1.98	7.71	1.25	0.407	0.843	2.91
×7/16	15/16	14.3	4.18	15.4	3.81	1.92	1.95	6.81	1.22	0.276	0.575	2.93
×3/8	7/8	12.3	3.61	13.4	3.30	1.93	1.93	5.89	1.19	0.177	0.369	2.94
×5/16	13/16	10.3	3.03	11.4	2.77	1.94	1.90	4.96	1.16	0.104	0.217	2.96
L6×3 1/2×1/2	1	15.3	4.50	16.6	4.23	1.92	2.07	7.49	1.48	0.386	0.779	2.88
×3/8	7/8	11.7	3.42	12.9	3.23	1.93	2.02	5.74	1.41	0.168	0.341	2.90
×5/16	13/16	9.80	2.87	10.9	2.72	1.94	2.00	4.84	1.38	0.0990	0.201	2.92
L5×5×7/8	1 3/8	27.2	7.98	17.8	5.16	1.49	1.56	9.31	0.802	2.07	3.53	2.64
×3/4	1 1/4	23.6	6.94	15.7	4.52	1.50	1.52	8.14	0.698	1.33	2.32	2.67
×5/8	1 1/8	20.0	5.86	13.6	3.85	1.52	1.47	6.93	0.590	0.792	1.40	2.70
×1/2	1	16.2	4.75	11.3	3.15	1.53	1.42	5.66	0.479	0.417	0.744	2.73
×7/16	15/16	14.3	4.18	10.0	2.78	1.54	1.40	5.00	0.422	0.284	0.508	2.74
×3/8	7/8	12.3	3.61	8.76	2.41	1.55	1.37	4.33	0.365	0.183	0.327	2.76
×5/16	13/16	10.3	3.03	7.44	2.04	1.56	1.35	3.65	0.307	0.108	0.193	2.77
L5×3 1/2×3/4	1 3/16	19.8	5.81	13.9	4.26	1.55	1.74	7.60	1.12	1.09	1.52	2.36
×5/8	1 1/16	16.8	4.92	12.0	3.63	1.56	1.69	6.50	1.06	0.651	0.918	2.39
×1/2	15/16	13.6	4.00	9.96	2.97	1.58	1.65	5.33	0.997	0.343	0.491	2.42
×3/8	13/16	10.4	3.05	7.75	2.28	1.59	1.60	4.09	0.933	0.150	0.217	2.45
×5/16	3/4	8.70	2.56	6.58	1.92	1.60	1.57	3.45	0.901	0.0883	0.128	2.47
×1/4	11/16	7.00	2.06	5.36	1.55	1.61	1.55	2.78	0.868	0.0464	0.0670	2.48
L5×3×1/2	15/16	12.8	3.75	9.43	2.89	1.58	1.74	5.12	1.25	0.322	0.444	2.38
×7/16	7/8	11.3	3.31	8.41	2.56	1.59	1.72	4.53	1.21	0.220	0.304	2.39
×3/8	13/16	9.80	2.86	7.35	2.22	1.60	1.69	3.93	1.18	0.141	0.196	2.41
×5/16	3/4	8.20	2.40	6.24	1.87	1.61	1.67	3.32	1.15	0.0832	0.116	2.42
×1/4	11/16	6.60	1.94	5.09	1.51	1.62	1.64	2.68	1.12	0.0438	0.0606	2.43
L4×4×3/4	1 1/8	18.5	5.44	7.62	2.79	1.18	1.27	5.02	0.679	1.02	1.12	2.10
×5/8	1	15.7	4.61	6.62	2.38	1.20	1.22	4.28	0.576	0.610	0.680	2.13
×1/2	7/8	12.8	3.75	5.52	1.96	1.21	1.18	3.50	0.468	0.322	0.366	2.16
×7/16	13/16	11.3	3.31	4.93	1.73	1.22	1.15	3.10	0.413	0.220	0.252	2.18
×3/8	3/4	9.80	2.86	4.32	1.50	1.23	1.13	2.69	0.357	0.141	0.162	2.19
×5/16	11/16	8.20	2.40	3.67	1.27	1.24	1.11	2.26	0.300	0.0832	0.0963	2.21
×1/4	5/8	6.60	1.94	3.00	1.03	1.25	1.08	1.82	0.242	0.0438	0.0505	2.22

Note: For compactness criteria, refer to the end of Table 1–7.

Table 1–7 (continued)
Angles
Properties

L6-L4

Shape	Axis Y-Y						Axis Z-Z				Q_s
	I	S	r	$\bar{x}$	Z	x_p	I	S	r	Tan α	F_y = 36 ksi
	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.		
L6×4×7/8	9.70	3.37	1.10	1.12	6.26	0.665	5.82	1.90	0.854	0.421	1.00
×3/4	8.63	2.95	1.12	1.07	5.42	0.578	5.08	1.66	0.856	0.428	1.00
×5/8	7.48	2.52	1.13	1.03	4.56	0.488	4.32	1.42	0.859	0.435	1.00
×9/16	6.86	2.29	1.14	1.00	4.13	0.442	3.94	1.30	0.861	0.438	1.00
×1/2	6.22	2.06	1.14	0.981	3.69	0.396	3.55	1.17	0.864	0.440	1.00
×7/16	5.56	1.83	1.15	0.957	3.24	0.349	3.14	1.04	0.867	0.443	0.973
×3/8	4.86	1.58	1.16	0.933	2.79	0.301	2.73	0.908	0.870	0.446	0.912
×5/16	4.13	1.34	1.17	0.908	2.33	0.252	2.31	0.769	0.874	0.449	0.826
L6×3 1/2×1/2	4.24	1.59	0.968	0.829	2.88	0.376	2.58	0.914	0.756	0.343	1.00
×3/8	3.33	1.22	0.984	0.781	2.18	0.287	2.00	0.714	0.763	0.349	0.912
×5/16	2.84	1.03	0.991	0.756	1.82	0.241	1.70	0.609	0.767	0.352	0.826
L5×5×7/8	17.8	5.16	1.49	1.56	9.30	0.802	7.56	2.14	0.971	1.00	1.00
×3/4	15.7	4.52	1.50	1.52	8.14	0.698	6.59	1.86	0.972	1.00	1.00
×5/8	13.6	3.85	1.52	1.47	6.92	0.590	5.61	1.59	0.975	1.00	1.00
×1/2	11.3	3.15	1.53	1.42	5.66	0.479	4.60	1.30	0.980	1.00	1.00
×7/16	10.0	2.78	1.54	1.40	5.00	0.422	4.08	1.15	0.983	1.00	1.00
×3/8	8.76	2.41	1.55	1.37	4.33	0.365	3.55	1.00	0.986	1.00	0.983
×5/16	7.44	2.04	1.56	1.35	3.65	0.307	3.01	0.850	0.990	1.00	0.912
L5×3 1/2×3/4	5.52	2.20	0.974	0.993	4.07	0.582	3.22	1.22	0.744	0.464	1.00
×5/8	4.80	1.88	0.987	0.947	3.43	0.493	2.74	1.05	0.746	0.472	1.00
×1/2	4.02	1.55	1.00	0.901	2.79	0.400	2.25	0.862	0.750	0.479	1.00
×3/8	3.15	1.19	1.02	0.854	2.12	0.305	1.74	0.670	0.755	0.485	0.983
×5/16	2.69	1.01	1.02	0.829	1.77	0.256	1.47	0.569	0.758	0.489	0.912
×1/4	2.20	0.816	1.03	0.804	1.42	0.207	1.19	0.463	0.761	0.491	0.804
L5×3×1/2	2.55	1.13	0.824	0.746	2.08	0.375	1.55	0.645	0.642	0.357	1.00
×7/16	2.29	1.00	0.831	0.722	1.82	0.331	1.37	0.575	0.644	0.361	1.00
×3/8	2.01	0.874	0.838	0.698	1.57	0.286	1.20	0.503	0.646	0.364	0.983
×5/16	1.72	0.739	0.846	0.673	1.31	0.241	1.01	0.428	0.649	0.368	0.912
×1/4	1.41	0.600	0.853	0.648	1.05	0.194	0.825	0.350	0.652	0.371	0.804
L4×4×3/4	7.62	2.79	1.18	1.27	5.01	0.679	3.25	1.15	0.774	1.00	1.00
×5/8	6.62	2.38	1.20	1.22	4.28	0.576	2.76	0.975	0.774	1.00	1.00
×1/2	5.52	1.96	1.21	1.18	3.50	0.468	2.25	0.797	0.776	1.00	1.00
×7/16	4.93	1.73	1.22	1.15	3.10	0.413	2.00	0.706	0.777	1.00	1.00
×3/8	4.32	1.50	1.23	1.13	2.68	0.357	1.73	0.613	0.779	1.00	1.00
×5/16	3.67	1.27	1.24	1.11	2.26	0.300	1.46	0.517	0.781	1.00	0.997
×1/4	3.00	1.03	1.25	1.08	1.82	0.242	1.18	0.419	0.783	1.00	0.912

Note: For compactness criteria, refer to the end of Table 1–7.

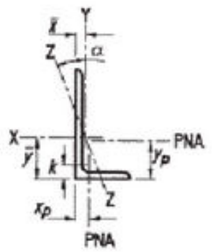


Table 1–7 (continued)
Angles
Properties

Shape	k	Wt.	Area, A	Axis X-X						Flexural-Torsional Properties		
				I	S	r	$\bar{y}$	Z	y_p	J	C_w	$\bar{r}_o$
	in.	lb/ft	in.^{2}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.
L4×3½×½	7/8	11.9	3.50	5.30	1.92	1.23	1.24	3.46	0.497	0.301	0.302	2.03
×3/8	3/4	9.10	2.67	4.15	1.48	1.25	1.20	2.66	0.433	0.132	0.134	2.06
×5/16	11/16	7.70	2.25	3.53	1.25	1.25	1.17	2.24	0.401	0.0782	0.0798	2.08
×1/4	5/8	6.20	1.81	2.89	1.01	1.26	1.14	1.81	0.368	0.0412	0.0419	2.09
L4×3×5/8	1	13.6	3.89	6.01	2.28	1.23	1.37	4.08	0.810	0.529	0.472	1.91
×1/2	7/8	11.1	3.25	5.02	1.87	1.24	1.32	3.36	0.747	0.281	0.255	1.94
×3/8	3/4	8.50	2.48	3.94	1.44	1.26	1.27	2.60	0.683	0.123	0.114	1.97
×5/16	11/16	7.20	2.09	3.36	1.22	1.27	1.25	2.19	0.651	0.0731	0.0676	1.98
×1/4	5/8	5.80	1.69	2.75	0.988	1.27	1.22	1.77	0.618	0.0386	0.0356	1.99
L3½×3½×½	7/8	11.1	3.25	3.63	1.48	1.05	1.05	2.66	0.466	0.281	0.238	1.87
×7/16	13/16	9.80	2.87	3.25	1.32	1.06	1.03	2.36	0.412	0.192	0.164	1.89
×3/8	3/4	8.50	2.48	2.86	1.15	1.07	1.00	2.06	0.357	0.123	0.106	1.90
×5/16	11/16	7.20	2.09	2.44	0.969	1.08	0.979	1.74	0.301	0.0731	0.0634	1.92
×1/4	5/8	5.80	1.69	2.00	0.787	1.09	0.954	1.41	0.243	0.0386	0.0334	1.93
L3½×3×½	7/8	10.2	3.00	3.45	1.45	1.07	1.12	2.61	0.480	0.260	0.191	1.75
×7/16	13/16	9.10	2.65	3.10	1.29	1.08	1.09	2.32	0.446	0.178	0.132	1.76
×3/8	3/4	7.90	2.30	2.73	1.12	1.09	1.07	2.03	0.411	0.114	0.0858	1.78
×5/16	11/16	6.60	1.93	2.33	0.951	1.09	1.05	1.72	0.375	0.0680	0.0512	1.79
×1/4	5/8	5.40	1.56	1.92	0.773	1.10	1.02	1.39	0.336	0.0360	0.0270	1.80
L3½×2½×½	7/8	9.40	2.75	3.24	1.41	1.08	1.20	2.52	0.736	0.234	0.159	1.66
×3/8	3/4	7.20	2.11	2.56	1.09	1.10	1.15	1.96	0.668	0.103	0.0714	1.69
×5/16	11/16	6.10	1.78	2.20	0.925	1.11	1.13	1.67	0.633	0.0611	0.0426	1.71
×1/4	5/8	4.90	1.44	1.81	0.753	1.12	1.10	1.36	0.596	0.0322	0.0225	1.72
L3×3×½	7/8	9.40	2.75	2.20	1.06	0.895	0.929	1.91	0.458	0.230	0.144	1.59
×7/16	13/16	8.30	2.43	1.98	0.946	0.903	0.907	1.70	0.405	0.157	0.100	1.60
×3/8	3/4	7.20	2.11	1.75	0.825	0.910	0.884	1.48	0.351	0.101	0.0652	1.62
×5/16	11/16	6.10	1.78	1.50	0.699	0.918	0.860	1.26	0.296	0.0597	0.0390	1.64
×1/4	5/8	4.90	1.44	1.23	0.569	0.926	0.836	1.02	0.239	0.0313	0.0206	1.65
×3/16	9/16	3.71	1.09	0.948	0.433	0.933	0.812	0.774	0.181	0.0136	0.00899	1.67
L3×2½×½	7/8	8.50	2.50	2.07	1.03	0.910	0.995	1.86	0.494	0.213	0.112	1.46
×7/16	13/16	7.60	2.21	1.87	0.921	0.917	0.972	1.66	0.462	0.146	0.0777	1.48
×3/8	3/4	6.60	1.92	1.65	0.803	0.924	0.949	1.45	0.430	0.0943	0.0507	1.49
×5/16	11/16	5.60	1.67	1.41	0.681	0.932	0.925	1.23	0.397	0.0560	0.0304	1.51
×1/4	5/8	4.50	1.31	1.16	0.555	0.940	0.900	1.000	0.363	0.0296	0.0161	1.52
×3/16	9/16	3.39	0.996	0.899	0.423	0.947	0.874	0.761	0.328	0.0130	0.00705	1.54

Note: For compactness criteria, refer to the end of Table 1–7.

Table 1–7 (continued)
Angles
Properties

Shape	Axis Y-Y						Axis Z-Z				Q_s
	I	S	r	$\bar{x}$	Z	x_p	I	S	r	Tan α	F_y = 36 ksi
	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.		
L4×3½×½	3.76	1.50	1.04	0.994	2.69	0.438	1.80	0.719	0.716	0.750	1.00
×3/8	2.96	1.16	1.05	0.947	2.06	0.334	1.38	0.555	0.719	0.755	1.00
×5/16	2.52	0.980	1.06	0.923	1.74	0.281	1.17	0.470	0.721	0.757	0.997
×1/4	2.07	0.794	1.07	0.897	1.40	0.227	0.950	0.382	0.723	0.759	0.912
L4×3×5/8	2.85	1.34	0.845	0.867	2.45	0.498	1.59	0.720	0.631	0.534	1.00
×1/2	2.40	1.10	0.858	0.822	1.99	0.407	1.30	0.592	0.633	0.542	1.00
×3/8	1.89	0.851	0.873	0.775	1.52	0.311	1.01	0.460	0.636	0.551	1.00
×5/16	1.62	0.721	0.880	0.750	1.28	0.262	0.851	0.390	0.638	0.554	0.997
×1/4	1.33	0.585	0.887	0.725	1.03	0.211	0.691	0.318	0.639	0.558	0.912
L3½×3½×½	3.63	1.48	1.05	1.05	2.66	0.466	1.51	0.609	0.679	1.00	1.00
×7/16	3.25	1.32	1.06	1.03	2.36	0.412	1.34	0.540	0.681	1.00	1.00
×3/8	2.86	1.15	1.07	1.00	2.05	0.357	1.17	0.471	0.683	1.00	1.00
×5/16	2.44	0.969	1.08	0.979	1.74	0.301	0.989	0.400	0.685	1.00	1.00
×1/4	2.00	0.787	1.09	0.954	1.41	0.243	0.807	0.326	0.688	1.00	0.965
L3½×3×½	2.32	1.09	0.877	0.869	1.97	0.431	1.15	0.537	0.618	0.713	1.00
×7/16	2.09	0.971	0.885	0.846	1.75	0.382	1.03	0.478	0.620	0.717	1.00
×3/8	1.84	0.847	0.892	0.823	1.52	0.331	0.895	0.418	0.622	0.720	1.00
×5/16	1.58	0.718	0.900	0.798	1.28	0.279	0.761	0.356	0.624	0.722	1.00
×1/4	1.30	0.585	0.908	0.773	1.04	0.226	0.623	0.292	0.628	0.725	0.965
L3½×2½×½	1.36	0.756	0.701	0.701	1.39	0.395	0.782	0.420	0.532	0.485	1.00
×3/8	1.09	0.589	0.716	0.655	1.07	0.303	0.608	0.329	0.535	0.495	1.00
×5/16	0.937	0.501	0.723	0.632	0.900	0.256	0.518	0.281	0.538	0.500	1.00
×1/4	0.775	0.410	0.731	0.607	0.728	0.207	0.425	0.232	0.541	0.504	0.965
L3×3×½	2.20	1.06	0.895	0.929	1.91	0.458	0.924	0.436	0.580	1.00	1.00
×7/16	1.98	0.946	0.903	0.907	1.70	0.405	0.819	0.386	0.580	1.00	1.00
×3/8	1.75	0.825	0.910	0.884	1.48	0.351	0.712	0.336	0.581	1.00	1.00
×5/16	1.50	0.699	0.918	0.860	1.25	0.296	0.603	0.284	0.583	1.00	1.00
×1/4	1.23	0.569	0.926	0.836	1.02	0.239	0.491	0.231	0.585	1.00	1.00
×3/16	0.948	0.433	0.933	0.812	0.774	0.181	0.374	0.176	0.586	1.00	0.912
L3×2½×½	1.29	0.736	0.718	0.746	1.34	0.418	0.666	0.370	0.516	0.666	1.00
×7/16	1.17	0.656	0.724	0.724	1.19	0.370	0.591	0.329	0.516	0.671	1.00
×3/16	1.03	0.573	0.731	0.701	1.03	0.321	0.514	0.287	0.517	0.675	1.00
×5/16	0.888	0.487	0.739	0.677	0.873	0.271	0.437	0.244	0.518	0.679	1.00
×1/4	0.734	0.397	0.746	0.653	0.707	0.220	0.356	0.199	0.520	0.683	1.00
×3/16	0.568	0.303	0.753	0.627	0.536	0.167	0.272	0.153	0.521	0.687	0.912

Note: For compactness criteria, refer to the end of Table 1–7.

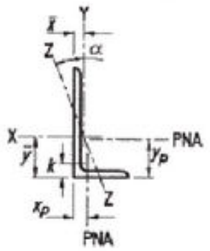
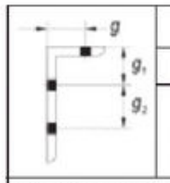


Table 1–7 (continued)
Angles
Properties

Shape	k	Wt.	Area, A	Axis X-X						Flexural-Torsional Properties		
				I	S	r	$\bar{y}$	Z	y_p	J	C_w	$\bar{r}_o$
	in.	lb/ft	in.^{2}	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{6}	in.
L3×2×1/2	13/16	7.70	2.25	1.92	1.00	0.922	1.08	1.78	0.736	0.192	0.0908	1.39
×3/8	11/16	5.90	1.73	1.54	0.779	0.937	1.03	1.39	0.668	0.0855	0.0413	1.42
×5/16	5/8	5.00	1.46	1.32	0.662	0.945	1.01	1.19	0.633	0.0510	0.0248	1.43
×1/4	9/16	4.10	1.19	1.09	0.541	0.953	0.980	0.969	0.596	0.0270	0.0132	1.45
×3/16	1/2	3.07	0.902	0.847	0.414	0.961	0.952	0.743	0.556	0.0119	0.00576	1.46
L2 1/2×2 1/2×1/2	3/4	7.70	2.25	1.22	0.716	0.735	0.803	1.29	0.450	0.188	0.0791	1.30
×3/8	5/8	5.90	1.73	0.972	0.558	0.749	0.758	1.01	0.347	0.0833	0.0362	1.33
×5/16	9/16	5.00	1.46	0.837	0.474	0.756	0.735	0.853	0.293	0.0495	0.0218	1.35
×1/4	1/2	4.10	1.19	0.692	0.387	0.764	0.711	0.695	0.237	0.0261	0.0116	1.36
×3/16	7/16	3.07	0.900	0.535	0.295	0.771	0.687	0.529	0.180	0.0114	0.00510	1.38
L2 1/2×2×3/8	5/8	5.30	1.55	0.914	0.546	0.766	0.826	0.982	0.425	0.0746	0.0268	1.22
×5/16	9/16	4.50	1.31	0.790	0.465	0.774	0.803	0.839	0.391	0.0444	0.0162	1.23
×1/4	1/2	3.62	1.06	0.656	0.381	0.782	0.779	0.688	0.356	0.0235	0.00868	1.25
×3/16	7/16	2.75	0.809	0.511	0.293	0.790	0.754	0.529	0.318	0.0103	0.00382	1.26
L2 1/2×1 1/2×1/4	1/2	3.22	0.938	0.594	0.364	0.792	0.866	0.644	0.606	0.0209	0.00694	1.19
×3/16	7/16	2.47	0.715	0.464	0.280	0.801	0.839	0.497	0.568	0.00921	0.00306	1.20
L2×2×3/8	5/8	4.70	1.36	0.476	0.348	0.591	0.632	0.629	0.342	0.0658	0.0174	1.05
×5/16	9/16	3.92	1.15	0.414	0.298	0.598	0.609	0.537	0.290	0.0393	0.0106	1.06
×1/4	1/2	3.19	0.938	0.346	0.244	0.605	0.586	0.440	0.236	0.0209	0.00572	1.08
×3/16	7/16	2.44	0.715	0.271	0.188	0.612	0.561	0.338	0.180	0.00921	0.00254	1.09
×1/8	3/8	1.65	0.484	0.189	0.129	0.620	0.534	0.230	0.123	0.00293	0.000789	1.10



Workable Gages in Angle Legs, in.														
Leg	8	7	6	5	4	3 1/2	3	2 1/2	2	1 3/4	1 1/2	1 3/8	1 1/4	1
g	4 1/2	4	3 1/2	3	2 1/2	2	1 3/4	1 3/8	1 1/8	1	7/8	7/8	3/4	5/8
g_1	3	2 1/2	2 1/4	2										
g_2	3	3	2 1/2	1 3/4										

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

Table 1–7 (continued)
Angles
Properties

L3-L2

Shape	Axis Y-Y						Axis Z-Z				Q_s
	I	S	r	$\bar{x}$	Z	x_p	I	S	r	Tan α	F_y = 36 ksi
	in.^{4}	in.^{3}	in.	in.	in.^{3}	in.	in.^{4}	in.^{3}	in.		
L3×2×1/2	0.667	0.470	0.543	0.580	0.887	0.377	0.409	0.266	0.425	0.413	1.00
×3/8	0.539	0.368	0.555	0.535	0.679	0.291	0.318	0.209	0.426	0.426	1.00
×5/16	0.467	0.314	0.562	0.511	0.572	0.247	0.271	0.179	0.428	0.432	1.00
×1/4	0.390	0.258	0.569	0.487	0.463	0.200	0.223	0.149	0.431	0.437	1.00
×3/16	0.305	0.198	0.577	0.462	0.351	0.153	0.173	0.116	0.435	0.442	0.912
L2 1/2×2 1/2×1/2	1.22	0.716	0.735	0.803	1.29	0.450	0.521	0.295	0.481	1.00	1.00
×3/8	0.972	0.558	0.749	0.758	1.00	0.347	0.400	0.226	0.481	1.00	1.00
×5/16	0.837	0.474	0.756	0.735	0.853	0.293	0.339	0.192	0.481	1.00	1.00
×1/4	0.692	0.387	0.764	0.711	0.694	0.237	0.275	0.156	0.482	1.00	1.00
×3/16	0.535	0.295	0.771	0.687	0.528	0.180	0.210	0.119	0.482	1.00	0.983
L2 1/2×2×3/8	0.513	0.361	0.574	0.578	0.657	0.311	0.273	0.189	0.419	0.612	1.00
×5/16	0.446	0.309	0.581	0.555	0.557	0.264	0.233	0.161	0.420	0.618	1.00
×1/4	0.372	0.253	0.589	0.532	0.454	0.214	0.191	0.133	0.423	0.624	1.00
×3/16	0.292	0.195	0.597	0.508	0.347	0.164	0.149	0.104	0.426	0.628	0.983
L2 1/2×1 1/2×1/4	0.160	0.142	0.411	0.372	0.261	0.189	0.0975	0.0818	0.321	0.354	1.00
×3/16	0.126	0.110	0.418	0.347	0.198	0.145	0.0760	0.0644	0.324	0.360	0.983
L2×2×3/8	0.476	0.348	0.591	0.632	0.628	0.342	0.203	0.144	0.386	1.00	1.00
×5/16	0.414	0.298	0.598	0.609	0.536	0.290	0.173	0.122	0.386	1.00	1.00
×1/4	0.346	0.244	0.605	0.586	0.440	0.236	0.141	0.1000	0.387	1.00	1.00
×3/16	0.271	0.188	0.612	0.561	0.338	0.180	0.109	0.0771	0.389	1.00	1.00
×1/8	0.189	0.129	0.620	0.534	0.230	0.123	0.0751	0.0531	0.391	1.00	0.912

t	Compactness Criteria for Angles		
	Compression	Flexure	
	non-slender up to	compact up to	non-compact up to
	Width of angle leg, in.		
1 1/8	8	8	—
1	↓	↓	—
7/8			—
3/4			—
5/8			—
9/16	7	↓	—
1/2	6	7	8
7/16	5	6	↓
3/8	4	5	
5/16	4	4	↓
1/4	3	3 1/2	6
3/16	2	2 1/2	4
1/8	1 1/2	1 1/2	3

Note: Compactness criteria given for F_y = 36 ksi. C_v = 1.0 for all angles.

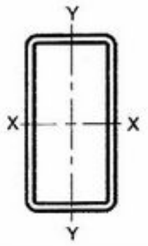


Table 1-11
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thick-ness, *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}
HSS20×12×5/8	0.581	127.37	35.0	17.7	31.4	1880	188	7.33	230
×1/2	0.465	103.30	28.3	22.8	40.0	1550	155	7.39	188
×3/8	0.349	78.52	21.5	31.4	54.3	1200	120	7.45	144
×5/16	0.291	65.87	18.1	38.2	65.7	1010	101	7.48	122
HSS20×8×5/8	0.581	110.36	30.3	10.8	31.4	1440	144	6.89	185
×1/2	0.465	89.68	24.6	14.2	40.0	1190	119	6.96	152
×3/8	0.349	68.31	18.7	19.9	54.3	926	92.6	7.03	117
×5/16	0.291	57.36	15.7	24.5	65.7	786	78.6	7.07	98.6
HSS20×4×1/2	0.465	76.07	20.9	5.60	40.0	838	83.8	6.33	115
×3/8	0.349	58.10	16.0	8.46	54.3	657	65.7	6.42	89.3
×5/16	0.291	48.86	13.4	10.7	65.7	560	56.0	6.46	75.6
×1/4	0.233	39.43	10.8	14.2	82.8	458	45.8	6.50	61.5
HSS18×6×5/8	0.581	93.34	25.7	7.33	28.0	923	103	6.00	135
×1/2	0.465	76.07	20.9	9.90	35.7	770	85.6	6.07	112
×3/8	0.349	58.10	16.0	14.2	48.6	602	66.9	6.15	86.4
×5/16	0.291	48.86	13.4	17.6	58.9	513	57.0	6.18	73.1
×1/4	0.233	39.43	10.8	22.8	74.3	419	46.5	6.22	59.4
HSS16×12×5/8	0.581	110.36	30.3	17.7	24.5	1090	136	6.00	165
×1/2	0.465	89.68	24.6	22.8	31.4	904	113	6.06	135
×3/8	0.349	68.31	18.7	31.4	42.8	702	87.7	6.12	104
×5/16	0.291	57.36	15.7	38.2	52.0	595	74.4	6.15	87.7
HSS16×8×5/8	0.581	93.34	25.7	10.8	24.5	815	102	5.64	129
×1/2	0.465	76.07	20.9	14.2	31.4	679	84.9	5.70	106
×3/8	0.349	58.10	16.0	19.9	42.8	531	66.3	5.77	82.1
×5/16	0.291	48.86	13.4	24.5	52.0	451	56.4	5.80	69.4
×1/4	0.233	39.43	10.8	31.3	65.7	368	46.1	5.83	56.4
HSS16×4×5/8	0.581	76.33	21.0	3.88	24.5	539	67.3	5.06	92.9
×1/2	0.465	62.46	17.2	5.60	31.4	455	56.9	5.15	77.3
×3/8	0.349	47.90	13.2	8.46	42.8	360	45.0	5.23	60.2
×5/16	0.291	40.35	11.1	10.7	52.0	308	38.5	5.27	51.1
×1/4	0.233	32.63	8.96	14.2	65.7	253	31.6	5.31	41.7
×3/16	0.174	24.73	6.76	20.0	89.0	193	24.2	5.35	31.7

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

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

HSS20-HSS16

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS20×12×5/8	851	142	4.930	162	17 3/16	9 3/16	1890	257	5.17
×1/2	705	117	4.99	132	17 3/4	9 3/4	1540	209	5.20
×3/8	547	91.1	5.04	102	18 5/16	10 5/16	1180	160	5.23
×5/16	464	77.3	5.07	85.8	18 5/8	10 5/8	997	134	5.25
HSS20×8×5/8	338	84.6	3.34	96.4	17 3/16	5 3/16	916	167	4.50
×1/2	283	70.8	3.39	79.5	17 3/4	5 3/4	757	137	4.53
×3/8	222	55.6	3.44	61.5	18 5/16	6 5/16	586	105	4.57
×5/16	189	47.4	3.47	52.0	18 5/8	6 5/8	496	88.3	4.58
HSS20×4×1/2	58.7	29.3	1.68	34.0	17 3/4	—	195	63.8	3.87
×3/8	47.6	23.8	1.73	26.8	18 5/16	2 5/16	156	49.9	3.90
×5/16	41.2	20.6	1.75	22.9	18 5/8	2 5/8	134	42.4	3.92
×1/4	34.3	17.1	1.78	18.7	18 7/8	2 7/8	111	34.7	3.93
HSS18×6×5/8	158	52.7	2.48	61.0	15 3/16	3 3/16	462	109	3.83
×1/2	134	44.6	2.53	50.7	15 3/4	3 3/4	387	89.9	3.87
×3/8	106	35.5	2.58	39.5	16 5/16	4 5/16	302	69.5	3.90
×5/16	91.3	30.4	2.61	33.5	16 9/16	4 9/16	257	58.7	3.92
×1/4	75.1	25.0	2.63	27.3	16 7/8	4 7/8	210	47.7	3.93
HSS16x12×5/8	700	117	4.80	135	13 3/16	9 3/16	1370	204	4.50
×1/2	581	96.8	4.86	111	13 3/4	9 3/4	1120	166	4.53
×3/8	452	75.3	4.91	85.5	14 5/16	10 5/16	862	127	4.57
×5/16	384	64.0	4.94	72.2	14 5/8	10 5/8	727	107	4.58
HSS16×8×5/8	274	68.6	3.27	79.2	13 3/16	5 3/16	681	132	3.83
×1/2	230	57.6	3.32	65.5	13 3/4	5 3/4	563	108	3.87
×3/8	181	45.3	3.37	50.8	14 5/16	6 5/16	436	83.4	3.90
×5/16	155	38.7	3.40	43.0	14 5/8	6 5/8	369	70.4	3.92
×1/4	127	31.7	3.42	35.0	14 7/8	6 7/8	300	57.0	3.93
HSS16×4×5/8	54.1	27.0	1.60	32.5	13 3/16	—	174	60.5	3.17
×1/2	47.0	23.5	1.65	27.4	13 3/4	—	150	50.7	3.20
×3/8	38.3	19.1	1.71	21.7	14 5/16	2 5/16	120	39.7	3.23
×5/16	33.2	16.6	1.73	18.5	14 5/8	2 5/8	103	33.8	3.25
×1/4	27.7	13.8	1.76	15.2	14 7/8	2 7/8	85.2	27.6	3.27
×3/16	21.5	10.8	1.78	11.7	15 3/16	3 3/16	65.5	21.1	3.28

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

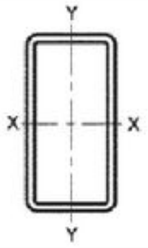


Table 1–11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thick-ness, *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}
HSS14×10×5/8	0.581	93.10	25.7	14.2	21.1	687	98.2	5.17	120
×1/2	0.465	75.94	20.9	18.5	27.1	573	81.8	5.23	98.8
×3/8	0.349	58.07	16.0	25.7	37.1	447	63.9	5.29	76.3
×5/16	0.291	48.87	13.4	31.4	45.1	380	54.3	5.32	64.6
×1/4	0.233	39.48	10.8	39.9	57.1	310	44.3	5.35	52.4
HSS14×6×5/8	0.581	76.09	21.0	7.33	21.1	478	68.3	4.77	88.7
×1/2	0.465	62.33	17.2	9.90	27.1	402	57.4	4.84	73.6
×3/8	0.349	47.86	13.2	14.2	37.1	317	45.3	4.91	57.3
×5/16	0.291	40.35	11.1	17.6	45.1	271	38.7	4.94	48.6
×1/4	0.233	32.66	8.96	22.8	57.1	222	31.7	4.98	39.6
×3/16	0.174	24.66	6.76	31.5	77.5	170	24.3	5.01	30.1
HSS14×4×5/8	0.581	67.59	18.7	3.88	21.1	373	53.3	4.47	73.1
×1/2	0.465	55.53	15.3	5.60	27.1	317	45.3	4.55	61.0
×3/8	0.349	42.75	11.8	8.46	37.1	252	36.0	4.63	47.8
×5/16	0.291	36.09	9.92	10.7	45.1	216	30.9	4.67	40.6
×1/4	0.233	29.25	8.03	14.2	57.1	178	25.4	4.71	33.2
×3/16	0.174	22.12	6.06	20.0	77.5	137	19.5	4.74	25.3
HSS12×10×1/2	0.465	69.14	19.0	18.5	22.8	395	65.9	4.56	78.8
×3/8	0.349	52.93	14.6	25.7	31.4	310	51.6	4.61	61.1
×5/16	0.291	44.62	12.2	31.4	38.2	264	44.0	4.64	51.7
×1/4	0.233	36.00	9.90	39.9	48.5	216	36.0	4.67	42.1
HSS12×8×5/8	0.581	76.13	21.0	10.8	17.7	397	66.1	4.34	82.1
×1/2	0.465	62.33	17.2	14.2	22.8	333	55.6	4.41	68.1
×3/8	0.349	47.82	13.2	19.9	31.4	262	43.7	4.47	53.0
×5/16	0.291	40.36	11.1	24.5	38.2	224	37.4	4.50	44.9
×1/4	0.233	32.60	8.96	31.3	48.5	184	30.6	4.53	36.6
×3/16	0.174	24.78	6.76	43.0	66.0	140	23.4	4.56	27.8
HSS12×6×5/8	0.581	67.62	18.7	7.33	17.7	321	53.4	4.14	68.8
×1/2	0.465	55.53	15.3	9.90	22.8	271	45.2	4.21	57.4
×5/8	0.349	42.72	11.8	14.2	31.4	215	35.9	4.28	44.8
×5/16	0.291	36.10	9.92	17.6	38.2	184	30.7	4.31	38.1
×1/4	0.233	29.19	8.03	22.8	48.5	151	25.2	4.34	31.1
×3/16	0.174	22.22	6.06	31.5	66.0	116	19.4	4.38	23.7

Note: For compactness criteria, refer to the end of Table 1-12.

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

HSS14–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
HSS14×10×5/8	407	81.5	3.98	95.1	11 3/16	7 3/16	832	146	3.83
×1/2	341	68.1	4.04	78.5	11 3/4	7 3/4	685	120	3.87
×3/8	267	53.4	4.09	60.7	12 5/16	8 5/16	528	91.8	3.90
×5/16	227	45.5	4.12	51.4	12 9/16	8 9/16	446	77.4	3.92
×1/4	186	37.2	4.14	41.8	12 7/8	8 7/8	362	62.6	3.93
HSS14×6×5/8	124	41.2	2.43	48.4	11 3/16	3 3/16	334	83.7	3.17
×1/2	105	35.1	2.48	40.4	11 3/4	3 3/4	279	69.3	3.20
×3/8	84.1	28.0	2.53	31.6	12 5/16	4 5/16	219	53.7	3.23
×5/16	72.3	24.1	2.55	26.9	12 9/16	4 9/16	186	45.5	3.25
×1/4	59.6	19.9	2.58	22.0	12 7/8	4 7/8	152	36.9	3.27
×3/16	45.9	15.3	2.61	16.7	13 3/16	5 3/16	116	28.0	3.28
HSS14×4×5/8	47.2	23.6	1.59	28.5	11 1/4	—	148	52.6	2.83
×1/2	41.2	20.6	1.64	24.1	11 3/4	—	127	44.1	2.87
×3/8	33.6	16.8	1.69	19.1	12 1/4	2 1/4	102	34.6	2.90
×5/16	29.2	14.6	1.72	16.4	12 5/8	2 5/8	87.7	29.5	2.92
×1/4	24.4	12.2	1.74	13.5	12 7/8	2 7/8	72.4	24.1	2.93
×3/16	19.0	9.48	1.77	10.3	13 1/8	3 1/8	55.8	18.4	2.95
HSS12×10×1/2	298	59.7	3.96	69.6	9 3/4	7 3/4	545	102	3.53
×3/8	234	46.9	4.01	54.0	10 5/16	8 5/16	421	78.3	3.57
×5/16	200	40.0	4.04	45.7	10 9/16	8 9/16	356	66.1	3.58
×1/4	164	32.7	4.07	37.2	10 7/8	8 7/8	289	53.5	3.60
HSS12×8×5/8	210	52.5	3.16	61.9	9 3/16	5 3/16	454	97.7	3.17
×1/2	178	44.4	3.21	51.5	9 3/4	5 3/4	377	80.4	3.20
×3/8	140	35.1	3.27	40.1	10 5/16	6 5/16	293	62.1	3.23
×5/16	120	30.1	3.29	34.1	10 9/16	6 9/16	248	52.4	3.25
×1/4	98.8	24.7	3.32	27.8	10 7/8	6 7/8	202	42.5	3.27
×3/16	75.7	18.9	3.35	21.1	11 1/8	7 1/8	153	32.2	3.28
HSS12×6×5/8	107	35.5	2.39	42.1	9 3/16	3 3/16	271	71.1	2.83
×1/2	91.1	30.4	2.44	35.2	9 3/4	3 3/4	227	59.0	2.87
×3/8	72.9	24.3	2.49	27.7	10 5/16	4 5/16	178	45.8	2.90
×5/16	62.8	20.9	2.52	23.6	10 9/16	4 9/16	152	38.8	2.92
×1/4	51.9	17.3	2.54	19.3	10 7/8	4 7/8	124	31.6	2.93
×3/16	40.0	13.3	2.57	14.7	11 3/16	5 3/16	94.6	24.0	2.95

—Flat depth or width is too small to establish a workable flat.

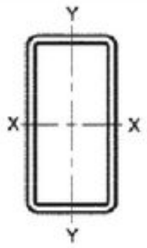


Table 1–11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thick-ness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	Axis X-X			
						I	*S*	*r*	*Z*
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS12×4×5/8	0.581	59.11	16.4	3.88	17.7	245	40.8	3.87	55.5
×1/2	0.465	48.72	13.5	5.60	22.8	210	34.9	3.95	46.7
×3/8	0.349	37.61	10.4	8.46	31.4	168	28.0	4.02	36.7
×5/16	0.291	31.84	8.76	10.7	38.2	144	24.1	4.06	31.3
×1/4	0.233	25.79	7.10	14.2	48.5	119	19.9	4.10	25.6
×3/16	0.174	19.66	5.37	20.0	66.0	91.8	15.3	4.13	19.6
HSS12×3 1/2×3/8	0.349	36.34	10.0	7.03	31.4	156	26.0	3.94	34.7
×5/16	0.291	30.77	8.46	9.03	38.2	134	22.4	3.98	29.6
HSS12×3×5/16	0.291	29.71	8.17	7.31	38.2	124	20.7	3.90	27.9
×1/4	0.233	24.09	6.63	9.88	48.5	103	17.2	3.94	22.9
×3/16	0.174	18.38	5.02	14.2	66.0	79.6	13.3	3.98	17.5
HSS12×2×5/16	0.291	27.58	7.59	3.87	38.2	104	17.4	3.71	24.5
×1/4	0.233	22.39	6.17	5.58	48.5	86.9	14.5	3.75	20.1
×3/16	0.174	17.10	4.67	8.49	66.0	67.4	11.2	3.80	15.5
HSS10×8×5/8	0.581	67.62	18.7	10.8	14.2	253	50.5	3.68	62.2
×1/2	0.465	55.53	15.3	14.2	18.5	214	42.7	3.73	51.9
×3/8	0.349	42.72	11.8	19.9	25.7	169	33.9	3.79	40.5
×5/16	0.291	36.10	9.92	24.5	31.4	145	29.0	3.82	34.4
×1/4	0.233	29.19	8.03	31.3	39.9	119	23.8	3.85	28.1
×3/16	0.174	22.22	6.06	43.0	54.5	91.4	18.3	3.88	21.4
HSS10×6×5/8	0.581	59.11	16.4	7.33	14.2	201	40.2	3.50	51.3
×1/2	0.465	48.72	13.5	9.90	18.5	171	34.3	3.57	43.0
×3/8	0.349	37.61	10.4	14.2	25.7	137	27.4	3.63	33.8
×5/16	0.291	31.84	8.76	17.6	31.4	118	23.5	3.66	28.8
×1/4	0.233	25.79	7.10	22.8	39.9	96.9	19.4	3.69	23.6
×3/16	0.174	19.66	5.37	31.5	54.5	74.6	14.9	3.73	18.0
HSS10×5×3/8	0.349	35.06	9.67	11.3	25.7	120	24.1	3.53	30.4
×5/16	0.291	29.71	8.17	14.2	31.4	104	20.8	3.56	26.0
×1/4	0.233	24.09	6.63	18.5	39.9	85.8	17.2	3.60	21.3
×3/16	0.174	18.38	5.02	25.7	54.5	66.2	13.2	3.63	16.3

Note: For compactness criteria, refer to the end of Table 1-12.

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

HSS12–HSS10

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS12×4×5/8	40.4	20.2	1.57	24.5	9 3/16	—	122	44.6	2.50
×1/2	35.3	17.7	1.62	20.9	9 3/4	—	105	37.5	2.53
×3/8	28.9	14.5	1.67	16.6	10 5/16	2 5/16	84.1	29.5	2.57
×5/16	25.2	12.6	1.70	14.2	10 5/8	2 5/8	72.4	25.2	2.58
×1/4	21.0	10.5	1.72	11.7	10 7/8	2 7/8	59.8	20.6	2.60
×3/16	16.4	8.20	1.75	9.00	11 3/16	3 3/16	46.1	15.7	2.62
HSS12×3 1/2×3/8	21.3	12.2	1.46	14.0	10 5/16	—	64.7	25.5	2.48
×5/16	18.6	10.6	1.48	12.1	10 5/8	—	56.0	21.8	2.50
HSS12×3×5/16	13.1	8.73	1.27	10.0	10 5/8	—	41.3	18.4	2.42
×1/4	11.1	7.38	1.29	8.28	10 7/8	—	34.5	15.1	2.43
×3/16	8.72	5.81	1.32	6.40	11 3/16	2 3/16	26.8	11.6	2.45
HSS12×2×5/16	5.10	5.10	0.820	6.05	10 5/8	—	17.6	11.6	2.25
×1/4	4.41	4.41	0.845	5.08	10 7/8	—	15.1	9.64	2.27
×3/16	3.55	3.55	0.872	3.97	11 3/16	—	12.0	7.49	2.28
HSS10×8×5/8	178	44.5	3.09	53.3	7 3/16	5 3/16	346	80.4	2.83
×1/2	151	37.8	3.14	44.5	7 3/4	5 3/4	288	66.4	2.87
×3/8	120	30.0	3.19	34.8	8 5/16	6 5/16	224	51.4	2.90
×5/16	103	25.7	3.22	29.6	8 5/8	6 5/8	190	43.5	2.92
×1/4	84.7	21.2	3.25	24.2	8 7/8	6 7/8	155	35.3	2.93
×3/16	65.1	16.3	3.28	18.4	9 3/16	7 3/16	118	26.7	2.95
HSS10×6×5/8	89.4	29.8	2.34	35.8	7 3/16	3 3/16	209	58.6	2.50
×1/2	76.8	25.6	2.39	30.1	7 3/4	3 3/4	176	48.7	2.53
×3/8	61.8	20.6	2.44	23.7	8 5/16	4 5/16	139	37.9	2.57
×5/16	53.3	17.8	2.47	20.2	8 5/8	4 5/8	118	32.2	2.58
×1/4	44.1	14.7	2.49	16.6	8 7/8	4 7/8	96.7	26.2	2.60
×3/16	34.1	11.4	2.52	12.7	9 3/16	5 3/16	73.8	19.9	2.62
HSS10×5×3/8	40.6	16.2	2.05	18.7	8 5/16	3 5/16	100	31.2	2.40
×5/16	35.2	14.1	2.07	16.0	8 5/8	3 5/8	86.0	26.5	2.42
×1/4	29.3	11.7	2.10	13.2	8 7/8	3 7/8	70.7	21.6	2.43
×3/16	22.7	9.09	2.13	10.1	9 3/16	4 3/16	54.1	16.5	2.45

—Flat depth or width is too small to establish a workable flat.

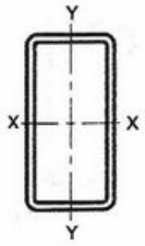


Table 1-11 (continued)
Rectangular HSS
Dimensions and Properties

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

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

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

HSS10-HSS9

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

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

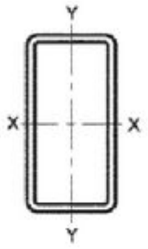


Table 1–11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	Axis X-X			
						I	*S*	*r*	*Z*
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS9×5×5/8	0.581	50.60	14.0	5.61	12.5	133	29.6	3.08	38.5
×1/2	0.465	41.91	11.6	7.75	16.4	115	25.5	3.14	32.5
×3/8	0.349	32.51	8.97	11.3	22.8	92.5	20.5	3.21	25.7
×5/16	0.291	27.58	7.59	14.2	27.9	79.8	17.7	3.24	22.0
×1/4	0.233	22.39	6.17	18.5	35.6	66.1	14.7	3.27	18.1
×3/16	0.174	17.10	4.67	25.7	48.7	51.1	11.4	3.31	13.8
HSS9×3×1/2	0.465	35.11	9.74	3.45	16.4	80.8	18.0	2.88	24.6
×3/8	0.349	27.41	7.58	5.60	22.8	66.3	14.7	2.96	19.7
×5/16	0.291	23.32	6.43	7.31	27.9	57.7	12.8	3.00	16.9
×1/4	0.233	18.99	5.24	9.88	35.6	48.2	10.7	3.04	14.0
×3/16	0.174	14.54	3.98	14.2	48.7	37.6	8.35	3.07	10.8
HSS8×6×5/8	0.581	50.60	14.0	7.33	10.8	114	28.5	2.85	36.1
×1/2	0.465	41.91	11.6	9.90	14.2	98.2	24.6	2.91	30.5
×3/8	0.349	32.51	8.97	14.2	19.9	79.1	19.8	2.97	24.1
×5/16	0.291	27.58	7.59	17.6	24.5	68.3	17.1	3.00	20.6
×1/4	0.233	22.39	6.17	22.8	31.3	56.6	14.2	3.03	16.9
×3/16	0.174	17.10	4.67	31.5	43.0	43.7	10.9	3.06	13.0
HSS8×4×5/8	0.581	42.10	11.7	3.88	10.8	82.0	20.5	2.64	27.4
×1/2	0.465	35.11	9.74	5.60	14.2	71.8	17.9	2.71	23.5
×3/8	0.349	27.41	7.58	8.46	19.9	58.7	14.7	2.78	18.8
×5/16	0.291	23.32	6.43	10.7	24.5	51.0	12.8	2.82	16.1
×1/4	0.233	18.99	5.24	14.2	31.3	42.5	10.6	2.85	13.3
×3/16	0.174	14.54	3.98	20.0	43.0	33.1	8.27	2.88	10.2
×1/8	0.116	9.85	2.70	31.5	66.0	22.9	5.73	2.92	7.02
HSS8×3×1/2	0.465	31.71	8.81	3.45	14.2	58.6	14.6	2.58	20.0
×3/8	0.349	24.85	6.88	5.60	19.9	48.5	12.1	2.65	16.1
×5/16	0.291	21.19	5.85	7.31	24.5	42.4	10.6	2.69	13.9
×1/4	0.233	17.28	4.77	9.88	31.3	35.5	8.88	2.73	11.5
×3/16	0.174	13.26	3.63	14.2	43.0	27.8	6.94	2.77	8.87
×1/8	0.116	9.00	2.46	22.9	66.0	19.3	4.83	2.80	6.11

Note: For compactness criteria, refer to the end of Table 1-12.

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

HSS9–HSS8

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS9×5×5/8	52.0	20.8	1.92	25.3	6 3/16	2 3/16	128	42.5	2.17
×1/2	45.2	18.1	1.97	21.5	6 3/4	2 3/4	109	35.6	2.20
×3/8	36.8	14.7	2.03	17.1	7 5/16	3 5/16	86.9	27.9	2.23
×5/16	32.0	12.8	2.05	14.6	7 5/8	3 5/8	74.4	23.8	2.25
×1/4	26.6	10.6	2.08	12.0	7 7/8	3 7/8	61.2	19.4	2.27
×3/16	20.7	8.28	2.10	9.25	8 3/16	4 3/16	46.9	14.8	2.28
HSS9×3×1/2	13.2	8.81	1.17	10.8	6 3/4	—	40.0	19.7	1.87
×3/8	11.2	7.45	1.21	8.80	7 5/16	—	33.1	15.8	1.90
×5/16	9.88	6.59	1.24	7.63	7 5/8	—	28.9	13.6	1.92
×1/4	8.38	5.59	1.27	6.35	7 7/8	—	24.2	11.3	1.93
×3/16	6.64	4.42	1.29	4.92	8 3/16	2 3/16	18.9	8.66	1.95
HSS8×6×5/8	72.3	24.1	2.27	29.5	5 3/16	3 3/16	150	46.0	2.17
×1/2	62.5	20.8	2.32	24.9	5 3/4	3 3/4	127	38.4	2.20
×3/8	50.6	16.9	2.38	19.8	6 5/16	4 5/16	100	30.0	2.23
×5/16	43.8	14.6	2.40	16.9	6 5/8	4 5/8	85.8	25.5	2.25
×1/4	36.4	12.1	2.43	13.9	6 7/8	4 7/8	70.3	20.8	2.27
×3/16	28.2	9.39	2.46	10.7	7 3/16	5 3/16	53.7	15.8	2.28
HSS8×4×5/8	26.6	13.3	1.51	16.6	5 3/16	—	70.3	28.7	1.83
×1/2	23.6	11.8	1.56	14.3	5 3/4	—	61.1	24.4	1.87
×3/8	19.6	9.80	1.61	11.5	6 5/16	2 5/16	49.3	19.3	1.90
×5/16	17.2	8.58	1.63	9.91	6 5/8	2 5/8	42.6	16.5	1.92
×1/4	14.4	7.21	1.66	8.20	6 7/8	2 7/8	35.3	13.6	1.93
×3/16	11.3	5.65	1.69	6.33	7 3/16	3 3/16	27.2	10.4	1.95
×1/8	7.90	3.95	1.71	4.36	7 7/16	3 7/16	18.7	7.10	1.97
HSS8×3×1/2	11.7	7.81	1.15	9.64	5 3/4	—	34.3	17.4	1.70
×3/8	9.95	6.63	1.20	7.88	6 5/16	—	28.5	14.0	1.73
×5/16	8.81	5.87	1.23	6.84	6 5/8	—	24.9	12.1	1.75
×1/4	7.49	4.99	1.25	5.70	6 7/8	—	20.8	10.0	1.77
×3/16	5.94	3.96	1.28	4.43	7 3/16	2 3/16	16.2	7.68	1.78
×1/8	4.20	2.80	1.31	3.07	7 7/16	2 7/16	11.3	5.27	1.80

—Flat depth or width is too small to establish a workable flat.

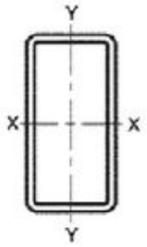


Table 1–11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thick-ness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	Axis X-X			
						I	*S*	*r*	*Z*
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS8×2×3/8	0.349	22.30	6.18	2.73	19.9	38.2	9.56	2.49	13.4
×5/16	0.291	19.06	5.26	3.87	24.5	33.7	8.43	2.53	11.6
×1/4	0.233	15.58	4.30	5.58	31.3	28.5	7.12	2.57	9.68
×3/16	0.174	11.98	3.28	8.49	43.0	22.4	5.61	2.61	7.51
×1/8	0.116	8.15	2.23	14.2	66.0	15.7	3.93	2.65	5.19
HSS7×5×1/2	0.465	35.11	9.74	7.75	12.1	60.6	17.3	2.50	21.9
×3/8	0.349	27.41	7.58	11.3	17.1	49.5	14.1	2.56	17.5
×5/16	0.291	23.32	6.43	14.2	21.1	43.0	12.3	2.59	15.0
×1/4	0.233	18.99	5.24	18.5	27.0	35.9	10.2	2.62	12.4
×3/16	0.174	14.54	3.98	25.7	37.2	27.9	7.96	2.65	9.52
×1/8	0.116	9.85	2.70	40.1	57.3	19.3	5.52	2.68	6.53
HSS7×4×1/2	0.465	31.71	8.81	5.60	12.1	50.7	14.5	2.40	18.8
×3/8	0.349	24.85	6.88	8.46	17.1	41.8	11.9	2.46	15.1
×5/16	0.291	21.19	5.85	10.7	21.1	36.5	10.4	2.50	13.1
×1/4	0.233	17.28	4.77	14.2	27.0	30.5	8.72	2.53	10.8
×3/16	0.174	13.26	3.63	20.0	37.2	23.8	6.81	2.56	8.33
×1/8	0.116	9.00	2.46	31.5	57.3	16.6	4.73	2.59	5.73
HSS7×3×1/2	0.465	28.30	7.88	3.45	12.1	40.7	11.6	2.27	15.8
×3/8	0.349	22.30	6.18	5.60	17.1	34.1	9.73	2.35	12.8
×5/16	0.291	19.06	5.26	7.31	21.1	29.9	8.54	2.38	11.1
×1/4	0.233	15.58	4.30	9.88	27.0	25.2	7.19	2.42	9.22
×3/16	0.174	11.98	3.28	14.2	37.2	19.8	5.65	2.45	7.14
×1/8	0.116	8.15	2.23	22.9	57.3	13.8	3.95	2.49	4.93
HSS7×2×1/4	0.233	13.88	3.84	5.58	27.0	19.8	5.67	2.27	7.64
×3/16	0.174	10.70	2.93	8.49	37.2	15.7	4.49	2.31	5.95
×1/8	0.116	7.30	2.00	14.2	57.3	11.1	3.16	2.35	4.13
HSS6×5×1/2	0.465	31.71	8.81	7.75	9.90	41.1	13.7	2.16	17.2
×3/8	0.349	24.85	6.88	11.3	14.2	33.9	11.3	2.22	13.8
×5/16	0.291	21.19	5.85	14.2	17.6	29.6	9.85	2.25	11.9
×1/4	0.233	17.28	4.77	18.5	22.8	24.7	8.25	2.28	9.87
×3/16	0.174	13.26	3.63	25.7	31.5	19.3	6.44	2.31	7.62
×1/8	0.116	9.00	2.46	40.1	48.7	13.4	4.48	2.34	5.24

Note: For compactness criteria, refer to the end of Table 1-12.

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

HSS8–HSS6

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

—Flat depth or width is too small to establish a workable flat.

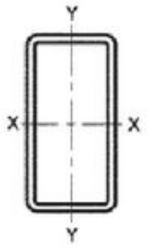


Table 1–11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thick-ness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	Axis X-X			
						I	*S*	*r*	*Z*
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS6×4×1/2	0.465	28.30	7.88	5.60	9.90	34.0	11.3	2.08	14.6
×3/8	0.349	22.30	6.18	8.46	14.2	28.3	9.43	2.14	11.9
×5/16	0.291	19.06	5.26	10.7	17.6	24.8	8.27	2.17	10.3
×1/4	0.233	15.58	4.30	14.2	22.8	20.9	6.96	2.20	8.53
×3/16	0.174	11.98	3.28	20.0	31.5	16.4	5.46	2.23	6.60
×1/8	0.116	8.15	2.23	31.5	48.7	11.4	3.81	2.26	4.56
HSS6×3×1/2	0.465	24.90	6.95	3.45	9.90	26.8	8.95	1.97	12.1
×3/8	0.349	19.75	5.48	5.60	14.2	22.7	7.57	2.04	9.90
×5/16	0.291	16.93	4.68	7.31	17.6	20.1	6.69	2.07	8.61
×1/4	0.233	13.88	3.84	9.88	22.8	17.0	5.66	2.10	7.19
×3/16	0.174	10.70	2.93	14.2	31.5	13.4	4.47	2.14	5.59
×1/8	0.116	7.30	2.00	22.9	48.7	9.43	3.14	2.17	3.87
HSS6×2×3/8	0.349	17.20	4.78	2.73	14.2	17.1	5.71	1.89	7.93
×5/16	0.291	14.80	4.10	3.87	17.6	15.3	5.11	1.93	6.95
×1/4	0.233	12.18	3.37	5.58	22.8	13.1	4.37	1.97	5.84
×3/16	0.174	9.43	2.58	8.49	31.5	10.5	3.49	2.01	4.58
×1/8	0.116	6.45	1.77	14.2	48.7	7.42	2.47	2.05	3.19
HSS5×4×1/2	0.465	24.90	6.95	5.60	7.75	21.2	8.49	1.75	10.9
×3/8	0.349	19.75	5.48	8.46	11.3	17.9	7.17	1.81	8.96
×5/16	0.291	16.93	4.68	10.7	14.2	15.8	6.32	1.84	7.79
×1/4	0.233	13.88	3.84	14.2	18.5	13.4	5.35	1.87	6.49
×3/16	0.174	10.70	2.93	20.0	25.7	10.6	4.22	1.90	5.05
×1/8	0.116	7.30	2.00	31.5	40.1	7.42	2.97	1.93	3.50
HSS5×3×1/2	0.465	21.50	6.02	3.45	7.75	16.4	6.57	1.65	8.83
×3/8	0.349	17.20	4.78	5.60	11.3	14.1	5.65	1.72	7.34
×5/16	0.291	14.80	4.10	7.31	14.2	12.6	5.03	1.75	6.42
×1/4	0.233	12.18	3.37	9.88	18.5	10.7	4.29	1.78	5.38
×3/16	0.174	9.43	2.58	14.2	25.7	8.53	3.41	1.82	4.21
×1/8	0.116	6.45	1.77	22.9	40.1	6.03	2.41	1.85	2.93

Note: For compactness criteria, refer to the end of Table 1-12.

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

HSS6–HSS5

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

—Flat depth or width is too small to establish a workable flat.

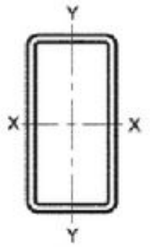


Table 1–11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thick-ness, *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}
HSS5×2½×¼	0.233	11.33	3.14	7.73	18.5	9.40	3.76	1.73	4.83
×3/16	0.174	8.79	2.41	11.4	25.7	7.51	3.01	1.77	3.79
×⅛	0.116	6.02	1.65	18.6	40.1	5.34	2.14	1.80	2.65
HSS5×2×3/8	0.349	14.65	4.09	2.73	11.3	10.4	4.14	1.59	5.71
×5/16	0.291	12.67	3.52	3.87	14.2	9.35	3.74	1.63	5.05
×¼	0.233	10.48	2.91	5.58	18.5	8.08	3.23	1.67	4.27
×3/16	0.174	8.15	2.24	8.49	25.7	6.50	2.60	1.70	3.37
×⅛	0.116	5.60	1.54	14.2	40.1	4.65	1.86	1.74	2.37
HSS4×3×3/8	0.349	14.65	4.09	5.60	8.46	7.93	3.97	1.39	5.12
×5/16	0.291	12.67	3.52	7.31	10.7	7.14	3.57	1.42	4.51
×¼	0.233	10.48	2.91	9.88	14.2	6.15	3.07	1.45	3.81
×3/16	0.174	8.15	2.24	14.2	20.0	4.93	2.47	1.49	3.00
×⅛	0.116	5.60	1.54	22.9	31.5	3.52	1.76	1.52	2.11
HSS4×2½×3/8	0.349	13.37	3.74	4.16	8.46	6.77	3.38	1.35	4.48
×5/16	0.291	11.60	3.23	5.59	10.7	6.13	3.07	1.38	3.97
×¼	0.233	9.63	2.67	7.73	14.2	5.32	2.66	1.41	3.38
×3/16	0.174	7.51	2.06	11.4	20.0	4.30	2.15	1.44	2.67
×⅛	0.116	5.17	1.42	18.6	31.5	3.09	1.54	1.47	1.88
HSS4×2×3/8	0.349	12.09	3.39	2.73	8.46	5.60	2.80	1.29	3.84
×5/16	0.291	10.54	2.94	3.87	10.7	5.13	2.56	1.32	3.43
×¼	0.233	8.78	2.44	5.58	14.2	4.49	2.25	1.36	2.94
×3/16	0.174	6.87	1.89	8.49	20.0	3.66	1.83	1.39	2.34
×⅛	0.116	4.75	1.30	14.2	31.5	2.65	1.32	1.43	1.66
HSS3½×2½×3/8	0.349	12.09	3.39	4.16	7.03	4.75	2.72	1.18	3.59
×5/16	0.291	10.54	2.94	5.59	9.03	4.34	2.48	1.22	3.20
×¼	0.233	8.78	2.44	7.73	12.0	3.79	2.17	1.25	2.74
×3/16	0.174	6.87	1.89	11.4	17.1	3.09	1.76	1.28	2.18
×⅛	0.116	4.75	1.30	18.6	27.2	2.23	1.28	1.31	1.54
HSS3½×2×¼	0.233	7.93	2.21	5.58	12.0	3.17	1.81	1.20	2.36
×3/16	0.174	6.23	1.71	8.49	17.1	2.61	1.49	1.23	1.89
×⅛	0.116	4.32	1.19	14.2	27.2	1.90	1.09	1.27	1.34

Note: For compactness criteria, refer to the end of Table 1-12.

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

HSS5–HSS3½

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS5×2½×¼	3.13	2.50	0.999	2.95	3 7/8	—	7.93	4.99	1.18
×3/16	2.53	2.03	1.02	2.33	4 3/16	—	6.26	3.89	1.20
×⅛	1.82	1.46	1.05	1.64	4 7/16	—	4.40	2.70	1.22
HSS5×2×3/8	2.28	2.28	0.748	2.88	3 5/16	—	6.61	5.20	1.07
×5/16	2.10	2.10	0.772	2.57	3 5/8	—	5.99	4.59	1.08
×¼	1.84	1.84	0.797	2.20	3 7/8	—	5.17	3.88	1.10
×3/16	1.51	1.51	0.823	1.75	4 3/16	—	4.15	3.05	1.12
×⅛	1.10	1.10	0.848	1.24	4 7/16	—	2.95	2.13	1.13
HSS4×3×3/8	5.01	3.34	1.11	4.18	2 5/16	—	10.6	6.59	1.07
×5/16	4.52	3.02	1.13	3.69	2 5/8	—	9.41	5.75	1.08
×¼	3.91	2.61	1.16	3.12	2 7/8	—	7.96	4.81	1.10
×3/16	3.16	2.10	1.19	2.46	3 3/16	—	6.26	3.74	1.12
×⅛	2.27	1.51	1.21	1.73	3 7/16	—	4.38	2.59	1.13
HSS4×2½×3/8	3.17	2.54	0.922	3.20	2 5/16	—	7.57	5.32	0.983
×5/16	2.89	2.32	0.947	2.85	2 5/8	—	6.77	4.67	1.00
×¼	2.53	2.02	0.973	2.43	2 7/8	—	5.78	3.93	1.02
×3/16	2.06	1.65	0.999	1.93	3 1/8	—	4.59	3.08	1.03
×⅛	1.49	1.19	1.03	1.36	3 7/16	—	3.23	2.14	1.05
HSS4×2×3/8	1.80	1.80	0.729	2.31	2 5/16	—	4.83	4.04	0.900
×5/16	1.67	1.67	0.754	2.08	2 5/8	—	4.40	3.59	0.917
×¼	1.48	1.48	0.779	1.79	2 7/8	—	3.82	3.05	0.933
×3/16	1.22	1.22	0.804	1.43	3 3/16	—	3.08	2.41	0.950
×⅛	0.898	0.898	0.830	1.02	3 7/16	—	2.20	1.69	0.967
HSS3½×2½×3/8	2.77	2.21	0.904	2.82	—	—	6.16	4.57	0.900
×5/16	2.54	2.03	0.930	2.52	2 1/8	—	5.53	4.03	0.917
×¼	2.23	1.78	0.956	2.16	2 3/8	—	4.75	3.40	0.933
×3/16	1.82	1.46	0.983	1.72	2 11/16	—	3.78	2.67	0.950
×⅛	1.33	1.06	1.01	1.22	2 15/16	—	2.67	1.87	0.967
HSS3½×2×¼	1.30	1.30	0.766	1.58	2 3/8	—	3.16	2.64	0.850
×3/16	1.08	1.08	0.792	1.27	2 11/16	—	2.55	2.09	0.867
×⅛	0.795	0.795	0.818	0.912	2 15/16	—	1.83	1.47	0.883

—Flat depth or width is too small to establish a workable flat.

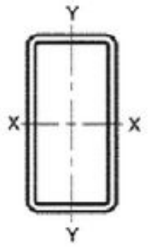


Table 1–11 (continued)
Rectangular HSS
Dimensions and Properties

Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	Axis X-X			
						I	*S*	*r*	*Z*
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}
HSS3$^1/_2$×1$^1/_2$×$^1/_4$	0.233	7.08	1.97	3.44	12.0	2.55	1.46	1.14	1.98
×$^3/_{16}$	0.174	5.59	1.54	5.62	17.1	2.12	1.21	1.17	1.60
×$^1/_8$	0.116	3.90	1.07	9.93	27.2	1.57	0.896	1.21	1.15
HSS3×2$^1/_2$×$^5/_{16}$	0.291	9.47	2.64	5.59	7.31	2.92	1.94	1.05	2.51
×$^1/_4$	0.233	7.93	2.21	7.73	9.88	2.57	1.72	1.08	2.16
×$^3/_{16}$	0.174	6.23	1.71	11.4	14.2	2.11	1.41	1.11	1.73
×$^1/_8$	0.116	4.32	1.19	18.6	22.9	1.54	1.03	1.14	1.23
HSS3×2×$^5/_{16}$	0.291	8.41	2.35	3.87	7.31	2.38	1.59	1.01	2.11
×$^1/_4$	0.233	7.08	1.97	5.58	9.88	2.13	1.42	1.04	1.83
×$^3/_{16}$	0.174	5.59	1.54	8.49	14.2	1.77	1.18	1.07	1.48
×$^1/_8$	0.116	3.90	1.07	14.2	22.9	1.30	0.867	1.10	1.06
HSS3×1$^1/_2$×$^1/_4$	0.233	6.23	1.74	3.44	9.88	1.68	1.12	0.982	1.51
×$^3/_{16}$	0.174	4.95	1.37	5.62	14.2	1.42	0.945	1.02	1.24
×$^1/_8$	0.116	3.47	0.956	9.93	22.9	1.06	0.706	1.05	0.895
HSS3×1×$^3/_{16}$	0.174	4.31	1.19	2.75	14.2	1.07	0.713	0.947	0.989
×$^1/_8$	0.116	3.04	0.840	5.62	22.9	0.817	0.545	0.987	0.728
HSS2$^1/_2$×2×$^1/_4$	0.233	6.23	1.74	5.58	7.73	1.33	1.06	0.874	1.37
×$^3/_{16}$	0.174	4.95	1.37	8.49	11.4	1.12	0.894	0.904	1.12
×$^1/_8$	0.116	3.47	0.956	14.2	18.6	0.833	0.667	0.934	0.809
HSS2$^1/_2$×1$^1/_2$×$^1/_4$	0.233	5.38	1.51	3.44	7.73	1.03	0.822	0.826	1.11
×$^3/_{16}$	0.174	4.31	1.19	5.62	11.4	0.882	0.705	0.860	0.915
×$^1/_8$	0.116	3.04	0.840	9.93	18.6	0.668	0.535	0.892	0.671
HSS2$^1/_2$×1×$^3/_{16}$	0.174	3.67	1.02	2.75	11.4	0.646	0.517	0.796	0.713
×$^1/_8$	0.116	2.62	0.724	5.62	18.6	0.503	0.403	0.834	0.532
HSS2$^1/_4$×2×$^3/_{16}$	0.174	4.63	1.28	8.49	9.93	0.859	0.764	0.819	0.952
×$^1/_8$	0.116	3.26	0.898	14.2	16.4	0.646	0.574	0.848	0.693
HSS2×1$^1/_2$×$^3/_{16}$	0.174	3.67	1.02	5.62	8.49	0.495	0.495	0.697	0.639
×$^1/_8$	0.116	2.62	0.724	9.93	14.2	0.383	0.383	0.728	0.475
HSS2×1×$^3/_{16}$	0.174	3.03	0.845	2.75	8.49	0.350	0.350	0.643	0.480
×$^1/_8$	0.116	2.19	0.608	5.62	14.2	0.280	0.280	0.679	0.366

Note: For compactness criteria, refer to the end of Table 1-12.

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

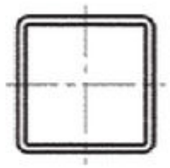
HSS3$^1/_2$–HSS2

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.^{4}	in.^{3}	in.	in.^{3}	in.	in.	in.^{4}	in.^{3}	ft^2/ft
HSS3$^1/_2$×1$^1/_2$×$^1/_4$	0.638	0.851	0.569	1.06	2$^3/_8$	—	1.79	1.88	0.767
×$^3/_{16}$	0.544	0.725	0.594	0.867	2$^{11}/_{16}$	—	1.49	1.51	0.784
×$^1/_8$	0.411	0.548	0.619	0.630	2$^{15}/_{16}$	—	1.09	1.08	0.800
HSS3×2$^1/_2$×$^5/_{16}$	2.18	1.74	0.908	2.20	—	—	4.34	3.39	0.833
×$^1/_4$	1.93	1.54	0.935	1.90	—	—	3.74	2.87	0.850
×$^3/_{16}$	1.59	1.27	0.963	1.52	2$^3/_{16}$	—	3.00	2.27	0.867
×$^1/_8$	1.16	0.931	0.990	1.09	2$^7/_{16}$	—	2.13	1.59	0.883
HSS3×2×$^5/_{16}$	1.24	1.24	0.725	1.58	—	—	2.87	2.60	0.750
×$^1/_4$	1.11	1.11	0.751	1.38	—	—	2.52	2.23	0.767
×$^3/_{16}$	0.932	0.932	0.778	1.12	2$^3/_{16}$	—	2.05	1.78	0.784
×$^1/_8$	0.692	0.692	0.804	0.803	2$^7/_{16}$	—	1.47	1.25	0.800
HSS3×1$^1/_2$×$^1/_4$	0.543	0.725	0.559	0.911	1$^7/_8$	—	1.44	1.58	0.683
×$^3/_{16}$	0.467	0.622	0.584	0.752	2$^3/_{16}$	—	1.21	1.28	0.700
×$^1/_8$	0.355	0.474	0.610	0.550	2$^7/_{16}$	—	0.886	0.920	0.717
HSS3×1×$^3/_{16}$	0.173	0.345	0.380	0.432	2$^3/_{16}$	—	0.526	0.792	0.617
×$^1/_8$	0.138	0.276	0.405	0.325	2$^7/_{16}$	—	0.408	0.585	0.633
HSS2$^1/_2$×2×$^1/_4$	0.930	0.930	0.731	1.17	—	—	1.90	1.82	0.683
×$^3/_{16}$	0.786	0.786	0.758	0.956	—	—	1.55	1.46	0.700
×$^1/_8$	0.589	0.589	0.785	0.694	—	—	1.12	1.04	0.717
HSS2$^1/_2$×1$^1/_2$×$^1/_4$	0.449	0.599	0.546	0.764	—	—	1.10	1.29	0.600
×$^3/_{16}$	0.390	0.520	0.572	0.636	—	—	0.929	1.05	0.617
×$^1/_8$	0.300	0.399	0.597	0.469	—	—	0.687	0.759	0.633
HSS2$^1/_2$×1×$^3/_{16}$	0.143	0.285	0.374	0.360	—	—	0.412	0.648	0.534
×$^1/_8$	0.115	0.230	0.399	0.274	—	—	0.322	0.483	0.550
HSS2$^1/_4$×2×$^3/_{16}$	0.713	0.713	0.747	0.877	—	—	1.32	1.30	0.659
×$^1/_8$	0.538	0.538	0.774	0.639	—	—	0.957	0.927	0.675
HSS2×1$^1/_2$×$^3/_{16}$	0.313	0.417	0.554	0.521	—	—	0.664	0.822	0.534
×$^1/_8$	0.244	0.325	0.581	0.389	—	—	0.496	0.599	0.550
HSS2×1×$^3/_{16}$	0.112	0.225	0.365	0.288	—	—	0.301	0.505	0.450
×$^1/_8$	0.0922	0.184	0.390	0.223	—	—	0.238	0.380	0.467

—Flat depth or width is too small to establish a workable flat.

HSS16–HSS8

Table 1–12
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
HSS16×16×5/8	0.581	127.00	35.0	24.5	24.5	1370	171	6.25	200	13 3/16	2170	276	5.17
×1/2	0.465	103.00	28.3	31.4	31.4	1130	141	6.31	164	13 3/4	1770	224	5.20
×3/8	0.349	78.45	21.5	42.8	42.8	873	109	6.37	126	14 5/16	1350	171	5.23
×5/16	0.291	65.82	18.1	52.0	52.0	739	92.3	6.39	106	14 5/8	1140	144	5.25
HSS14×14×5/8	0.581	110.00	30.3	21.1	21.1	897	128	5.44	151	11 3/16	1430	208	4.50
×1/2	0.465	89.55	24.6	27.1	27.1	743	106	5.49	124	11 3/4	1170	170	4.53
×3/8	0.349	68.24	18.7	37.1	37.1	577	82.5	5.55	95.4	12 5/16	900	130	4.57
×5/16	0.291	57.31	15.7	45.1	45.1	490	69.9	5.58	80.5	12 5/8	759	109	4.58
HSS12×12×5/8	0.581	93.14	25.7	17.7	17.7	548	91.4	4.62	109	9 3/16	885	151	3.83
×1/2	0.465	75.94	20.9	22.8	22.8	457	76.2	4.68	89.6	9 3/4	728	123	3.87
×3/8	0.349	58.03	16.0	31.4	31.4	357	59.5	4.73	69.2	10 5/16	561	94.6	3.90
×5/16	0.291	48.81	13.4	38.2	38.2	304	50.7	4.76	58.6	10 5/8	474	79.7	3.92
×1/4	0.233	39.40	10.8	48.5	48.5	248	41.4	4.79	47.6	10 7/8	384	64.5	3.93
×3/16	0.174	29.82	8.15	66.0	66.0	189	31.5	4.82	36.0	11 3/16	290	48.6	3.95
HSS10×10×5/8	0.581	76.13	21.0	14.2	14.2	304	60.8	3.80	73.2	7 3/16	498	102	3.17
×1/2	0.465	62.33	17.2	18.5	18.5	256	51.2	3.86	60.7	7 3/4	412	84.2	3.20
×3/8	0.349	47.82	13.2	25.7	25.7	202	40.4	3.92	47.2	8 5/16	320	64.8	3.23
×5/16	0.291	40.30	11.1	31.4	31.4	172	34.5	3.94	40.1	8 5/8	271	54.8	3.25
×1/4	0.233	32.60	8.96	39.9	39.9	141	28.3	3.97	32.7	8 7/8	220	44.4	3.27
×3/16	0.174	24.72	6.76	54.5	54.5	108	21.6	4.00	24.8	9 3/16	167	33.6	3.28
HSS9×9×5/8	0.581	67.62	18.7	12.5	12.5	216	47.9	3.40	58.1	6 3/16	356	81.6	2.83
×1/2	0.465	55.53	15.3	16.4	16.4	183	40.6	3.45	48.4	6 3/4	296	67.4	2.87
×3/8	0.349	42.72	11.8	22.8	22.8	145	32.2	3.51	37.8	7 5/16	231	52.1	2.90
×5/16	0.291	36.05	9.92	27.9	27.9	124	27.6	3.54	32.1	7 5/8	196	44.0	2.92
×1/4	0.233	29.19	8.03	35.6	35.6	102	22.7	3.56	26.2	7 7/8	159	35.8	2.93
×3/16	0.174	22.16	6.06	48.7	48.7	78.2	17.4	3.59	20.0	8 3/16	121	27.1	2.95
×1/8	0.116	14.95	4.09	74.6	74.6	53.5	11.9	3.62	13.6	8 7/16	82.0	18.3	2.97
HSS8×8×5/8	0.581	59.11	16.4	10.8	10.8	146	36.5	2.99	44.7	5 3/16	244	63.2	2.50
×1/2	0.465	48.72	13.5	14.2	14.2	125	31.2	3.04	37.5	5 3/4	204	52.4	2.53
×3/8	0.349	37.61	10.4	19.9	19.9	100	24.9	3.10	29.4	6 5/16	160	40.7	2.57
×5/16	0.291	31.79	8.76	24.5	24.5	85.6	21.4	3.13	25.1	6 5/8	136	34.5	2.58
×1/4	0.233	25.79	7.10	31.3	31.3	70.7	17.7	3.15	20.5	6 7/8	111	28.1	2.60
×3/16	0.174	19.61	5.37	43.0	43.0	54.4	13.6	3.18	15.7	7 3/16	84.5	21.3	2.62
×1/8	0.116	13.25	3.62	66.0	66.0	37.4	9.34	3.21	10.7	7 7/16	57.3	14.4	2.63

Note: For compactness criteria, refer to the end of Table 1-12.

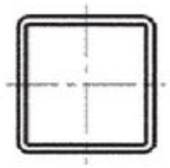
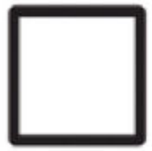


Table 1–12 (continued)
Square HSS
Dimensions and Properties

HSS7–HSS4 1/2

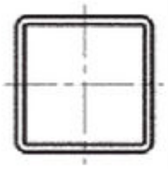
Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*b/t*	*h/t*	*I*	*S*	*r*	*Z*	Workable Flat	Torsion		Surface Area
											J	*C*	
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}	in.	in.^{4}	in.^{3}	ft^2/ft
HSS7×7×5/8	0.581	50.60	14.0	9.05	9.05	93.4	26.7	2.58	33.1	4 3/16	158	47.1	2.17
×1/2	0.465	41.91	11.6	12.1	12.1	80.5	23.0	2.63	27.9	4 3/4	133	39.3	2.20
×3/8	0.349	32.51	8.97	17.1	17.1	65.0	18.6	2.69	22.1	5 5/16	105	30.7	2.23
×5/16	0.291	27.54	7.59	21.1	21.1	56.1	16.0	2.72	18.9	5 5/8	89.7	26.1	2.25
×1/4	0.233	22.39	6.17	27.0	27.0	46.5	13.3	2.75	15.5	5 7/8	73.5	21.3	2.27
×3/16	0.174	17.06	4.67	37.2	37.2	36.0	10.3	2.77	11.9	6 3/16	56.1	16.2	2.28
×1/8	0.116	11.55	3.16	57.3	57.3	24.8	7.09	2.80	8.13	6 7/16	38.2	11.0	2.30
HSS6×6×5/8	0.581	42.10	11.7	7.33	7.33	55.2	18.4	2.17	23.2	3 3/16	94.9	33.4	1.83
×1/2	0.465	35.11	9.74	9.90	9.90	48.3	16.1	2.23	19.8	3 3/4	81.1	28.1	1.87
×3/8	0.349	27.41	7.58	14.2	14.2	39.5	13.2	2.28	15.8	4 5/16	64.6	22.1	1.90
×5/16	0.291	23.29	6.43	17.6	17.6	34.3	11.4	2.31	13.6	4 5/8	55.4	18.9	1.92
×1/4	0.233	18.99	5.24	22.8	22.8	28.6	9.54	2.34	11.2	4 7/8	45.6	15.4	1.93
×3/16	0.174	14.51	3.98	31.5	31.5	22.3	7.42	2.37	8.63	5 3/16	35.0	11.8	1.95
×1/8	0.116	9.85	2.70	48.7	48.7	15.5	5.15	2.39	5.92	5 7/16	23.9	8.03	1.97
HSS5 1/2×5 1/2×3/8	0.349	24.85	6.88	12.8	12.8	29.7	10.8	2.08	13.1	3 13/16	49.0	18.4	1.73
×5/16	0.291	21.16	5.85	15.9	15.9	25.9	9.43	2.11	11.3	4 1/8	42.2	15.7	1.75
×1/4	0.233	17.28	4.77	20.6	20.6	21.7	7.90	2.13	9.32	4 3/8	34.8	12.9	1.77
×3/16	0.174	13.23	3.63	28.6	28.6	17.0	6.17	2.16	7.19	4 11/16	26.7	9.85	1.78
×1/8	0.116	9.00	2.46	44.4	44.4	11.8	4.30	2.19	4.95	4 15/16	18.3	6.72	1.80
HSS5×5×1/2	0.465	28.30	7.88	7.75	7.75	26.0	10.4	1.82	13.1	2 3/4	44.6	18.7	1.53
×3/8	0.349	22.30	6.18	11.3	11.3	21.7	8.68	1.87	10.6	3 5/16	36.1	14.9	1.57
×5/16	0.291	19.03	5.26	14.2	14.2	19.0	7.62	1.90	9.16	3 5/8	31.2	12.8	1.58
×1/4	0.233	15.58	4.30	18.5	18.5	16.0	6.41	1.93	7.61	3 7/8	25.8	10.5	1.60
×3/16	0.174	11.96	3.28	25.7	25.7	12.6	5.03	1.96	5.89	4 3/16	19.9	8.08	1.62
×1/8	0.116	8.15	2.23	40.1	40.1	8.80	3.52	1.99	4.07	4 7/16	13.7	5.53	1.63
HSS4 1/2×4 1/2×1/2	0.465	24.90	6.95	6.68	6.68	18.1	8.03	1.61	10.2	2 1/4	31.3	14.8	1.37
×3/8	0.349	19.75	5.48	9.89	9.89	15.3	6.79	1.67	8.36	2 13/16	25.7	11.9	1.40
×5/16	0.291	16.91	4.68	12.5	12.5	13.5	6.00	1.70	7.27	3 1/8	22.3	10.2	1.42
×1/4	0.233	13.88	3.84	16.3	16.3	11.4	5.08	1.73	6.06	3 3/8	18.5	8.44	1.43
×3/16	0.174	10.68	2.93	22.9	22.9	9.02	4.01	1.75	4.71	3 11/16	14.4	6.49	1.45
×1/8	0.116	7.30	2.00	35.8	35.8	6.35	2.82	1.78	3.27	3 15/16	9.92	4.45	1.47

Note: For compactness criteria, refer to the end of Table 1-12.



HSS4–HSS2

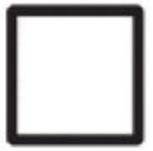
Table 1–12 (continued)
Square HSS
Dimensions and Properties



Shape	Design Wall Thick-ness, *t*	Nom-inal Wt.	Area, *A*	*b*/*t*	*h*/*t*	*I*	*S*	*r*	*Z*	Work-able Flat	Torsion		Sur-face Area
											J	*C*	
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}	in.	in.^{4}	in.^{3}	ft^2/ft
HSS4×4×1/2	0.465	21.50	6.02	5.60	5.60	11.9	5.97	1.41	7.70	—	21.0	11.2	1.20
×3/8	0.349	17.20	4.78	8.46	8.46	10.3	5.13	1.47	6.39	2 5/16	17.5	9.14	1.23
×5/16	0.291	14.78	4.10	10.7	10.7	9.14	4.57	1.49	5.59	2 5/8	15.3	7.91	1.25
×1/4	0.233	12.18	3.37	14.2	14.2	7.80	3.90	1.52	4.69	2 7/8	12.8	6.56	1.27
×3/16	0.174	9.40	2.58	20.0	20.0	6.21	3.10	1.55	3.67	3 3/16	10.0	5.07	1.28
×1/8	0.116	6.45	1.77	31.5	31.5	4.40	2.20	1.58	2.56	3 7/16	6.91	3.49	1.30
HSS3 1/2×3 1/2×3/8	0.349	14.65	4.09	7.03	7.03	6.49	3.71	1.26	4.69	—	11.2	6.77	1.07
×5/16	0.291	12.65	3.52	9.03	9.03	5.84	3.34	1.29	4.14	2 1/8	9.89	5.90	1.08
×1/4	0.233	10.48	2.91	12.0	12.0	5.04	2.88	1.32	3.50	2 3/8	8.35	4.92	1.10
×3/16	0.174	8.13	2.24	17.1	17.1	4.05	2.31	1.35	2.76	2 11/16	6.56	3.83	1.12
×1/8	0.116	5.60	1.54	27.2	27.2	2.90	1.66	1.37	1.93	2 15/16	4.58	2.65	1.13
HSS3×3×3/8	0.349	12.09	3.39	5.60	5.60	3.78	2.52	1.06	3.25	—	6.64	4.74	0.900
×5/16	0.291	10.53	2.94	7.31	7.31	3.45	2.30	1.08	2.90	—	5.94	4.18	0.917
×1/4	0.233	8.78	2.44	9.88	9.88	3.02	2.01	1.11	2.48	—	5.08	3.52	0.933
×3/16	0.174	6.85	1.89	14.2	14.2	2.46	1.64	1.14	1.97	2 3/16	4.03	2.76	0.950
×1/8	0.116	4.75	1.30	22.9	22.9	1.78	1.19	1.17	1.40	2 7/16	2.84	1.92	0.967
HSS2 1/2×2 1/2×5/16	0.291	8.40	2.35	5.59	5.59	1.82	1.46	0.880	1.88	—	3.20	2.74	0.750
×1/4	0.233	7.08	1.97	7.73	7.73	1.63	1.30	0.908	1.63	—	2.79	2.35	0.767
×3/16	0.174	5.57	1.54	11.4	11.4	1.35	1.08	0.937	1.32	—	2.25	1.86	0.784
×1/8	0.116	3.90	1.07	18.6	18.6	0.998	0.799	0.965	0.947	—	1.61	1.31	0.800
HSS2 1/4×2 1/4×1/4	0.233	6.23	1.74	6.66	6.66	1.13	1.01	0.806	1.28	—	1.96	1.85	0.683
×3/16	0.174	4.94	1.37	9.93	9.93	0.953	0.847	0.835	1.04	—	1.60	1.48	0.700
×1/8	0.116	3.47	0.956	16.4	16.4	0.712	0.633	0.863	0.755	—	1.15	1.05	0.717
HSS2×2×1/4	0.233	5.38	1.51	5.58	5.58	0.747	0.747	0.704	0.964	—	1.31	1.41	0.600
×3/16	0.174	4.30	1.19	8.49	8.49	0.641	0.641	0.733	0.797	—	1.09	1.14	0.617
×1/8	0.116	3.04	0.840	14.2	14.2	0.486	0.486	0.761	0.584	—	0.796	0.817	0.633

— Flat depth or width is too small to establish a workable flat.

Rectangular and Square HSS
Compactness Criteria



Nominal Wall Thickness	Compactness Criteria for Rectangular and Square HSS			
	Compression	Flexure		Shear
	non-slender up to	compact up to	compact up to	$C_v = 1.0$ up to
	Flange Width	Flange Width	Web Width	Web Depth
5/8	20	18	20	20
1/2	16	14	20	20
3/8	12	10	20	20
5/16	10	9	18	18
1/4	8	7	14	14
3/16	6	5	10	10
1/8	4	3 1/2	7	7

Note: Compactness criteria given for $F_y = 46$ ksi.

HSS20.000–
HSS10.000

Table 1–13
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}
HSS20.000×0.500	0.465	104.00	28.5	43.0	1360	136	6.91	177	2720	272
×0.375[f]	0.349	78.67	21.5	57.3	1040	104	6.95	135	2080	208
HSS18.000×0.500	0.465	93.54	25.6	38.7	985	109	6.20	143	1970	219
×0.375[f]	0.349	70.66	19.4	51.6	754	83.8	6.24	109	1510	168
HSS16.000×0.625	0.581	103.00	28.1	27.5	838	105	5.46	138	1680	209
×0.500	0.465	82.85	22.7	34.4	685	85.7	5.49	112	1370	171
×0.438	0.407	72.87	19.9	39.3	606	75.8	5.51	99.0	1210	152
×0.375	0.349	62.64	17.2	45.8	526	65.7	5.53	85.5	1050	131
×0.312[f]	0.291	52.32	14.4	55.0	443	55.4	5.55	71.8	886	111
×0.250[f]	0.233	42.09	11.5	68.7	359	44.8	5.58	57.9	717	89.7
HSS14.000×0.625	0.581	89.36	24.5	24.1	552	78.9	4.75	105	1100	158
×0.500	0.465	72.16	19.8	30.1	453	64.8	4.79	85.2	907	130
×0.375	0.349	54.62	15.0	40.1	349	49.8	4.83	65.1	698	100
×0.312	0.291	45.65	12.5	48.1	295	42.1	4.85	54.7	589	84.2
×0.250[f]	0.233	36.75	10.1	60.1	239	34.1	4.87	44.2	478	68.2
HSS12.750×0.500	0.465	65.48	17.9	27.4	339	53.2	4.35	70.2	678	106
×0.375	0.349	49.61	13.6	36.5	262	41.0	4.39	53.7	523	82.1
×0.250[f]	0.233	33.41	9.16	54.7	180	28.2	4.43	36.5	359	56.3
HSS10.750×0.500	0.465	54.79	15.0	23.1	199	37.0	3.64	49.2	398	74.1
×0.375	0.349	41.59	11.4	30.8	154	28.7	3.68	37.8	309	57.4
×0.250	0.233	28.06	7.70	46.1	106	19.8	3.72	25.8	213	39.6
HSS10.000×0.625	0.581	62.64	17.2	17.2	191	38.3	3.34	51.6	383	76.6
×0.500	0.465	50.78	13.9	21.5	159	31.7	3.38	42.3	317	63.5
×0.375	0.349	38.58	10.6	28.7	123	24.7	3.41	32.5	247	49.3
×0.312	0.291	32.31	8.88	34.4	105	20.9	3.43	27.4	209	41.9
×0.250	0.233	26.06	7.15	42.9	85.3	17.1	3.45	22.2	171	34.1
×0.188[f]	0.174	19.72	5.37	57.5	64.8	13.0	3.47	16.8	130	25.9

[f] Shape exceeds compact limit for flexure with F_y = 42 ksi.

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

HSS9.625–
HSS6.875

Shape	Design Wall Thickness, *t*	Nominal Wt.	Area, *A*	*D*/*t*	*I*	*S*	*r*	*Z*	Torsion	
									J	*C*
	in.	lb/ft	in.^{2}		in.^{4}	in.^{3}	in.	in.^{3}	in.^{4}	in.^{3}
HSS9.625×0.500	0.465	48.77	13.4	20.7	141	29.2	3.24	39.0	281	58.5
×0.375	0.349	37.08	10.2	27.6	110	22.8	3.28	30.0	219	45.5
×0.312	0.291	31.06	8.53	33.1	93.0	19.3	3.30	25.4	186	38.7
×0.250	0.233	25.06	6.87	41.3	75.9	15.8	3.32	20.6	152	31.5
×0.188[f]	0.174	18.97	5.17	55.3	57.7	12.0	3.34	15.5	115	24.0
HSS8.625×0.625	0.581	53.45	14.7	14.8	119	27.7	2.85	37.7	239	55.4
×0.500	0.465	43.43	11.9	18.5	100	23.1	2.89	31.0	199	46.2
×0.375	0.349	33.07	9.07	24.7	77.8	18.0	2.93	23.9	156	36.1
×0.322	0.300	28.58	7.85	28.8	68.1	15.8	2.95	20.8	136	31.6
×0.250	0.233	22.38	6.14	37.0	54.1	12.5	2.97	16.4	108	25.1
×0.188[f]	0.174	16.96	4.62	49.6	41.3	9.57	2.99	12.4	82.5	19.1
×0.375	0.349	29.06	7.98	21.8	52.9	13.9	2.58	18.5	106	27.8
×0.328	0.305	25.59	7.01	25.0	47.1	12.3	2.59	16.4	94.1	24.7
HSS7.50×0.500	0.465	37.42	10.3	16.1	63.9	17.0	2.49	23.0	128	34.1
×0.375	0.349	28.56	7.84	21.5	50.2	13.4	2.53	17.9	100	26.8
×0.312	0.291	23.97	6.59	25.8	42.9	11.4	2.55	15.1	85.8	22.9
×0.250	0.233	19.38	5.32	32.2	35.2	9.37	2.57	12.3	70.3	18.7
×0.188	0.174	14.70	4.00	43.1	26.9	7.17	2.59	9.34	53.8	14.3
HSS7.000×0.500	0.465	34.74	9.55	15.1	51.2	14.6	2.32	19.9	102	29.3
×0.375	0.349	26.56	7.29	20.1	40.4	11.6	2.35	15.5	80.9	23.1
×0.312	0.291	22.31	6.13	24.1	34.6	9.88	2.37	13.1	69.1	19.8
×0.250	0.233	18.04	4.95	30.0	28.4	8.11	2.39	10.7	56.8	16.2
×0.188	0.174	13.69	3.73	40.2	21.7	6.21	2.41	8.11	43.5	12.4
×0.125[f]	0.116	9.19	2.51	60.3	14.9	4.25	2.43	5.50	29.7	8.49
HSS6.875×0.500	0.465	34.07	9.36	14.8	48.3	14.1	2.27	19.1	96.7	28.1
×0.375	0.349	26.06	7.16	19.7	38.2	11.1	2.31	14.9	76.4	22.2
×0.312	0.291	21.89	6.02	23.6	32.7	9.51	2.33	12.6	65.4	19.0
×0.250	0.233	17.71	4.86	29.5	26.8	7.81	2.35	10.3	53.7	15.6
×0.188	0.174	13.44	3.66	39.5	20.6	5.99	2.37	7.81	41.1	12.0

[f] Shape exceeds compact limit for flexure with F_y = 42 ksi.

HSS6.625–
HSS5.000

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

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

[f] Shape exceeds compact limit for flexure with F_y = 42 ksi.

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

HSS4.500–
HSS2.500

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

HSS2.375–
HSS1.660

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

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

Live and Concentrated Loads

TABLE 1607.1
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o, AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
1. Apartments (see residential)	—	—
2. Access floor systems Office use Computer use	 50 100	 2,000 2,000
3. Armories and drill rooms	150 [m]	—
4. Assembly areas Fixed seats (fastened to floor) Follow spot, projections and control rooms Lobbies Movable seats Stage floors Platforms (assembly) Other assembly areas	 60 [m] 50 100 [m] 100 [m] 150 [m] 100 [m] 100 [m]	 —
5. Balconies and decks[h]	Same as occupancy served	—
6. Catwalks	40	300
7. Cornices	60	—
8. Corridors First floor Other floors	 100 Same as occupancy served except as indicated	 —
9. Dining rooms and restaurants	100 [m]	—
10. Dwellings (see residential)	—	—
11. Elevator machine room grating (on area of 2 inches by 2 inches)	—	300
12. Finish light floor plate construction (on area of 1 inch by 1 inch)	—	200
13. Fire escapes On single-family dwellings only	100 40	 —
14. Garages (passenger vehicles only) Trucks and buses	40 [m] See Section 1607.7	Note a
15. Handrails, guards and grab bars	See Section 1607.8	
16. Helipads	See Section 1607.6	
17. Hospitals Corridors above first floor Operating rooms, laboratories Patient rooms	 80 60 40	 1,000 1,000 1,000
18. Hotels (see residential)	—	—
19. Libraries Corridors above first floor Reading rooms Stack rooms	 80 60 150 [b, m]	 1,000 1,000 1,000
20. Manufacturing Heavy Light	 250 [m] 125 [m]	 3,000 2,000
21. Marquees	75	—
22. Office buildings Corridors above first floor File and computer rooms shall be designed for heavier loads based on anticipated occupancy Lobbies and first-floor corridors Offices	 80 — 100 50	 2,000 — 2,000 2,000
23. Penal institutions Cell blocks Corridors	 40 100	 —
24. Recreational uses: Bowling alleys, poolrooms and similar uses Dance halls and ballrooms Gymnasiums Reviewing stands, grandstands and bleachers Stadiums and arenas with fixed seats (fastened to floor)	 75 [m] 100 [m] 100 [m] 100 [c, m] 60 [c, m]	 —
25. Residential One- and two-family dwellings Uninhabitable attics without storage[i] Uninhabitable attics with storage [i, j, k] Habitable attics and sleeping areas[k] All other areas Hotels and multifamily dwellings Private rooms and corridors serving them Public rooms[m] and corridors serving them	 10 20 30 40 40 100	 —
26. Roofs All roof surfaces subject to maintenance workers Awnings and canopies: Fabric construction supported by a skeleton structure All other construction Ordinary flat, pitched, and curved roofs (that are not occupiable) Primary roof members exposed to a work floor. Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages All other primary roof members Occupiable roofs: Roof gardens Assembly areas All other similar areas	 5 nonreducible 20 20 100 100 [m] Note 1	 300 2,000 300 Note 1
27. Schools Classrooms Corridors above first floor First-floor corridors	 40 80 100	 1,000 1,000 1,000
28. Scuttles, skylight ribs and accessible ceilings	—	200
29. Sidewalks, vehicular drive ways and yards, subject to trucking	250 [d, m]	8,000[e]

(continued)

TABLE 1607.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o, AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
30. Stairs and exits One- and two-family dwellings All other	 40 100	 300[f] 300[f]
31. Storage warehouses (shall be designed for heavier loads if required for anticipated storage) Heavy Light	 250[m] 125[m]	—
32. Stores Retail First floor Upper floors Wholesale, all floors	 100 75 125[m]	 1,000 1,000 1,000
33. Vehicle barriers	See Section 1607.8.3	
34. Walkways and elevated platforms (other than exitways)	60	—
35. Yards and terraces, pedestrians	100[m]	—

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2,
1 square foot = 0.0929 m^2,
1 pound per square foot = 0.0479 kN/m^2, 1 pound = 0.004448 kN,
1 pound per cubic foot = 16 kg/m^3.

a. Floors in garages or portions of buildings used for the storage of motor vehicles shall be designed for the uniformly distributed live loads of Table 1607.1 or the following concentrated loads: (1) for garages restricted to passenger vehicles accommodating not more than nine passengers, 3,000 pounds acting on an area of 4.5 inches by 4.5 inches; (2) for mechanical parking structures without slab or deck that are used for storing passenger vehicles only, 2,250 pounds per wheel.

b. The loading applies to stack room floors that support nonmobile, double-faced library book stacks, subject to the following limitations:
   1. The nominal bookstack unit height shall not exceed 90 inches;
   2. The nominal shelf depth shall not exceed 12 inches for each face; and
   3. Parallel rows of double-faced book stacks shall be separated by aisles not less than 36 inches wide.

c. Design in accordance with ICC 300.

d. Other uniform loads in accordance with an approved method containing provisions for truck loadings shall also be considered where appropriate.

e. The concentrated wheel load shall be applied on an area of 4.5 inches by 4.5 inches.

f. The minimum concentrated load on stair treads shall be applied on an area of 2 inches by 2 inches. This load need not be assumed to act concurrently with the uniform load.

g. Where snow loads occur that are in excess of the design conditions, the structure shall be designed to support the loads due to the increased loads caused by drift buildup or a greater snow design determined by the building official (see Section 1608).

h. See Section 1604.8.3 for decks attached to exterior walls.

i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

(continued)

j. Uninhabitable attics with storage are those where the maximum clear height between the joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.

   The live load need only be applied to those portions of the joists or truss bottom chords where both of the following conditions are met:
   i. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is a minimum of 30 inches; and
   ii. The slopes of the joists or truss bottom chords are no greater than two units vertical in 12 units horizontal.

   The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 lb./ft^2.

k. Attic spaces served by stairways other than the pull-down type shall be designed to support the minimum live load specified for habitable attics and sleeping rooms.

l. Areas of occupiable roofs, other than roof gardens and assembly areas, shall be designed for appropriate loads as approved by the building official. Unoccupied landscaped areas of roofs shall be designed in accordance with Section 1607.12.3.1.

m. Live load reduction is not permitted unless specific exceptions of Section 1607.10 apply.