COMPANION TO THE AISC *STEEL CONSTRUCTION MANUAL*

Volume 2: Design Tables

Version 15.1

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PREFACE

The objective of this Companion is to provide additional design tables beyond what are incorporated into the 15th Edition AISC *Steel Construction Manual*.

Tables in this Companion that present available strengths are developed using the geometric conditions indicated and applicable limits states from the 2016 AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360-16). Given the nature of the tables, and the possible governing limit state for each table value, linear interpolation between tabulated values may or may not provide correct strengths.

Tables are arranged with LRFD and ASD designs presented side-by-side, for consistency with the AISC *Manual*. Design with ASD and LRFD are based on the same nominal strength for each element so that the only differences between the approaches are the set of load combinations from ASCE/SEI 7-16 used for design, and whether the resistance factor for LRFD or the safety factor for ASD is used.

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CONVENTIONS

The following conventions are used throughout these examples:

1. The 2016 AISC *Specification for Structural Steel Buildings* is referred to as the AISC *Specification* and the 15th Edition AISC *Steel Construction Manual,* is referred to as the AISC *Manual*.

2. The source of equations or tabulated values taken from the AISC *Specification* or AISC *Manual* is noted along the right-hand edge of the page.

3. Values are presented to three significant figures throughout this Companion.

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DESIGN TABLE DISCUSSION

Table 4-A. Available Strength in Axial Compression—Composite Filled Rectangular HSS

Available strengths in axial compression are given for filled rectangular HSS with F_y = 50 ksi and F_u = 62 ksi (ASTM A500 Grade C) and 4-ksi normal weight concrete. The tabulated values are given for the effective length with respect to the *y*-axis (L_{cy}). However, the effective length with respect to the *x*-axis (L_{cx}) must also be investigated. To determine the available strength in axial compression, the table should be entered at the larger of L_{cy} and $L_{cy\ eq}$, where

$$L_{cy\ eq} = \frac{L_{cx}}{\left(\frac{r_{mx}}{r_{my}}\right)} \tag{1}$$

Values of the ratio r_{mx}/r_{my} and other properties useful in the design of composite HSS compression members are listed at the bottom of Table 4-A. The values r_{mx} and r_{my} are the radii of gyration for the composite cross section. The ratio r_{mx}/r_{my} is determined as

$$\frac{r_{mx}}{r_{my}} = \sqrt{\frac{P_{ex}\left(L_{cx}\right)^2}{P_{ey}\left(L_{cy}\right)^2}} \tag{2}$$

For compact composite sections, the values of ϕM_n and M_n/Ω are calculated using the nominal flexural strength equations for Point B of the interaction diagram in AISC *Manual* Table 6-4. For noncompact composite sections, the values of ϕM_n and M_n/Ω are calculated using the closed formed equations presented in the AISC *Specification* Commentary Figure C-I3.7.

The available strengths tabulated in Table 4-A are given for the indicated shape with the associated concrete fill. AISC *Specification* Section I2.2b stipulates that the available compressive strength of a filled composite member need not be less than that specified for the bare steel member, as required by AISC *Specification* Chapter E. In this table, available strengths controlled by the bare steel acting alone are identified. Additionally, there is no longitudinal reinforcement provided because there is no requirement for minimum reinforcement in the AISC *Specification*. The use of filled shapes without longitudinal reinforcement is a common industry practice.

Table 4-B. Available Strength in Axial Compression—Composite Filled Rectangular HSS

Table 4-B is the same as Table 4-A, except it provides the available strength for filled rectangular HSS with F_y = 50 ksi and F_u = 62 ksi (ASTM A500 Grade C) and 5-ksi normal weight concrete.

Table 4-C. Available Strength in Axial Compression—Composite Filled Square HSS

Table 4-C is the same as Table 4-A, except it provides the available strength for filled square HSS with F_y = 50 ksi and F_u = 62 ksi (ASTM A500 Grade C) and 4-ksi normal weight concrete.

Table 4-D. Available Strength in Axial Compression—Composite Filled Square HSS

Table 4-D is the same as Table 4-A, except it provides the available strength for filled square HSS with F_y = 50 ksi and F_u = 62 ksi (ASTM A500 Grade C) and 5-ksi normal weight concrete.

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Table 4-E. Available Strength in Axial Compression—Composite Filled Round HSS

Available strengths in axial compression are given for filled round HSS with F_y = 46 ksi and F_u = 62 ksi (ASTM A500 Grade C) 4-ksi normal weight concrete. To determine the available strength in axial compression, the table should be entered at the largest effective length, L_c. Other properties useful in the design of compression members are listed at the bottom of Table 4-E.

The values of ϕM_n and M_n/Ω were calculated using the nominal flexural strength equations for Point B of the interaction diagram in AISC *Manual* Table 6-5.

Table 4-F. Available Strength in Axial Compression—Composite Filled Round HSS

Table 4-F is the same as Table 4-E, except it provides the available strength for filled round HSS with F_y = 46 ksi and F_u = 62 ksi (ASTM A500 Grade C) and 5-ksi normal weight concrete.

Table 4-G. Available Strength in Axial Compression—Composite Filled Pipe

Table 4-G is the same as Table 4-E, except it provides the available strength for filled pipe with F_y = 35 ksi and F_u = 60 ksi (ASTM A53) and 4-ksi normal weight concrete.

Table 4-H. Available Strength in Axial Compression—Composite Filled Pipe

Table 4-H is the same as Table 4-E, except it provides the available strength for filled pipe with F_y = 35 ksi and F_u = 60 ksi (ASTM A53) and 5-ksi normal weight concrete.

Table 6-A. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—W-Shapes

Table 6-A is the same as AISC *Manual* Table 6-2, except it provides the available strength for F_y = 65 ksi and F_u = 80 ksi (ASTM A913 Grade 65). Discussion on the use of this table can be found in Part 6 of the AISC *Manual*.

Table 6-B. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—W-Shapes

Table 6-B is the same as Table 6-A, except it provides the available strength for F_y = 70 ksi and F_u = 90 ksi (ASTM A913 Grade 70).

Table 6-C. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—Rectangular HSS

The available strengths of rectangular HSS are given in Table 6-C for F_y = 50 ksi and F_u = 65 ksi (ASTM A1085 Grade A). These tables may be used to design members with only compression, tension, flexure and shear forces or may be used to design members subject to combined effects. All the information presented here in the following is presented in Parts 3, 4 and 5 of the AISC *Manual*, but has been grouped here for ease of use.

HSS Subject to Flexure

The available flexural strengths of rectangular HSS bent about their major (X-X) and minor (Y-Y) principal axis are given in the lower portion of Table 6-C.

The available strength for bending about the major and minor axes is a single value based on the limit states of yielding or flange local buckling. The limit state of lateral-torsional buckling is not included and must be checked for bending in the major axis. Lateral-torsional buckling does not apply to bending of rectangular HSS about their minor axis.

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HSS Subject to Shear

The available shear strengths of rectangular HSS for both the major (X-X) and minor (Y-Y) principal axis are given in the lower portion of Table 6-C.

HSS Subject to Compression

The available strengths in axial compression are tabulated for the effective length with respect to the minor axis, L_{cy}. However, the effective length with respect to the major axis, L_{cx}, must also be investigated. To determine the available strength in axial compression the table should be entered at the larger of L_{cy} and $L_{cy\,eq}$, where

$$L_{cy\,eq} = \frac{L_{cy}}{\frac{r_x}{r_y}} \qquad \text{(}\textit{Manual}\text{ Eq. 4-1)}$$

Values for the ratio r_x / r_y and other properties useful in the design of rectangular HSS compression members are listed at the bottom of Table 6-C.

HSS Subject to Tension

The available tensile strengths of rectangular HSS are given in the lower portion of Table 6-C for the limit states of tensile yielding and tensile rupture.

Strengths given for the limit state of tensile rupture are based on the assumption that $A_e = 0.75A_g$.

HSS Subject to Combined Forces

AISC *Specification* Equation H1-1a or Equation H1-1b governs the design of HSS subject to combined axial force and flexure. The values of the available strength in tension, compression or flexure obtained from Table 6-C may be used to check interaction through these equations or the equations given in AISC *Specification* Section H1.3.

Table 6-D. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—Rectangular HSS

Table 6-D is the same as Table 6-C, except it provides the available strength for rectangular HSS with F_y = 50 ksi and F_u = 62 ksi (ASTM A500 Grade C).

Table 6-E. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—Square HSS

Table 6-E is the same as Table 6-C, except it provides the available strength for square HSS with F_y = 50 ksi and F_u = 65 ksi (ASTM A1085 Grade A).

The limit state of lateral-torsional buckling does not apply for a square HSS bending in either the major or minor axis.

Table 6-F. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—Square HSS

Table 6-F is the same as Table 6-E, except it provides the available strength for square HSS with F_y = 50 ksi and F_u = 62 ksi (ASTM A500 Grade C).

Table 6-G. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—Round HSS

The available strengths of round HSS are given in Table 6-G for F_y = 50 ksi and F_u = 65 ksi (ASTM A1085 Grade A). This table is similar to Table 6-C, except the available flexural strength is determined from AISC *Specification*

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Section F8 and the available strength in axial compression is determined by entering the top of the table with the effective length, L_c.

Table 6-H. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—Round HSS

Table 6-H is the same as Table 6-G, except it provides the available strength for square HSS with F_y = 46 ksi and F_u = 62 ksi (ASTM A500 Grade C).

Table 6-I. Available Strength for Members Subject to Axial, Shear, Flexural and Combined Forces—Pipe

Table 6-I is similar to Table 6-G, except it provides the available strengths for pipes with F_y = 35 ksi and F_u = 60 ksi (ASTM A53 Grade B).

Table 6-J. Combined Flexure and Axial Force—W-Shapes

W-shapes with F_y = 50 ksi and F_u = 65 ksi (ASTM A992) and subject to combined axial force (tension or compression) and flexure may be checked for compliance with the provisions of AISC *Specification* Sections H1.1 and H1.2 using values listed in Table 1 and the appropriate interaction equations provided in the following sections.

Values p, b_x, b_y, t_y and t_r presented in Table 6-J are defined in Table 1. Values of p, b_x and b_y already account for section compactness and can be used directly. Given that the limit state of lateral-torsional buckling does not apply to W-shapes bent about their minor axis, values of b_y are independent of unbraced length and C_b. Values of b_x equally apply to combined flexure and compression, as well as combined flexure and tension. Smaller values of variable p for a given L_c and smaller values of b_x for a given L_b indicate higher strength for the type of load in question. For example, a section with a smaller p at a certain L_c is more effective in carrying axial compression than another section with a larger value of p at the same L_c. Similarly, a section with a smaller b_x is more effective for flexure at a given L_b than another section with a larger b_x for the same L_b. This information may be used to select more efficient shapes when relatively large amounts of axial load or bending are present.

Table 1
Variables in Table 6-J

	LRFD		ASD	
Axial Compression	$p = \frac{1}{\phi_c P_n}$, (kips)$^{-1}$	(3a)	$p = \frac{\Omega_c}{P_n}$, (kips)$^{-1}$	(3b)
Major-Axis Bending	$b_x = \frac{8}{9\phi_b M_{nx}}$, (kip-ft)$^{-1}$	(4a)	$b_x = \frac{8\Omega_b}{9M_{nx}}$, (kip-ft)$^{-1}$	(4b)
Minor-Axis Bending	$b_y = \frac{8}{9\phi_b M_{ny}}$, (kip-ft)$^{-1}$	(5a)	$b_y = \frac{8\Omega_b}{9M_{ny}}$, (kip-ft)$^{-1}$	(5b)
Tension Yielding	$t_y = \frac{1}{\phi_t F_y A_g}$, (kips)$^{-1}$	(6a)	$t_y = \frac{\Omega_t}{F_y A_g}$, (kips)$^{-1}$	(6b)
Tension Rupture	$t_r = \frac{1}{\phi_t F_u (0.75A_g)}$, (kips)$^{-1}$	(7a)	$t_r = \frac{\Omega_t}{F_u (0.75A_g)}$, (kips)$^{-1}$	(7b)

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The tabulated values of b_x assume that C_b = 1.0. These values may be modified in accordance with AISC *Specification* Sections F1 and H1.2. The following procedure may be used to account for C_b >1.0.

$$b_{x(C_b>1.0)} = \frac{b_{x(C_b=1.0)}}{C_b} \geq b_{x\ min} \tag{8}$$

Combined Flexure and Compression

Equations H1-1a and H1-1b of the AISC *Specification* may be written as follows using the coefficients listed in Table 6-J and defined in Table 1.

When $pP_r \geq 0.2$:

$$pP_r + b_x M_{rx} + b_y M_{ry} \leq 1.0 \tag{9}$$

When $pP_r < 0.2$:

$$\frac{pP_r}{2} + \frac{9}{8}\left(b_x M_{rx} + b_y M_{ry}\right) \leq 1.0 \tag{10}$$

The designer may check acceptability of a given shape using the appropriate interaction Equation 9 or 10. See Aminmansour (2000) for more information on this method, including an alternative approach for selection of a trial shape.

Combined Flexure and Tension

Equations H1-1a and H1-1b of the AISC *Specification* may be written as follows using the coefficients listed in Table 6-J and defined in Table 1.

When $pP_r \geq 0.2$:

$$\left(t_y \text{ or } t_r\right) P_r + b_x M_{rx} + b_y M_{ry} \leq 1.0 \tag{11}$$

When $pP_r < 0.2$:

$$\frac{\left(t_y \text{ or } t_r\right) P_r}{2} + \frac{9}{8}\left(b_x M_{rx} + b_y M_{ry}\right) \leq 1.0 \tag{12}$$

The larger value of t_y and t_r should be used in the above equations.

The designer may check acceptability of a given shape using the approximate interaction Equation 11 or 12 along with variables t_r, t_y, b_x and b_y. See Aminmansour (2006) for more information on this method.

It is noted that the values for t_r listed in Table 6-J are based on the assumption that $A_e = 0.75A_g$. See Part 5 of the AISC *Manual* for more information on this assumption. When $A_e > 0.75A_g$, the tabulated values for t_r are conservative. When $A_e < 0.75A_g$, t_r must be calculated based upon the actual value of A_e.

Values of $b_{x\ min}$ are listed in Table 6-J at L_b = 0. See Aminmansour (2009) for more information on this method. Values for p, b_x, b_y, t_y and t_r presented in Table 6-J have been multiplied by 10^3. Thus, when used in the appropriate interaction equation they must be multiplied by 10^{-3} (0.001).

Table 9-A. Plastic Section Modulus for Coped W-Shapes

Values are given for the major axis gross and net plastic section modulus (Z_x and Z_{net}, respectfully) for coped W-shapes, as illustrated in the table header.

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REFERENCES

Aminmansour, A. (2000), "A New Approach for Design of Steel Beam-Columns," *Engineering Journal*, AISC, Vol. 37, No. 2, pp. 41–72.

Aminmansour, A. (2006), "New Method of Design for Combined Tension and Bending," *Engineering Journal*, AISC, Vol. 43, No. 4, pp. 247–256.

Aminmansour, A. (2009), "Optimum Flexural Design of Steel Members Utilizing Moment Gradient and C_b," *Engineering Journal*, AISC, Vol. 46, No. 1, pp. 47–55.

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4

COMPOSITE
HSS20–HSS16

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS20x12x								HSS16x12x			
		5/8		1/2		3/8		5/16		5/8		1/2	
t_{des}, in,		0.581		0.465		0.349		0.291		0.581		0.465	
Steel, lb/ft		127		103		78.5		65.9		110		89.7	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	1220	1830	1070	1600	908	1360	803	1200	1030	1550	898	1350
	1	1220	1830	1070	1600	908	1360	803	1200	1030	1540	898	1350
	2	1220	1830	1060	1600	906	1360	802	1200	1030	1540	896	1340
	3	1220	1820	1060	1590	904	1360	799	1200	1030	1540	894	1340
	4	1210	1820	1060	1590	901	1350	797	1190	1020	1530	891	1340
	5	1210	1810	1050	1580	897	1340	793	1190	1020	1530	887	1330
	6	1200	1800	1050	1570	892	1340	788	1180	1010	1520	882	1320
	7	1190	1790	1040	1560	886	1330	783	1170	1010	1510	876	1310
	8	1180	1780	1030	1550	879	1320	777	1170	998	1500	870	1300
	9	1170	1760	1020	1540	871	1310	771	1160	990	1480	862	1290
	10	1160	1750	1010	1520	863	1290	763	1140	980	1470	854	1280
	11	1150	1730	1000	1510	854	1280	755	1130	970	1460	845	1270
	12	1140	1710	993	1490	844	1270	746	1120	959	1440	836	1250
	13	1130	1690	981	1470	833	1250	737	1100	947	1420	825	1240
	14	1110	1670	968	1450	822	1230	726	1090	934	1400	814	1220
	15	1100	1640	954	1430	809	1210	716	1070	921	1380	802	1200
	16	1080	1620	940	1410	797	1200	704	1060	907	1360	790	1180
	17	1060	1590	925	1390	783	1180	693	1040	892	1340	777	1170
	18	1040	1570	909	1360	769	1150	680	1020	877	1310	763	1140
	19	1030	1540	893	1340	755	1130	668	1000	861	1290	749	1120
	20	1010	1510	876	1310	740	1110	654	981	844	1270	735	1100
	21	987	1480	858	1290	725	1090	641	961	827	1240	720	1080
	22	967	1450	840	1260	709	1060	627	940	809	1210	704	1060
	23	946	1420	822	1230	693	1040	612	919	791	1190	688	1030
	24	925	1390	803	1200	676	1010	598	897	773	1160	672	1010
	25	903	1350	784	1180	660	990	583	875	754	1130	656	984
	26	881	1320	765	1150	643	964	568	852	735	1100	639	959
	27	859	1290	745	1120	626	938	553	829	716	1070	622	934
	28	836	1250	725	1090	608	912	537	806	697	1050	605	908
	29	813	1220	705	1060	591	886	522	783	677	1020	588	883
	30	791	1190	685	1030	573	860	506	760	658	986	571	857
	32	745	1120	644	967	538	807	475	713	618	927	537	805
	34	699	1050	604	906	503	754	444	666	579	868	502	753
	36	653	979	564	846	468	702	413	620	540	810	468	702
	38	608	912	524	786	434	651	383	575	501	752	434	652
	40	564	845	486	728	401	601	354	531	464	696	402	602
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	636	956	530	796	417	627	359	540	450	677	375	563
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	434	653	359	539	281	423	232	348	363	545	302	454
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		72200		62100		51100		45100		40300		34900	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		30500		26100		21400		18900		24900		21500	
r_{mx}/r_{my}		1.54		1.54		1.55		1.54		1.27		1.27	
r_{my}, in.		4.93		4.99		5.04		5.07		4.80		4.86	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

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4

COMPOSITE
HSS16

Table 4-A (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape			HSS16x12x				HSS16x8x							
			3/8		5/16		5/8		1/2		3/8		5/16	
t_{des}, in,			0.349		0.291		0.581		0.465		0.349		0.291	
Steel, lb/ft			68.3		57.4		93.3		76.1		58.1		48.9	
Design			P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y		0	761	1140	692	1040	814	1220	703	1050	590	885	529	794
		1	761	1140	691	1040	814	1220	703	1050	589	884	529	793
		2	760	1140	690	1040	811	1220	700	1050	587	881	527	790
		3	758	1140	688	1030	807	1210	697	1040	584	876	524	786
		4	755	1130	686	1030	800	1200	691	1040	580	870	520	780
		5	751	1130	682	1020	793	1190	685	1030	574	861	515	772
		6	747	1120	678	1020	783	1170	677	1020	567	851	509	763
		7	742	1110	674	1010	772	1160	668	1000	559	839	502	752
		8	736	1100	668	1000	760	1140	657	985	550	826	493	740
		9	730	1090	662	993	746	1120	645	968	540	811	484	726
		10	723	1080	656	983	731	1100	632	948	529	794	474	711
		11	715	1070	648	972	714	1070	618	927	518	776	464	695
		12	706	1060	640	960	697	1050	603	905	505	757	452	678
		13	697	1050	632	948	678	1020	587	881	491	737	440	660
		14	688	1030	623	934	659	988	571	856	477	716	427	640
		15	677	1020	613	920	638	957	553	830	463	694	414	620
		16	666	1000	603	905	617	926	535	803	447	671	400	600
		17	655	983	592	889	595	893	517	775	432	648	385	578
		18	643	965	581	872	573	860	498	747	416	624	371	556
		19	631	946	570	855	551	826	479	718	400	599	356	534
		20	618	927	558	837	528	792	459	689	383	575	341	512
		21	605	908	546	819	505	758	440	659	367	550	326	489
		22	592	888	534	801	482	723	420	630	350	525	311	467
		23	578	867	521	782	459	689	400	600	333	500	296	444
		24	564	846	508	762	436	656	381	571	317	475	281	422
		25	550	825	495	742	416	625	361	542	301	451	267	400
		26	536	803	482	722	395	594	342	513	284	427	252	378
		27	521	782	468	702	375	564	323	485	269	403	238	357
		28	506	760	455	682	356	534	305	457	253	380	224	336
		29	492	737	441	661	336	505	287	430	238	357	210	316
		30	477	715	427	641	317	477	269	404	223	334	197	295
		32	447	670	400	600	280	421	236	355	196	294	173	259
		34	417	626	372	559	248	373	209	314	174	260	153	230
		36	388	582	346	518	221	333	187	280	155	232	137	205
		38	359	539	319	479	199	299	168	252	139	208	123	184
		40	331	497	294	440	179	269	151	227	125	188	111	166
Properties														
M_{nx}/Ω_b	$\phi_b M_{nx}$	kip-ft	296	444	253	381	348	524	292	438	232	348	199	299
M_{ny}/Ω_b	$\phi_b M_{ny}$	kip-ft	237	356	203	304	208	312	174	261	137	205	117	175
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}			28700		25400		29100		25700		21400		18900	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}			17600		15600		9060		7950		6590		5820	
r_{mx}/r_{my}			1.28		1.28		1.79		1.80		1.80		1.80	
r_{my}, in.			4.91		4.94		3.27		3.32		3.37		3.40	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS16–HSS14

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS16x8x		HSS14x10x									
		¼		⅝		½		⅜		5/16		¼	
t_{des}, in,		0.233		0.581		0.465		0.349		0.291		0.233	
Steel, lb/ft		39.4		93.3		76.1		58.1		48.9		39.4	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	455	682	835	1250	724	1090	610	915	550	825	488	733
	1	454	682	834	1250	723	1080	610	915	549	824	488	732
	2	453	679	832	1250	722	1080	608	913	548	822	487	730
	3	450	676	829	1240	719	1080	606	909	546	819	485	728
	4	447	670	825	1240	716	1070	603	905	543	815	482	724
	5	442	664	820	1230	711	1070	599	899	540	809	479	719
	6	437	656	813	1220	705	1060	594	892	535	803	475	713
	7	431	646	806	1210	699	1050	589	883	530	795	470	705
	8	424	636	797	1200	692	1040	582	873	524	786	465	697
	9	416	624	787	1180	683	1020	575	863	517	776	459	688
	10	407	611	777	1170	674	1010	567	851	510	765	452	678
	11	398	597	765	1150	664	996	559	838	502	753	445	667
	12	388	582	752	1130	653	980	549	824	494	740	437	655
	13	378	566	739	1110	642	963	539	809	484	727	429	643
	14	366	550	725	1090	630	944	529	793	475	712	420	630
	15	355	532	710	1060	617	925	518	777	465	697	410	616
	16	343	515	694	1040	603	905	506	759	454	681	401	601
	17	331	496	678	1020	589	884	494	741	443	664	391	586
	18	318	477	661	991	575	862	482	722	432	647	380	570
	19	306	458	643	965	560	840	469	703	420	630	370	554
	20	293	439	625	938	545	817	456	684	408	612	359	538
	21	280	420	607	911	529	793	442	663	395	593	347	521
	22	267	400	588	883	513	769	429	643	383	574	336	504
	23	254	381	570	854	497	745	415	622	370	555	325	487
	24	241	362	551	826	481	721	401	601	357	536	313	469
	25	228	343	531	797	464	696	387	580	345	517	301	452
	26	216	324	512	768	448	671	373	559	332	498	290	434
	27	204	306	493	739	431	646	358	538	319	478	278	417
	28	192	288	474	711	414	622	344	516	306	459	266	400
	29	180	270	455	682	398	597	330	495	293	440	255	382
	30	168	253	436	653	382	572	316	475	281	421	244	365
	32	148	222	398	597	349	524	289	433	256	384	221	332
	34	131	197	362	543	318	477	262	394	232	348	200	300
	36	117	175	327	491	288	432	237	355	208	313	179	268
	38	105	157	294	442	259	388	213	319	187	281	161	241
	40	94.7	142	266	399	234	350	192	288	169	253	145	217
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	166	249	324	487	271	408	214	322	184	277	153	229
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	93.6	141	253	380	211	318	166	250	142	214	116	175
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		16200		24500		21600		17800		15700		13500	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		4980		13900		12300		10100		8870		7620	
r_{mx}/r_{my}		1.80		1.33		1.33		1.33		1.33		1.33	
r_{my}, in.		3.42		3.98		4.04		4.09		4.12		4.14	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS12

Table 4-A (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS12x10x								HSS12x8x			
		½		⅜		5/16		¼		⅝		½	
t_{des}, in,		0.465		0.349		0.291		0.233		0.581		0.465	
Steel, lb/ft		69.3		53.0		44.6		36.0		76.3		62.5	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	645	968	544	815	488	732	434	652	650	976	563	844
	1	645	967	543	815	487	731	434	651	650	975	562	843
	2	643	965	542	813	486	729	433	650	648	971	560	840
	3	641	962	540	810	484	727	431	647	644	966	557	836
	4	638	957	537	806	482	723	429	643	639	958	553	829
	5	634	951	534	800	479	718	426	639	632	948	547	821
	6	629	943	529	794	475	712	422	633	624	937	541	811
	7	623	934	524	786	470	705	418	627	615	923	533	799
	8	616	924	518	777	465	697	413	620	605	907	524	786
	9	608	912	512	768	459	688	408	612	593	890	514	771
	10	600	900	505	757	452	678	402	603	581	871	504	755
	11	591	886	497	745	445	668	395	593	567	850	492	738
	12	581	871	488	733	437	656	388	582	552	828	479	719
	13	570	856	479	719	429	644	381	571	537	805	466	699
	14	559	839	470	705	421	631	373	559	521	781	453	679
	15	548	821	460	690	412	617	364	546	504	755	438	657
	16	535	803	449	674	402	603	356	533	486	729	423	635
	17	523	784	439	658	392	588	346	520	468	702	408	612
	18	509	764	427	641	382	573	337	506	450	675	392	589
	19	496	744	416	624	371	557	328	491	432	647	377	565
	20	482	723	404	606	361	541	318	477	413	620	361	541
	21	468	702	392	588	350	524	308	461	395	594	345	517
	22	453	680	379	569	338	508	297	446	377	567	328	493
	23	439	658	367	550	327	491	287	431	360	541	312	469
	24	424	636	354	532	316	474	277	415	343	515	297	445
	25	409	613	342	513	304	456	266	400	325	489	281	421
	26	394	591	329	494	293	439	256	384	308	463	265	398
	27	379	568	316	474	281	422	246	368	292	438	250	375
	28	364	546	304	456	270	405	235	353	275	413	235	353
	29	349	524	291	437	259	388	225	338	259	389	221	331
	30	334	502	279	418	247	371	215	322	243	366	206	310
	32	306	458	254	381	225	338	195	293	214	321	181	272
	34	277	416	230	346	204	306	176	264	189	285	161	241
	36	250	375	207	311	183	275	157	236	169	254	143	215
	38	225	337	186	279	164	246	141	212	152	228	129	193
	40	203	304	168	252	148	222	127	191	137	206	116	174
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	214	322	170	255	146	219	121	182	219	329	185	277
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	187	282	148	223	127	191	105	158	163	244	137	206
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		14500		12000		10600		9110		13600		12000	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		10700		8820		7790		6690		6900		6100	
r_{mx}/r_{my}		1.16		1.17		1.17		1.17		1.40		1.40	
r_{my}, in.		3.96		4.01		4.04		4.07		3.16		3.21	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS12

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS12x8x				HSS12x6x							
		3/8		1/4		5/8		1/2		3/8		5/16	
t_{des}, in,		0.349		0.233		0.581		0.465		0.349		0.291	
Steel, lb/ft		47.9		32.6		67.8		55.7		42.8		36.1	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	470	705	372	557	560	841	478	716	397	595	353	530
	1	470	704	371	557	559	840	477	715	396	594	352	529
	2	468	702	370	555	556	835	474	711	394	591	350	526
	3	465	698	368	552	551	828	469	704	390	585	347	521
	4	462	693	365	547	544	817	463	695	385	577	343	514
	5	457	686	361	542	535	804	455	683	378	567	337	505
	6	452	678	356	535	524	787	445	668	370	556	330	495
	7	445	668	351	527	512	769	434	652	361	542	322	483
	8	438	657	345	518	498	748	422	633	351	527	313	469
	9	430	644	338	507	482	725	408	613	340	510	303	454
	10	421	631	331	496	466	700	394	590	328	492	292	438
	11	411	616	323	484	448	673	378	567	315	473	281	421
	12	401	601	314	472	429	645	362	542	302	453	269	403
	13	390	584	305	458	410	616	344	517	288	432	256	385
	14	378	567	296	444	390	586	327	490	273	410	244	365
	15	366	549	286	429	370	556	309	464	259	388	231	346
	16	354	530	276	414	349	525	291	438	244	366	217	326
	17	341	511	266	399	329	494	275	413	229	344	204	306
	18	328	492	255	383	308	463	258	388	214	322	191	287
	19	315	472	244	367	288	433	242	364	200	300	178	267
	20	301	452	234	350	268	403	226	339	186	279	166	248
	21	288	432	223	334	248	373	210	316	172	258	153	230
	22	274	412	212	318	229	345	195	293	158	237	141	212
	23	261	392	201	302	211	317	180	270	145	218	129	194
	24	248	372	190	286	194	291	165	248	133	200	119	178
	25	235	352	180	270	178	268	152	229	123	184	109	164
	26	222	332	170	254	165	248	141	211	114	170	101	152
	27	209	313	160	239	153	230	130	196	105	158	93.9	141
	28	197	295	150	224	142	214	121	182	97.9	147	87.3	131
	29	184	277	140	210	133	199	113	170	91.2	137	81.4	122
	30	172	259	131	196	124	186	106	159	85.3	128	76.0	114
	32	152	227	115	172	109	164	92.9	140	74.9	112	66.8	100
	34	134	201	102	153	96.4	145	82.2	124	66.4	99.6	59.2	88.8
	36	120	180	90.7	136	86.0	129	73.4	110	59.2	88.8	52.8	79.2
	38	107	161	81.4	122	77.2	116	65.8	99.0	53.1	79.7	47.4	71.1
	40	97.0	145	73.5	110			59.4	89.3	48.0	71.9	42.8	64.2
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	147	221	105	158	182	274	154	232	123	185	106	160
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	108	163	76.9	116	109	164	92.1	138	73.5	110	63.2	94.9
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		10100		7690		10800		9520		8120		7260	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		5100		3860		3380		2980		2520		2250	
r_{mx}/r_{my}		1.41		1.41		1.79		1.79		1.80		1.80	
r_{my}, in.		3.27		3.32		2.39		2.44		2.49		2.52	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.

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4

COMPOSITE
HSS12–HSS10

Table 4-A (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS12x6x				HSS10x8x							
		¼		3/16		5/8		½		3/8		5/16	
t_{des}, in,		0.233		0.174		0.581		0.465		0.349		0.291	
Steel, lb/ft		29.2		22.2		67.8		55.7		42.8		36.1	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	309	464	255	382	570	855	491	737	410	615	367	550
	1	309	463	254	382	569	854	491	736	410	615	366	549
	2	307	460	253	379	567	851	489	733	408	613	365	547
	3	304	456	250	376	564	846	486	729	406	609	363	544
	4	300	450	247	371	559	839	482	723	403	604	360	540
	5	295	442	243	364	553	830	477	716	399	598	356	534
	6	288	433	238	356	546	819	471	707	394	591	352	528
	7	281	422	232	347	538	807	464	696	388	582	347	520
	8	273	410	225	337	528	792	456	684	382	572	341	511
	9	264	396	218	326	518	777	447	671	374	561	334	501
	10	255	382	210	314	506	759	438	657	366	549	327	490
	11	245	367	201	302	494	741	427	641	358	537	319	479
	12	234	351	192	288	481	721	416	624	348	523	311	466
	13	223	334	183	275	467	700	404	607	339	508	302	453
	14	212	317	174	261	452	678	392	588	329	493	293	439
	15	200	300	164	246	437	657	379	569	318	477	283	425
	16	188	283	154	232	422	635	366	549	307	460	273	410
	17	177	265	145	217	407	612	352	528	296	443	263	395
	18	165	248	135	203	392	589	338	507	284	426	253	379
	19	154	231	126	189	376	565	324	486	272	409	242	364
	20	143	214	116	175	360	541	310	465	261	391	232	348
	21	132	198	107	161	344	517	296	443	249	373	221	332
	22	121	182	98.7	148	328	493	281	422	237	355	210	316
	23	111	166	90.3	135	312	470	267	401	225	338	200	300
	24	102	153	83.0	124	297	446	253	380	214	320	189	284
	25	93.8	141	76.4	115	281	422	239	359	202	303	179	269
	26	86.7	130	70.7	106	266	399	226	338	191	286	169	253
	27	80.4	121	65.5	98.3	251	377	212	318	179	269	159	238
	28	74.8	112	60.9	91.4	236	354	199	299	169	253	149	224
	29	69.7	105	56.8	85.2	221	333	187	280	158	237	140	209
	30	65.1	97.7	53.1	79.6	207	311	175	263	148	221	130	196
	32	57.3	85.9	46.7	70.0	182	274	154	231	130	195	115	172
	34	50.7	76.1	41.3	62.0	161	242	136	205	115	172	102	152
	36	45.2	67.9	36.9	55.3	144	216	121	183	102	154	90.6	136
	38	40.6	60.9	33.1	49.6	129	194	109	164	92.0	138	81.3	122
	40	36.6	55.0	29.9	44.8	116	175	98.4	148	83.0	125	73.4	110
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	88.7	133	69.6	105	165	247	139	209	111	167	95.6	144
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	52.2	78.5	39.3	59.1	140	210	118	178	94.1	141	80.9	122
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		6230		5120		8440		7480		6340		5610	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		1930		1570		5820		5140		4360		3850	
r_{mx}/r_{my}		1.80		1.81		1.20		1.21		1.21		1.21	
r_{my}, in.		2.54		2.57		3.09		3.14		3.19		3.22	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS10

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS10x8x				HSS10x6x							
		¼		3/16		5/8		½		3/8		5/16	
t_{des}, in,		0.233		0.174		0.581		0.465		0.349		0.291	
Steel, lb/ft		29.2		22.2		59.3		48.9		37.7		31.8	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	323	484	277	416	491	738	415	623	344	515	306	458
	1	322	484	277	415	490	737	415	622	343	514	305	458
	2	321	482	276	413	487	732	412	618	341	511	303	455
	3	319	479	274	411	483	725	408	612	338	507	300	451
	4	317	475	272	407	476	716	402	603	333	500	296	444
	5	313	470	269	403	468	703	395	593	327	491	291	437
	6	309	464	265	397	458	689	386	580	320	481	285	428
	7	305	457	261	391	447	672	377	565	312	469	278	417
	8	299	449	256	384	434	653	365	548	303	455	270	405
	9	293	440	251	376	420	632	353	530	293	440	261	392
	10	287	430	245	367	405	609	340	510	283	424	252	378
	11	280	420	239	358	389	585	326	489	271	407	242	363
	12	272	409	232	348	372	560	311	467	260	389	231	347
	13	265	397	225	337	355	533	296	445	247	371	220	331
	14	256	384	217	326	337	506	282	423	235	352	209	314
	15	248	371	210	315	319	479	267	401	222	332	198	297
	16	239	358	202	303	300	451	252	379	209	313	186	280
	17	230	344	194	291	282	423	237	357	196	293	175	262
	18	220	331	186	278	263	396	222	334	183	274	163	245
	19	211	316	177	266	245	369	208	312	170	255	152	228
	20	201	302	169	254	228	342	193	291	158	236	141	212
	21	192	288	161	241	210	316	179	269	145	218	130	196
	22	183	274	152	229	194	291	166	249	134	201	120	180
	23	173	260	144	216	177	266	152	229	122	184	110	165
	24	164	246	136	204	163	245	140	210	112	169	101	151
	25	155	232	128	192	150	225	129	194	104	155	92.9	139
	26	146	218	120	180	139	208	119	179	95.7	144	85.9	129
	27	137	205	113	169	129	193	110	166	88.8	133	79.7	119
	28	128	192	105	158	120	180	103	154	82.5	124	74.1	111
	29	120	179	97.9	147	111	168	95.7	144	76.9	116	69.0	104
	30	112	168	91.5	137	104	157	89.4	134	71.9	108	64.5	96.8
	32	98.2	147	80.4	121	91.5	138	78.6	118	63.2	94.9	56.7	85.1
	34	87.0	131	71.2	107	81.1	122	69.6	105	56.0	84.0	50.2	75.3
	36	77.6	116	63.5	95.3	72.3	109	62.1	93.3	49.9	75.0	44.8	67.2
	38	69.7	104	57.0	85.5	64.9	97.6	55.7	83.8	44.8	67.3	40.2	60.3
	40	62.9	94.3	51.5	77.2					40.4	60.7	36.3	54.4
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	79.5	119	62.0	93.3	135	203	115	172	92.1	138	79.6	120
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	67.2	101	52.1	78.3	92.8	140	78.8	118	63.0	94.6	54.2	81.4
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		4810		3950		6600		5860		5020		4530	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		3300		2700		2810		2500		2130		1910	
r_{mx}/r_{my}		1.21		1.21		1.53		1.53		1.54		1.54	
r_{my}, in.		3.25		3.28		2.34		2.39		2.44		2.47	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.

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COMPOSITE
HSS10

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS10x6x				HSS10x5x							
		¼		3/16		3/8		5/16		¼		3/16	
t_{des}, in,		0.233		0.174		0.349		0.291		0.233		0.174	
Steel, lb/ft		25.8		19.6		35.1		29.7		24.1		18.4	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	267	401	227	340	310	464	275	412	239	359	202	303
	1	267	400	226	340	309	463	274	411	239	358	201	302
	2	265	398	225	338	306	459	272	408	237	355	200	299
	3	262	394	223	334	302	453	268	402	233	350	197	295
	4	259	388	220	329	296	444	263	395	229	343	193	289
	5	254	381	216	323	289	433	257	385	223	335	188	282
	6	249	373	211	316	280	420	249	374	217	325	182	273
	7	243	364	205	308	270	406	241	361	209	314	176	263
	8	235	353	199	299	259	389	231	346	201	301	168	253
	9	228	342	192	288	248	371	220	331	192	287	160	241
	10	219	329	185	277	235	352	209	314	182	273	152	228
	11	210	316	177	266	222	333	198	297	172	258	143	215
	12	201	302	169	253	208	312	186	279	161	242	134	201
	13	192	287	161	241	194	291	173	260	151	226	125	188
	14	182	272	152	228	180	270	161	242	140	210	116	174
	15	172	257	143	215	166	250	149	223	129	194	107	160
	16	161	242	134	201	153	229	137	205	119	178	97.8	147
	17	151	227	126	188	140	211	125	188	109	163	89.0	134
	18	141	212	117	175	129	193	114	171	98.6	148	80.6	121
	19	131	197	108	162	117	176	103	154	89.0	133	72.5	109
	20	122	182	100	150	106	159	92.6	139	80.3	120	65.4	98.1
	21	112	168	92.0	138	96.2	145	84.0	126	72.8	109	59.3	89.0
	22	103	154	84.0	126	87.6	132	76.5	115	66.4	99.5	54.1	81.1
	23	94.1	141	76.9	115	80.2	121	70.0	105	60.7	91.1	49.5	74.2
	24	86.5	130	70.6	106	73.6	111	64.3	96.5	55.8	83.6	45.4	68.1
	25	79.7	120	65.1	97.6	67.9	102	59.3	88.9	51.4	77.1	41.9	62.8
	26	73.7	111	60.2	90.2	62.7	94.3	54.8	82.2	47.5	71.3	38.7	58.1
	27	68.3	102	55.8	83.7	58.2	87.5	50.8	76.2	44.1	66.1	35.9	53.8
	28	63.5	95.3	51.9	77.8	54.1	81.3	47.2	70.9	41.0	61.4	33.4	50.1
	29	59.2	88.8	48.4	72.5	50.4	75.8	44.0	66.1	38.2	57.3	31.1	46.7
	30	55.3	83.0	45.2	67.8	47.1	70.8	41.2	61.7	35.7	53.5	29.1	43.6
	32	48.6	72.9	39.7	59.6	41.4	62.3	36.2	54.3	31.4	47.0	25.6	38.3
	34	43.1	64.6	35.2	52.8	36.7	55.2	32.0	48.1	27.8	41.7	22.6	33.9
	36	38.4	57.6	31.4	47.1								
	38	34.5	51.7	28.2	42.2								
	40	31.1	46.7	25.4	38.1								
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	66.5	99.9	52.1	78.3	82.4	124	71.5	107	59.7	89.8	47.0	70.6
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	45.1	67.7	35.0	52.7	49.2	73.9	42.4	63.8	35.4	53.2	27.5	41.3
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		3880		3180		4320		3930		3410		2800	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		1640		1340		1350		1220		1050		859	
r_{mx}/r_{my}		1.54		1.54		1.79		1.79		1.80		1.81	
r_{my}, in.		2.49		2.52		2.05		2.07		2.10		2.13	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS9

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS9x7x											
		5/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.581		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		59.3		48.9		37.7		31.8		25.8		19.6	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	491	738	420	631	349	523	311	466	272	408	232	348
	1	490	737	420	630	348	522	310	465	272	408	232	348
	2	488	734	418	627	347	520	309	463	271	406	231	346
	3	485	728	415	622	344	516	307	460	269	403	229	343
	4	480	721	410	615	341	511	303	455	266	399	226	339
	5	473	711	405	607	336	504	299	449	262	393	223	335
	6	466	700	398	597	331	496	295	442	258	387	219	329
	7	457	687	390	585	324	486	289	434	253	379	215	322
	8	447	672	381	572	317	476	283	424	247	371	210	315
	9	436	655	372	557	309	464	276	413	241	361	204	306
	10	424	637	361	541	301	451	268	402	234	351	198	297
	11	411	618	350	524	291	437	260	390	227	340	192	288
	12	398	598	338	506	282	423	251	377	219	329	185	278
	13	383	576	325	487	271	407	242	363	211	316	178	267
	14	368	554	312	468	261	391	233	349	203	304	170	256
	15	353	531	298	448	250	375	223	334	194	291	163	244
	16	337	507	285	427	239	358	213	319	185	278	155	233
	17	321	483	271	406	227	341	203	304	176	264	147	221
	18	305	459	257	385	216	324	192	289	167	250	139	209
	19	289	435	243	365	204	306	182	273	158	237	132	197
	20	273	411	230	345	193	289	172	258	149	223	124	186
	21	257	387	217	326	181	272	162	243	140	210	116	174
	22	242	363	204	307	170	255	152	228	131	197	108	163
	23	226	340	191	288	159	239	142	213	123	184	101	151
	24	211	317	179	269	148	223	133	199	114	171	93.8	141
	25	196	295	167	251	138	207	123	185	106	159	86.6	130
	26	182	273	155	234	128	192	114	171	98.0	147	80.1	120
	27	169	253	144	217	118	178	106	159	90.9	136	74.3	111
	28	157	236	134	201	110	165	98.4	148	84.5	127	69.1	104
	29	146	220	125	188	103	154	91.8	138	78.8	118	64.4	96.6
	30	137	205	117	175	95.9	144	85.7	129	73.6	110	60.2	90.2
	32	120	180	103	154	84.3	126	75.4	113	64.7	97.0	52.9	79.3
	34	106	160	90.8	137	74.7	112	66.7	100	57.3	86.0	46.8	70.3
	36	94.9	143	81.0	122	66.6	99.9	59.5	89.3	51.1	76.7	41.8	62.7
	38	85.1	128	72.7	109	59.8	89.7	53.4	80.2	45.9	68.8	37.5	56.2
	40	76.8	115	65.6	98.7	54.0	80.9	48.2	72.3	41.4	62.1	33.8	50.8
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	127	191	108	162	86.4	130	74.6	112	62.2	93.5	48.6	73.0
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	106	159	89.7	135	71.6	108	61.8	92.9	51.4	77.3	40.1	60.2
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		5690		5080		4330		3870		3330		2720	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		3740		3320		2840		2530		2180		1780	
r_{mx}/r_{my}		1.23		1.24		1.23		1.24		1.24		1.24	
r_{my}, in.		2.68		2.73		2.78		2.81		2.84		2.87	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS9

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS9x5x											
		5/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.581		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		50.8		42.1		32.6		27.6		22.4		17.1	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	419	630	347	522	285	427	253	379	220	330	185	278
	1	418	628	346	521	284	426	252	378	219	329	185	277
	2	414	623	344	516	282	422	250	375	218	326	183	275
	3	409	614	339	509	278	417	247	370	215	322	180	271
	4	400	602	333	500	272	408	242	363	210	316	177	265
	5	390	587	325	488	265	398	236	354	205	308	172	259
	6	378	568	315	473	257	386	229	343	199	299	167	251
	7	364	548	304	457	248	372	221	331	192	288	161	241
	8	349	525	292	439	238	357	212	318	184	276	154	231
	9	333	500	279	419	227	340	202	303	176	264	147	220
	10	315	473	265	398	215	323	192	288	167	250	139	209
	11	297	446	250	376	203	304	181	271	157	236	131	197
	12	278	418	235	353	190	285	170	255	148	221	123	184
	13	259	389	220	330	177	266	158	238	138	207	114	172
	14	239	360	204	307	164	246	147	221	128	192	106	159
	15	220	331	189	284	151	227	136	204	118	177	97.5	146
	16	202	303	173	261	140	210	125	187	108	162	89.2	134
	17	184	276	159	238	128	193	114	171	98.8	148	81.2	122
	18	166	250	144	217	117	176	103	155	89.7	135	73.5	110
	19	149	224	130	196	107	160	93.0	139	80.8	121	66.0	99.0
	20	135	202	117	177	96.5	145	83.9	126	72.9	109	59.6	89.4
	21	122	184	107	160	87.5	131	76.1	114	66.1	99.2	54.1	81.1
	22	111	167	97.1	146	79.7	120	69.4	104	60.3	90.4	49.2	73.9
	23	102	153	88.8	134	72.9	110	63.5	95.2	55.1	82.7	45.1	67.6
	24	93.5	141	81.6	123	67.0	101	58.3	87.4	50.6	76.0	41.4	62.1
	25	86.2	130	75.2	113	61.7	92.8	53.7	80.6	46.7	70.0	38.1	57.2
	26	79.7	120	69.5	104	57.1	85.8	49.7	74.5	43.1	64.7	35.3	52.9
	27	73.9	111	64.5	96.9	52.9	79.5	46.1	69.1	40.0	60.0	32.7	49.0
	28	68.7	103	59.9	90.1	49.2	74.0	42.8	64.2	37.2	55.8	30.4	45.6
	29	64.1	96.3	55.9	84.0	45.9	69.0	39.9	59.9	34.7	52.0	28.3	42.5
	30	59.9	90.0	52.2	78.5	42.9	64.4	37.3	56.0	32.4	48.6	26.5	39.7
	32	52.6	79.1	45.9	69.0	37.7	56.6	32.8	49.2	28.5	42.7	23.3	34.9
	34							29.0	43.6	25.2	37.8	20.6	30.9
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	101	151	86.0	129	69.3	104	60.2	90.4	50.4	75.8	39.5	59.4
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	65.1	97.9	55.8	83.9	45.0	67.6	38.8	58.3	32.2	48.5	25.2	37.9
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		4270		3840		3280		2960		2590		2120	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		1600		1430		1220		1100		958		783	
r_{mx}/r_{my}		1.63		1.64		1.64		1.64		1.64		1.65	
r_{my}, in.		1.92		1.97		2.03		2.05		2.08		2.10	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS8

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS8x6x											
		5/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.581		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		50.8		42.1		32.6		27.6		22.4		17.1	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	419	630	351	526	290	435	258	387	225	338	190	285
	1	418	629	350	525	289	434	257	386	225	337	190	285
	2	416	625	348	522	288	431	256	384	223	335	189	283
	3	412	619	344	516	285	427	253	380	221	332	187	280
	4	406	610	339	509	281	421	250	375	218	327	184	276
	5	398	599	333	499	276	413	245	368	214	321	181	271
	6	389	585	325	488	270	404	240	360	209	314	176	265
	7	379	570	317	475	263	394	234	351	204	306	172	258
	8	368	553	307	461	255	382	227	341	198	297	166	250
	9	355	534	296	446	246	369	219	329	191	287	161	241
	10	342	514	286	429	237	355	211	317	184	276	154	232
	11	327	492	274	412	227	340	203	304	176	265	148	222
	12	312	469	262	394	217	325	193	290	168	253	141	211
	13	297	446	250	375	206	309	184	276	160	240	134	201
	14	281	422	237	356	195	293	174	262	152	228	126	190
	15	265	398	224	336	184	276	165	247	143	215	119	179
	16	248	373	210	316	173	259	155	232	134	202	112	167
	17	232	349	197	297	162	242	145	217	126	189	104	156
	18	216	325	184	277	151	226	135	203	117	176	96.9	145
	19	200	301	171	258	140	209	125	188	109	163	89.7	135
	20	185	278	159	239	129	194	116	174	101	151	82.7	124
	21	170	256	147	220	119	178	107	160	92.6	139	75.9	114
	22	156	234	135	202	109	164	98.0	147	84.8	127	69.3	104
	23	142	214	123	185	100	151	89.6	134	77.6	116	63.4	95.1
	24	131	196	113	170	92.1	138	82.3	123	71.3	107	58.2	87.3
	25	120	181	104	157	84.9	128	75.9	114	65.7	98.5	53.7	80.5
	26	111	167	96.4	145	78.5	118	70.1	105	60.7	91.1	49.6	74.4
	27	103	155	89.4	134	72.8	109	65.0	97.6	56.3	84.5	46.0	69.0
	28	96.0	144	83.1	125	67.6	102	60.5	90.7	52.4	78.5	42.8	64.2
	29	89.5	135	77.5	116	63.1	94.8	56.4	84.6	48.8	73.2	39.9	59.8
	30	83.7	126	72.4	109	58.9	88.6	52.7	79.0	45.6	68.4	37.3	55.9
	32	73.5	111	63.6	95.7	51.8	77.8	46.3	69.5	40.1	60.1	32.7	49.1
	34	65.1	97.9	56.4	84.7	45.9	69.0	41.0	61.5	35.5	53.3	29.0	43.5
	36	58.1	87.3	50.3	75.6	40.9	61.5	36.6	54.9	31.7	47.5	25.9	38.8
	38			45.1	67.8	36.7	55.2	32.8	49.3	28.4	42.6	23.2	34.8
	40							29.6	44.5	25.7	38.5	21.0	31.4
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	94.3	142	80.6	121	64.9	97.5	56.2	84.5	46.9	70.5	37.0	55.6
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	76.4	115	65.2	98.0	52.6	79.1	45.4	68.2	37.8	56.9	29.7	44.6
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		3650		3270		2790		2520		2190		1790	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		2260		2020		1730		1560		1350		1100	
r_{mx}/r_{my}		1.27		1.27		1.27		1.27		1.27		1.28	
r_{my}, in.		2.27		2.32		2.38		2.40		2.43		2.46	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS8

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS8x4x											
		5/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.581		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		42.3		35.2		27.5		23.3		19.0		14.5	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	350	526	292	438	230	345	204	306	176	264	147	220
	1	349	524	290	436	229	344	203	304	175	263	146	219
	2	344	517	287	431	226	339	200	300	173	260	144	217
	3	336	505	280	422	221	332	196	294	170	254	141	212
	4	325	489	272	409	215	322	190	285	165	247	137	206
	5	312	469	262	393	206	309	183	274	158	238	132	198
	6	297	446	250	375	196	295	174	262	151	227	126	189
	7	279	420	236	355	186	280	165	247	143	214	119	179
	8	261	392	221	332	175	263	155	232	134	201	112	167
	9	241	362	205	309	163	245	144	215	125	187	104	156
	10	221	332	189	284	151	227	132	198	115	172	95.5	143
	11	200	301	173	260	139	209	121	181	105	158	87.3	131
	12	180	271	156	235	126	190	109	164	95.3	143	79.1	119
	13	161	241	140	211	114	172	98.5	148	85.7	128	71.0	106
	14	142	213	125	188	102	154	88.5	133	76.3	115	63.2	94.8
	15	124	186	110	165	91.0	137	78.9	119	67.4	101	55.7	83.5
	16	109	163	96.6	145	80.1	120	69.7	105	59.2	88.8	48.9	73.4
	17	96.4	145	85.6	129	71.0	107	61.7	92.7	52.4	78.7	43.4	65.0
	18	85.9	129	76.4	115	63.3	95.1	55.0	82.7	46.8	70.2	38.7	58.0
	19	77.1	116	68.5	103	56.8	85.4	49.4	74.2	42.0	63.0	34.7	52.1
	20	69.6	105	61.9	93.0	51.3	77.1	44.6	67.0	37.9	56.8	31.3	47.0
	21	63.1	94.9	56.1	84.3	46.5	69.9	40.4	60.8	34.4	51.5	28.4	42.6
	22	57.5	86.5	51.1	76.8	42.4	63.7	36.8	55.4	31.3	47.0	25.9	38.8
	23	52.6	79.1	46.8	70.3	38.8	58.3	33.7	50.7	28.6	43.0	23.7	35.5
	24	48.3	72.7	43.0	64.6	35.6	53.5	31.0	46.5	26.3	39.5	21.8	32.6
	25	44.6	67.0	39.6	59.5	32.8	49.3	28.5	42.9	24.2	36.4	20.0	30.1
	26			36.6	55.0	30.3	45.6	26.4	39.6	22.4	33.6	18.5	27.8
	27							24.5	36.8	20.8	31.2	17.2	25.8
	28											16.0	24.0
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	71.0	107	61.6	92.5	50.1	75.3	43.5	65.4	36.6	55.0	28.8	43.3
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	42.4	63.7	36.8	55.3	29.9	45.0	26.0	39.1	21.7	32.7	17.0	25.6
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		2570		2330		2010		1820		1610		1330	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		800		727		628		568		498		411	
r_{mx}/r_{my}		1.79		1.79		1.79		1.79		1.80		1.80	
r_{my}, in.		1.51		1.56		1.61		1.63		1.66		1.69	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS8–HSS7

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS8x4x		HSS7x5x									
		⅛		½		⅜		5/16		¼		3/16	
t_{des}, in,		0.116		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		9.86		35.2		27.5		23.3		19.0		14.5	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	114	170	292	438	235	353	209	313	181	272	152	228
	1	113	170	291	437	235	352	208	312	181	271	152	227
	2	112	167	288	433	233	349	206	310	179	269	150	225
	3	109	164	284	427	229	344	203	305	177	265	148	222
	4	106	159	278	419	225	337	199	299	173	260	145	218
	5	102	153	271	408	219	328	194	291	169	253	141	212
	6	96.9	145	263	395	212	318	188	282	164	245	137	205
	7	91.5	137	253	380	204	306	181	272	158	236	132	198
	8	85.6	128	242	364	195	293	174	260	151	227	126	189
	9	79.4	119	231	347	186	278	165	248	144	216	120	180
	10	73.0	110	219	328	176	263	156	235	136	204	114	170
	11	66.6	99.8	206	309	165	248	147	221	128	193	107	160
	12	60.1	90.2	192	289	154	231	138	207	120	180	99.8	150
	13	53.8	80.8	179	269	143	216	128	192	112	168	92.8	139
	14	47.8	71.7	166	249	133	200	119	178	104	155	85.7	129
	15	42.0	62.9	152	229	123	185	109	164	95.4	143	78.8	118
	16	36.9	55.3	139	209	113	170	99.7	150	87.4	131	72.0	108
	17	32.7	49.0	127	190	104	156	90.7	136	79.5	119	65.3	98.0
	18	29.1	43.7	114	172	94.2	142	81.9	123	72.0	108	58.9	88.4
	19	26.1	39.2	103	154	85.1	128	73.6	111	64.6	97.0	52.9	79.3
	20	23.6	35.4	92.7	139	76.8	115	66.4	99.9	58.3	87.5	47.7	71.6
	21	21.4	32.1	84.1	126	69.6	105	60.3	90.6	52.9	79.4	43.3	65.0
	22	19.5	29.3	76.6	115	63.4	95.4	54.9	82.5	48.2	72.3	39.5	59.2
	23	17.8	26.8	70.1	105	58.0	87.2	50.2	75.5	44.1	66.2	36.1	54.1
	24	16.4	24.6	64.4	96.8	53.3	80.1	46.1	69.4	40.5	60.8	33.2	49.7
	25	15.1	22.7	59.3	89.2	49.1	73.8	42.5	63.9	37.3	56.0	30.6	45.8
	26	14.0	20.9	54.9	82.5	45.4	68.3	39.3	59.1	34.5	51.8	28.2	42.4
	27	12.9	19.4	50.9	76.5	42.1	63.3	36.5	54.8	32.0	48.0	26.2	39.3
	28	12.0	18.1	47.3	71.1	39.2	58.9	33.9	51.0	29.8	44.6	24.4	36.5
	29			44.1	66.3	36.5	54.9	31.6	47.5	27.7	41.6	22.7	34.1
	30			41.2	61.9	34.1	51.3	29.5	44.4	25.9	38.9	21.2	31.8
	32					30.0	45.1	26.0	39.0	22.8	34.2	18.6	28.0
	34											16.5	24.8
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	20.6	31.0	57.4	86.3	46.7	70.1	40.5	60.9	34.0	51.1	26.8	40.2
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	11.7	17.5	44.9	67.5	36.3	54.6	31.6	47.5	26.5	39.8	20.7	31.2
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		1010		1960		1690		1530		1350		1110	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		310		1120		967		872		766		627	
r_{mx}/r_{my}		1.81		1.32		1.32		1.32		1.33		1.33	
r_{my}, in.		1.71		1.91		1.97		1.99		2.02		2.05	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS7

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS7x5x		HSS7x4x									
		1/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.116		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		9.86		31.8		24.9		21.2		17.3		13.3	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	122	183	264	396	207	311	183	275	158	238	132	198
	1	122	183	263	395	206	309	183	274	158	237	131	197
	2	121	181	259	389	203	305	180	270	156	234	130	195
	3	119	178	253	381	199	298	176	264	152	229	127	190
	4	116	174	245	369	193	289	171	256	148	222	123	185
	5	113	169	236	354	185	279	164	246	142	213	118	178
	6	109	164	224	337	177	266	156	235	136	203	113	169
	7	105	157	212	318	168	252	148	222	128	192	107	160
	8	100	150	198	297	157	236	138	207	120	180	99.8	150
	9	95.0	143	183	275	146	220	128	192	112	167	92.7	139
	10	89.6	134	168	253	135	203	118	177	103	154	85.3	128
	11	84.0	126	153	230	124	186	107	161	93.8	141	77.8	117
	12	78.2	117	138	207	112	169	97.6	147	84.9	127	70.4	106
	13	72.4	109	123	185	101	152	88.2	133	76.1	114	63.1	94.6
	14	66.6	99.8	109	164	90.1	135	79.0	119	67.7	102	56.1	84.1
	15	60.8	91.3	95.7	144	79.7	120	70.2	106	59.6	89.4	49.3	73.9
	16	55.3	82.9	84.1	126	70.0	105	61.8	92.9	52.4	78.6	43.3	65.0
	17	49.9	74.9	74.5	112	62.0	93.2	54.8	82.3	46.4	69.6	38.4	57.6
	18	44.7	67.0	66.4	99.9	55.3	83.2	48.9	73.4	41.4	62.1	34.2	51.3
	19	40.1	60.2	59.6	89.6	49.7	74.6	43.8	65.9	37.2	55.8	30.7	46.1
	20	36.2	54.3	53.8	80.9	44.8	67.4	39.6	59.5	33.5	50.3	27.7	41.6
	21	32.8	49.3	48.8	73.4	40.7	61.1	35.9	53.9	30.4	45.6	25.1	37.7
	22	29.9	44.9	44.5	66.8	37.0	55.7	32.7	49.2	27.7	41.6	22.9	34.4
	23	27.4	41.1	40.7	61.2	33.9	50.9	29.9	45.0	25.4	38.0	21.0	31.4
	24	25.1	37.7	37.4	56.2	31.1	46.8	27.5	41.3	23.3	34.9	19.3	28.9
	25	23.2	34.8	34.4	51.8	28.7	43.1	25.3	38.1	21.5	32.2	17.7	26.6
	26	21.4	32.1			26.5	39.9	23.4	35.2	19.8	29.8	16.4	24.6
	27	19.9	29.8							18.4	27.6	15.2	22.8
	28	18.5	27.7										
	29	17.2	25.8										
	30	16.1	24.1										
	32	14.1	21.2										
	34	12.5	18.8										
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	19.0	28.6	49.1	73.7	40.1	60.2	35.2	52.9	29.5	44.3	23.3	35.0
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	14.5	21.8	32.4	48.7	26.6	39.9	23.2	34.9	19.5	29.3	15.3	23.0
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		842		1620		1410		1280		1130		940	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		475		637		553		501		440		364	
r_{mx}/r_{my}		1.33		1.59		1.60		1.60		1.60		1.61	
r_{my}, in.		2.07		1.53		1.58		1.61		1.64		1.66	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS7–HSS6

Table 4-A (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS7x4x		HSS6x5x							
		1/8		1/2		3/8		5/16		1/4	
t_{des}, in.		0.116		0.465		0.349		0.291		0.233	
Steel, lb/ft		9.01		31.8		24.9		21.2		17.3	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	105	157	264	396	211	316	187	280	162	243
	1	104	156	263	395	210	315	186	279	161	242
	2	103	154	261	392	208	312	185	277	160	240
	3	100	151	257	386	205	307	182	273	158	236
	4	97.2	146	251	378	201	301	178	267	154	232
	5	93.3	140	245	368	195	293	173	260	150	226
	6	88.7	133	237	356	189	283	168	252	146	219
	7	83.6	125	228	342	182	272	162	242	140	210
	8	78.0	117	218	327	173	260	154	232	134	201
	9	72.2	108	207	311	165	247	147	220	128	192
	10	66.2	99.3	195	293	156	233	139	208	121	181
	11	60.1	90.2	183	275	146	219	130	196	114	170
	12	54.1	81.2	171	257	137	205	122	183	106	159
	13	48.2	72.4	159	238	127	191	113	170	98.8	148
	14	42.6	64.0	146	220	118	177	104	157	91.3	137
	15	37.3	55.9	134	201	108	163	95.7	144	83.9	126
	16	32.8	49.1	122	183	99.2	149	87.3	131	76.6	115
	17	29.0	43.5	110	166	90.2	136	79.2	119	69.6	104
	18	25.9	38.8	99.3	149	81.6	123	71.4	107	62.8	94.2
	19	23.2	34.8	89.1	134	73.3	110	64.3	96.7	56.3	84.5
	20	21.0	31.4	80.4	121	66.2	99.5	58.0	87.2	50.8	76.3
	21	19.0	28.5	72.9	110	60.0	90.2	52.7	79.1	46.1	69.2
	22	17.3	26.0	66.4	99.9	54.7	82.2	48.0	72.1	42.0	63.0
	23	15.9	23.8	60.8	91.4	50.0	75.2	43.9	66.0	38.4	57.7
	24	14.6	21.8	55.8	83.9	46.0	69.1	40.3	60.6	35.3	53.0
	25	13.4	20.1	51.5	77.3	42.4	63.7	37.2	55.8	32.5	48.8
	26	12.4	18.6	47.6	71.5	39.2	58.9	34.3	51.6	30.1	45.1
	27	11.5	17.3	44.1	66.3	36.3	54.6	31.9	47.9	27.9	41.8
	28	10.7	16.0	41.0	61.6	33.8	50.8	29.6	44.5	25.9	38.9
	29			38.2	57.5	31.5	47.3	27.6	41.5	24.2	36.3
	30			35.7	53.7	29.4	44.2	25.8	38.8	22.6	33.9
	32					25.9	38.9	22.7	34.1	19.9	29.8

Properties												
M_{nx}/Ω_b	$\phi_b M_{nx}$	kip-ft	16.7	25.0	44.8	67.4	36.6	54.9	31.9	47.9	26.8	40.3
M_{ny}/Ω_b	$\phi_b M_{ny}$	kip-ft	10.7	16.1	39.4	59.3	32.1	48.2	27.9	41.9	23.5	35.3
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}			714		1310		1130		1030		905	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}			275		968		838		758		668	
r_{mx}/r_{my}			1.61		1.16		1.16		1.17		1.16	
r_{my}, in.			1.69		1.87		1.92		1.95		1.98	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates Lc/rmy equal to or greater than 200.
Dashed line indicates the Lc beyond which the bare steel strength controls.

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4

COMPOSITE
HSS6

Table 4-A (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS6x5x				HSS6x4x							
		3/16		1/8		1/2		3/8		5/16		1/4	
t_{des}, in,		0.174		0.116		0.465		0.349		0.291		0.233	
Steel, lb/ft		13.3		9.01		28.4		22.4		19.1		15.6	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	135	203	108	162	236	355	185	278	163	244	141	211
	1	135	203	108	162	235	353	184	277	162	243	140	210
	2	134	201	107	160	232	348	182	273	160	240	138	207
	3	132	198	105	158	226	340	178	267	156	235	135	203
	4	129	194	103	154	219	329	173	259	151	227	131	196
	5	126	189	100	150	210	315	166	249	145	218	126	189
	6	122	183	96.7	145	199	300	158	238	138	208	120	180
	7	117	176	92.8	139	188	282	149	224	130	196	113	170
	8	112	168	88.6	133	175	263	140	210	122	183	106	159
	9	106	160	84.0	126	161	243	130	195	113	169	98.0	147
	10	101	151	79.1	119	148	222	119	179	104	155	90.1	135
	11	94.6	142	74.1	111	134	201	109	164	94.5	142	82.0	123
	12	88.4	133	69.0	103	120	181	98.4	148	85.8	129	74.0	111
	13	82.0	123	63.8	95.7	107	161	88.2	133	77.2	116	66.2	99.3
	14	75.7	114	58.6	87.9	94.3	142	78.4	118	68.9	104	58.7	88.1
	15	69.5	104	53.5	80.3	82.3	124	68.9	104	60.9	91.6	51.6	77.6
	16	63.4	95.1	48.6	72.9	72.3	109	60.5	91.0	53.5	80.5	45.4	68.3
	17	57.5	86.2	43.8	65.7	64.0	96.2	53.6	80.6	47.4	71.3	40.3	60.5
	18	51.7	77.6	39.2	58.8	57.1	85.9	47.8	71.9	42.3	63.6	35.9	54.0
	19	46.4	69.7	35.2	52.7	51.3	77.1	42.9	64.5	38.0	57.1	32.2	48.4
	20	41.9	62.9	31.7	47.6	46.3	69.5	38.7	58.2	34.3	51.5	29.1	43.7
	21	38.0	57.0	28.8	43.2	42.0	63.1	35.1	52.8	31.1	46.7	26.4	39.7
	22	34.6	52.0	26.2	39.3	38.2	57.5	32.0	48.1	28.3	42.6	24.0	36.1
	23	31.7	47.5	24.0	36.0	35.0	52.6	29.3	44.0	25.9	38.9	22.0	33.1
	24	29.1	43.7	22.0	33.1	32.1	48.3	26.9	40.4	23.8	35.8	20.2	30.4
	25	26.8	40.2	20.3	30.5	29.6	44.5	24.8	37.3	21.9	33.0	18.6	28.0
	26	24.8	37.2	18.8	28.2					20.3	30.5	17.2	25.9
	27	23.0	34.5	17.4	26.1								
	28	21.4	32.1	16.2	24.3								
	29	19.9	29.9	15.1	22.6								
	30	18.6	27.9	14.1	21.2								
	32	16.4	24.6	12.4	18.6								
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	21.2	31.8	15.1	22.6	37.9	57.0	31.4	47.2	27.5	41.3	23.1	34.7
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	18.5	27.8	13.1	19.6	28.3	42.5	23.3	35.0	20.4	30.6	17.1	25.8
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		748		566		1070		935		849		752	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		551		417		546		475		433		380	
r_{mx}/r_{my}		1.17		1.17		1.40		1.40		1.40		1.41	
r_{my}, in.		2.01		2.03		1.50		1.55		1.58		1.61	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS6

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS6x4x				HSS6x3x							
		3/16		1/8		1/2		3/8		5/16		1/4	
t_{des}, in,		0.174		0.116		0.465		0.349		0.291		0.233	
Steel, lb/ft		12.0		8.16		25.0		19.8		17.0		13.9	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	117	176	92.7	139	208	313	164	247	140	211	120	180
	1	117	175	92.2	138	206	310	163	245	139	209	119	178
	2	115	172	91.0	136	201	302	159	239	136	204	116	174
	3	112	169	88.9	133	193	290	153	230	131	197	112	168
	4	109	164	86.0	129	182	273	145	218	124	187	106	159
	5	105	157	82.5	124	169	254	135	203	116	175	98.7	148
	6	99.8	150	78.4	118	154	231	124	187	107	161	90.6	136
	7	94.2	141	73.8	111	138	207	113	169	97.3	146	81.9	123
	8	88.2	132	68.8	103	122	183	100	151	87.1	131	73.1	110
	9	81.8	123	63.6	95.4	105	158	88.0	132	76.7	115	64.8	97.4
	10	75.2	113	58.2	87.4	89.9	135	76.0	114	66.6	100	56.7	85.2
	11	68.5	103	52.8	79.3	75.2	113	64.7	97.2	57.0	85.7	48.8	73.4
	12	61.9	92.8	47.5	71.2	63.2	95.0	54.4	81.7	48.0	72.2	41.4	62.3
	13	55.4	83.1	42.3	63.4	53.8	80.9	46.3	69.6	40.9	61.5	35.3	53.1
	14	49.1	73.7	37.3	55.9	46.4	69.8	39.9	60.0	35.3	53.0	30.4	45.7
	15	43.1	64.7	32.6	48.8	40.4	60.8	34.8	52.3	30.7	46.2	26.5	39.9
	16	37.9	56.9	28.6	42.9	35.5	53.4	30.6	46.0	27.0	40.6	23.3	35.0
	17	33.6	50.4	25.3	38.0	31.5	47.3	27.1	40.7	23.9	36.0	20.6	31.0
	18	29.9	44.9	22.6	33.9	28.1	42.2	24.2	36.3	21.4	32.1	18.4	27.7
	19	26.9	40.3	20.3	30.4			21.7	32.6	19.2	28.8	16.5	24.8
	20	24.3	36.4	18.3	27.5							14.9	22.4
	21	22.0	33.0	16.6	24.9								
	22	20.0	30.1	15.1	22.7								
	23	18.3	27.5	13.8	20.8								
	24	16.8	25.3	12.7	19.1								
	25	15.5	23.3	11.7	17.6								
	26	14.4	21.5	10.8	16.3								
	27	13.3	20.0	10.0	15.1								
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	18.3	27.5	13.1	19.7	31.2	47.0	25.9	39.0	22.8	34.3	19.3	29.1
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	13.5	20.3	9.57	14.4	18.6	27.9	15.5	23.3	13.7	20.5	11.5	17.3
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		632		478		833		736		673		597	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		319		241		260		230		210		186	
r_{mx}/r_{my}		1.41		1.41		1.79		1.79		1.79		1.79	
r_{my}, in.		1.63		1.66		1.12		1.17		1.19		1.22	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS6–HSS5

Table 4-A (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS6x3x				HSS5x4x							
		3/16		1/8		1/2		3/8		5/16		1/4	
t_{des}, in,		0.174		0.116		0.465		0.349		0.291		0.233	
Steel, lb/ft		10.7		7.31		25.0		19.8		17.0		13.9	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	98.7	148	77.1	116	208	313	164	247	143	214	123	185
	1	97.9	147	76.5	115	207	311	163	245	142	213	123	184
	2	95.7	144	74.8	112	204	307	161	242	140	210	121	181
	3	92.2	138	71.9	108	199	299	157	237	137	205	118	177
	4	87.4	131	68.1	102	192	289	153	229	132	198	114	172
	5	81.7	123	63.5	95.3	184	276	146	220	127	190	110	165
	6	75.2	113	58.3	87.5	174	262	139	209	120	180	104	156
	7	68.1	102	52.8	79.1	163	246	131	197	113	170	98.3	147
	8	60.8	91.2	47.0	70.4	152	228	123	184	105	159	91.7	138
	9	53.5	80.2	41.2	61.7	139	210	113	170	97.8	147	84.8	127
	10	46.3	69.5	35.5	53.3	127	191	104	156	89.9	135	77.7	117
	11	39.5	59.3	30.2	45.3	114	172	94.5	142	81.9	123	70.5	106
	12	33.3	49.9	25.4	38.0	102	154	85.1	128	73.9	111	63.4	95.1
	13	28.4	42.5	21.6	32.4	90.3	136	76.0	114	66.2	99.5	56.5	84.8
	14	24.4	36.7	18.6	28.0	78.9	119	67.2	101	58.7	88.2	49.9	74.8
	15	21.3	31.9	16.2	24.3	68.7	103	58.7	88.3	51.5	77.4	43.9	66.0
	16	18.7	28.1	14.3	21.4	60.4	90.8	51.6	77.6	45.3	68.0	38.6	58.0
	17	16.6	24.9	12.6	19.0	53.5	80.4	45.7	68.7	40.1	60.3	34.2	51.4
	18	14.8	22.2	11.3	16.9	47.7	71.7	40.8	61.3	35.8	53.7	30.5	45.8
	19	13.3	19.9	10.1	15.2	42.8	64.4	36.6	55.0	32.1	48.2	27.4	41.1
	20	12.0	18.0	9.13	13.7	38.7	58.1	33.0	49.7	29.0	43.5	24.7	37.1
	21			8.28	12.4	35.1	52.7	30.0	45.0	26.3	39.5	22.4	33.7
	22					31.9	48.0	27.3	41.0	23.9	36.0	20.4	30.7
	23					29.2	43.9	25.0	37.5	21.9	32.9	18.7	28.1
	24					26.8	40.4	22.9	34.5	20.1	30.2	17.2	25.8
	25							21.1	31.8	18.5	27.9	15.8	23.8
	26											14.6	22.0
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	15.4	23.1	11.0	16.6	28.2	42.3	23.5	35.3	20.6	31.0	17.4	26.2
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	9.15	13.8	6.50	9.76	24.0	36.1	20.0	30.0	17.5	26.3	14.8	22.2
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		507		389		658		579		527		468	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		157		120		456		400		363		322	
r_{mx}/r_{my}		1.80		1.80		1.20		1.20		1.20		1.21	
r_{my}, in.		1.25		1.27		1.46		1.52		1.54		1.57	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS5

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS5x4x				HSS5x3x							
		3/16		1/8		1/2		3/8		5/16		1/4	
t_{des}, in,		0.174		0.116		0.465		0.349		0.291		0.233	
Steel, lb/ft		10.7		7.31		21.6		17.3		14.8		12.2	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	102	153	80.5	121	180	271	143	215	123	184	104	156
	1	102	152	80.1	120	179	269	142	213	122	183	103	154
	2	100	150	79.0	119	174	261	139	208	119	179	100	151
	3	98.0	147	77.2	116	166	250	133	200	115	172	96.5	145
	4	95.0	142	74.7	112	156	235	126	189	109	163	91.3	137
	5	91.2	137	71.6	107	144	217	117	176	101	152	84.9	127
	6	86.7	130	67.9	102	131	197	107	161	93.1	140	77.8	117
	7	81.8	123	63.9	95.9	117	175	96.2	145	84.2	127	70.1	105
	8	76.4	115	59.5	89.3	102	154	85.2	128	75.0	113	62.7	94.2
	9	70.8	106	54.9	82.4	87.9	132	74.2	112	65.8	99.0	55.2	83.0
	10	64.9	97.4	50.2	75.4	74.3	112	63.7	95.7	56.9	85.5	48.0	72.1
	11	59.0	88.6	45.5	68.2	61.7	92.7	53.6	80.5	48.4	72.7	41.0	61.7
	12	53.2	79.8	40.8	61.2	51.8	77.9	45.0	67.7	40.7	61.1	34.6	52.0
	13	47.5	71.3	36.3	54.4	44.2	66.4	38.4	57.7	34.7	52.1	29.5	44.3
	14	42.0	63.1	31.9	47.9	38.1	57.2	33.1	49.7	29.9	44.9	25.4	38.2
	15	36.8	55.2	27.8	41.8	33.2	49.9	28.8	43.3	26.0	39.1	22.1	33.3
	16	32.3	48.5	24.5	36.7	29.2	43.8	25.3	38.1	22.9	34.4	19.5	29.2
	17	28.6	43.0	21.7	32.5	25.8	38.8	22.4	33.7	20.3	30.5	17.2	25.9
	18	25.6	38.3	19.3	29.0	23.0	34.6	20.0	30.1	18.1	27.2	15.4	23.1
	19	22.9	34.4	17.4	26.0			18.0	27.0	16.2	24.4	13.8	20.7
	20	20.7	31.0	15.7	23.5								
	21	18.8	28.2	14.2	21.3								
	22	17.1	25.7	12.9	19.4								
	23	15.7	23.5	11.8	17.8								
	24	14.4	21.6	10.9	16.3								
	25	13.2	19.9	10.0	15.0								
	26	12.2	18.4	9.27	13.9								
	27			8.59	12.9								
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	13.8	20.8	9.90	14.9	22.7	34.1	19.1	28.7	16.9	25.4	14.4	21.6
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	11.7	17.6	8.36	12.6	15.5	23.4	13.1	19.7	11.6	17.5	9.87	14.8
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		397		300		503		450		413		367	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		272		206		214		192		176		157	
r_{mx}/r_{my}		1.21		1.21		1.53		1.53		1.53		1.53	
r_{my}, in.		1.60		1.62		1.09		1.14		1.17		1.19	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS5–HSS4

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS5x3x				HSS5x2½x						HSS4x3x	
		3/16		1/8		1/4		3/16		1/8		3/8	
t_{des}, in,		0.174		0.116		0.233		0.174		0.116		0.349	
Steel, lb/ft		9.42		6.46		11.4		8.78		6.03		14.7	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	85.4	128	66.7	100	94.1	141	77.2	116	59.6	89.4	122	184
	1	84.8	127	66.1	99.2	93.0	140	76.4	115	59.0	88.4	121	182
	2	82.8	124	64.6	96.9	90.1	135	73.9	111	57.1	85.6	118	178
	3	79.7	119	62.1	93.2	85.5	129	69.9	105	54.0	81.0	113	170
	4	75.4	113	58.8	88.2	79.4	119	64.7	97.1	50.0	75.0	107	161
	5	70.3	106	54.8	82.1	72.2	109	58.6	87.9	45.3	68.0	98.9	149
	6	64.6	96.9	50.2	75.3	64.3	96.6	51.9	77.8	40.2	60.3	90.0	135
	7	58.4	87.6	45.3	68.0	56.1	84.3	45.0	67.4	34.8	52.3	80.6	121
	8	51.9	77.9	40.3	60.4	47.9	71.9	38.1	57.1	29.6	44.4	70.9	107
	9	45.5	68.3	35.2	52.8	40.0	60.1	31.8	47.8	24.5	36.8	61.3	92.1
	10	39.3	58.9	30.3	45.5	32.7	49.2	26.2	39.3	20.0	30.0	52.1	78.3
	11	33.4	50.0	25.7	38.5	27.0	40.6	21.6	32.5	16.5	24.8	43.5	65.3
	12	28.0	42.0	21.6	32.4	22.7	34.1	18.2	27.3	13.9	20.8	36.5	54.9
	13	23.9	35.8	18.4	27.6	19.4	29.1	15.5	23.3	11.8	17.7	31.1	46.8
	14	20.6	30.9	15.9	23.8	16.7	25.1	13.4	20.1	10.2	15.3	26.8	40.3
	15	17.9	26.9	13.8	20.7	14.5	21.9	11.6	17.5	8.88	13.3	23.4	35.1
	16	15.8	23.6	12.1	18.2	12.8	19.2	10.2	15.4	7.80	11.7	20.5	30.9
	17	14.0	20.9	10.8	16.1			9.06	13.6	6.91	10.4	18.2	27.4
	18	12.5	18.7	9.59	14.4							16.2	24.4
	19	11.2	16.8	8.61	12.9								
	20	10.1	15.1	7.77	11.7								
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	11.5	17.2	8.26	12.4	12.8	19.3	10.3	15.4	7.43	11.2	13.3	19.9
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	7.86	11.8	5.62	8.45	7.66	11.5	6.13	9.21	4.40	6.61	10.7	16.2
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		313		242		317		271		212		248	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		132		102		99.3		84.3		65.6		153	
r_{mx}/r_{my}		1.54		1.54		1.79		1.79		1.80		1.27	
r_{my}, in.		1.22		1.25		0.999		1.02		1.05		1.11	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS4

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS4x3x								HSS4x2½x			
		5/16		1/4		3/16		1/8		3/8		5/16	
t_{des}, in,		0.291		0.233		0.174		0.116		0.349		0.291	
Steel, lb/ft		12.7		10.5		8.15		5.61		13.4		11.6	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	105	158	87.9	132	72.4	109	56.2	84.3	112	168	96.7	145
	1	105	157	87.2	131	71.8	108	55.8	83.6	111	166	95.6	144
	2	102	153	85.0	128	70.1	105	54.4	81.6	107	160	92.3	139
	3	97.9	147	81.5	122	67.3	101	52.3	78.4	100	151	87.0	131
	4	92.4	139	76.9	116	63.6	95.4	49.4	74.1	91.8	138	80.1	120
	5	85.8	129	71.6	108	59.2	88.7	46.0	68.9	82.2	123	72.1	108
	6	78.3	118	65.7	98.8	54.1	81.2	42.1	63.1	71.7	108	63.4	95.2
	7	70.4	106	59.4	89.2	48.7	73.1	37.9	56.8	61.0	91.7	54.4	81.8
	8	62.2	93.4	52.8	79.4	43.2	64.7	33.6	50.3	50.7	76.2	45.6	68.6
	9	54.0	81.2	46.2	69.5	37.6	56.4	29.3	43.9	41.0	61.6	37.3	56.1
	10	46.2	69.4	39.8	59.9	32.3	48.4	25.1	37.7	33.2	49.9	30.2	45.4
	11	38.8	58.3	33.8	50.8	27.3	41.0	21.2	31.7	27.4	41.2	25.0	37.6
	12	32.6	49.0	28.4	42.7	23.0	34.6	17.8	26.7	23.0	34.6	21.0	31.6
	13	27.8	41.7	24.2	36.3	19.6	29.4	15.2	22.7	19.6	29.5	17.9	26.9
	14	23.9	36.0	20.9	31.3	16.9	25.4	13.1	19.6	16.9	25.4	15.4	23.2
	15	20.9	31.3	18.2	27.3	14.7	22.1	11.4	17.1	14.7	22.2	13.4	20.2
	16	18.3	27.5	16.0	24.0	12.9	19.4	10.0	15.0				
	17	16.2	24.4	14.1	21.3	11.5	17.2	8.86	13.3				
	18	14.5	21.8	12.6	19.0	10.2	15.4	7.90	11.9				
	19			11.3	17.0	9.17	13.8	7.09	10.6				
	20							6.40	9.60				
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	11.8	17.7	10.1	15.1	8.08	12.1	5.86	8.80	11.6	17.4	10.3	15.5
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	9.56	14.4	8.17	12.3	6.54	9.83	4.71	7.08	8.18	12.3	7.33	11.0
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		229		205		174		136		210		195	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		142		127		108		84.1		95.5		88.8	
r_{mx}/r_{my}		1.27		1.27		1.27		1.27		1.48		1.48	
r_{my}, in.		1.13		1.16		1.19		1.21		0.922		0.947	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS4

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape		HSS4x2½x						HSS4x2x					
		¼		3/16		⅛		3/8		5/16		¼	
t_{des}, in,		0.233		0.174		0.116		0.349		0.291		0.233	
Steel, lb/ft		9.66		7.51		5.18		12.2		10.6		8.81	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	79.9	120	64.8	97.2	50.0	75.0	101	153	88	132	73.1	110
	1	79.1	119	64.1	96.1	49.4	74.2	99.5	150	86.4	130	71.8	108
	2	76.5	115	61.9	92.9	47.8	71.7	93.8	141	81.7	123	68.2	102
	3	72.3	109	58.5	87.7	45.2	67.8	84.9	128	74.5	112	62.5	93.9
	4	66.9	101	54.0	81.0	41.8	62.7	73.9	111	65.5	98.4	55.3	83.2
	5	60.5	91.0	48.7	73.0	37.8	56.7	61.9	93.0	55.4	83.3	47.3	71.2
	6	53.6	80.5	42.9	64.4	33.4	50.1	49.7	74.8	45.2	67.9	39.1	58.8
	7	46.4	69.7	37.0	55.5	28.8	43.3	38.4	57.7	35.5	53.4	31.2	46.9
	8	39.2	59.0	31.4	47.2	24.4	36.6	29.4	44.2	27.3	41.0	24.1	36.3
	9	32.5	48.8	26.2	39.4	20.1	30.2	23.2	34.9	21.5	32.4	19.1	28.7
	10	26.4	39.7	21.5	32.3	16.3	24.5	18.8	28.3	17.4	26.2	15.5	23.2
	11	21.8	32.8	17.7	26.7	13.5	20.3	15.5	23.4	14.4	21.7	12.8	19.2
	12	18.3	27.5	14.9	22.4	11.4	17.0	13.1	19.6	12.1	18.2	10.7	16.1
	13	15.6	23.5	12.7	19.1	9.67	14.5					9.15	13.7
	14	13.5	20.2	10.9	16.5	8.34	12.5						
	15	11.7	17.6	9.54	14.3	7.27	10.9						
	16	10.3	15.5	8.38	12.6	6.39	9.58						
	17					5.66	8.49						
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	8.90	13.4	7.17	10.8	5.20	7.82	9.86	14.8	8.88	13.4	7.70	11.6
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	6.31	9.48	5.08	7.64	3.66	5.50	5.87	8.82	5.31	7.98	4.61	6.92
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		175		150		119		172		161		146	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		80.0		68.3		53.7		53.3		50.2		45.6	
r_{mx}/r_{my}		1.48		1.48		1.49		1.80		1.79		1.79	
r_{my}, in.		0.973		0.999		1.03		0.729		0.754		0.779	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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4

COMPOSITE
HSS4

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

A500 Gr. C
F_y = 50 ksi
f'_c = 4 ksi

Shape			HSS4x2x			
			3/16		1/8	
t_{des}, in,			0.174		0.116	
Steel, lb/ft			6.87		4.75	
Design			P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
			ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y		0	57.5	86.2	43.8	65.7
		1	56.5	84.7	43.1	64.6
		2	53.5	80.3	40.9	61.4
		3	49.0	73.5	37.6	56.4
		4	43.6	65.5	33.4	50.1
		5	37.7	56.6	28.6	43.0
		6	31.5	47.3	23.8	35.6
		7	25.5	38.3	19.0	28.6
		8	19.9	29.9	14.8	22.2
		9	15.7	23.7	11.7	17.5
		10	12.8	19.2	9.46	14.2
		11	10.5	15.8	7.82	11.7
		12	8.86	13.3	6.57	9.85
		13	7.55	11.3	5.60	8.39
Properties						
M_{nx}/Ω_b	$\phi_b M_{nx}$	kip-ft	6.24	9.38	4.56	6.86
M_{ny}/Ω_b	$\phi_b M_{ny}$	kip-ft	3.72	5.60	2.71	4.07
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}			125		100	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}			39.1		31.1	
r_{mx}/r_{my}			1.79		1.79	
r_{my}, in.			0.804		0.830	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS20–HSS16

Table 4-B

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS20x12x								HSS16x12x			
		5/8		1/2		3/8		5/16		5/8		1/2	
t_{des}, in,		0.581		0.465		0.349		0.291		0.581		0.465	
Steel, lb/ft		127		103		78.5		65.9		110		89.7	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	1310	1960	1160	1730	1000	1500	891	1340	1100	1650	969	1450
	1	1310	1960	1160	1730	1000	1500	890	1340	1100	1650	969	1450
	2	1310	1960	1150	1730	999	1500	889	1330	1100	1640	967	1450
	3	1300	1950	1150	1730	996	1490	886	1330	1090	1640	965	1450
	4	1300	1950	1150	1720	992	1490	883	1320	1090	1630	961	1440
	5	1290	1940	1140	1710	987	1480	879	1320	1080	1630	956	1430
	6	1280	1930	1130	1700	981	1470	873	1310	1080	1620	951	1430
	7	1280	1910	1130	1690	974	1460	867	1300	1070	1610	944	1420
	8	1270	1900	1120	1680	966	1450	860	1290	1060	1590	937	1410
	9	1260	1880	1110	1660	958	1440	852	1280	1050	1580	928	1390
	10	1240	1870	1100	1650	948	1420	843	1260	1040	1560	919	1380
	11	1230	1850	1090	1630	937	1410	834	1250	1030	1550	909	1360
	12	1220	1820	1070	1610	925	1390	823	1230	1020	1530	898	1350
	13	1200	1800	1060	1590	913	1370	812	1220	1010	1510	886	1330
	14	1180	1780	1040	1570	899	1350	800	1200	992	1490	874	1310
	15	1170	1750	1030	1540	885	1330	787	1180	977	1470	860	1290
	16	1150	1720	1010	1520	870	1310	774	1160	962	1440	846	1270
	17	1130	1700	995	1490	855	1280	760	1140	945	1420	832	1250
	18	1110	1670	977	1470	838	1260	746	1120	928	1390	817	1220
	19	1090	1630	958	1440	822	1230	731	1100	911	1370	801	1200
	20	1070	1600	939	1410	804	1210	715	1070	892	1340	784	1180
	21	1050	1570	919	1380	787	1180	699	1050	873	1310	768	1150
	22	1020	1540	899	1350	768	1150	683	1020	854	1280	750	1130
	23	1000	1500	878	1320	750	1120	666	999	834	1250	733	1100
	24	978	1470	857	1290	731	1100	649	974	814	1220	715	1070
	25	954	1430	836	1250	711	1070	632	948	794	1190	696	1040
	26	929	1390	814	1220	692	1040	615	922	773	1160	678	1020
	27	905	1360	792	1190	672	1010	597	895	752	1130	659	989
	28	880	1320	769	1150	652	978	579	869	731	1100	640	960
	29	855	1280	747	1120	632	948	561	842	709	1060	621	932
	30	830	1240	724	1090	612	918	543	815	688	1030	602	903
	32	779	1170	679	1020	572	858	508	761	645	968	564	846
	34	729	1090	634	952	532	798	472	708	602	903	526	789
	36	679	1020	590	885	493	740	437	656	560	840	488	733
	38	630	945	546	819	455	682	403	605	518	778	452	678
	40	582	874	504	756	418	626	370	555	478	717	416	624
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	647	972	540	812	425	639	367	551	457	687	381	573
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	439	660	362	545	285	428	235	353	367	551	306	460
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		74400		64200		53100		47100		41400		36000	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		31200		26800		22100		19600		25500		22100	
r_{mx}/r_{my}		1.54		1.55		1.55		1.55		1.27		1.28	
r_{my}, in.		4.93		4.99		5.04		5.07		4.80		4.86	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

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COMPOSITE
HSS16

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS16x12x				HSS16x8x							
		3/8		5/16		5/8		1/2		3/8		5/16	
t_{des}, in,		0.349		0.291		0.581		0.465		0.349		0.291	
Steel, lb/ft		68.3		57.4		93.3		76.1		58.1		48.9	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	835	1250	766	1150	857	1290	749	1120	637	956	578	867
	1	834	1250	766	1150	857	1280	748	1120	636	955	577	866
	2	833	1250	765	1150	854	1280	745	1120	634	951	575	863
	3	831	1250	762	1140	849	1270	741	1110	631	946	572	858
	4	827	1240	759	1140	842	1260	735	1100	626	939	567	851
	5	823	1230	756	1130	834	1250	728	1090	619	929	561	842
	6	818	1230	751	1130	824	1240	719	1080	612	917	554	831
	7	812	1220	745	1120	812	1220	709	1060	603	904	546	819
	8	806	1210	739	1110	798	1200	697	1050	592	889	536	805
	9	798	1200	732	1100	783	1170	684	1030	581	872	526	789
	10	790	1180	724	1090	766	1150	670	1000	569	853	514	771
	11	781	1170	715	1070	749	1120	654	981	555	833	502	753
	12	771	1160	706	1060	729	1090	638	957	541	811	489	733
	13	760	1140	696	1040	709	1060	620	930	526	789	475	712
	14	749	1120	685	1030	688	1030	602	903	510	765	460	690
	15	737	1110	674	1010	666	999	583	874	493	740	445	667
	16	725	1090	662	993	643	965	563	845	476	714	429	643
	17	711	1070	649	974	620	930	543	814	459	688	413	619
	18	698	1050	636	955	596	894	522	783	441	661	396	594
	19	684	1030	623	935	572	857	501	752	423	634	379	569
	20	669	1000	609	914	547	821	480	720	404	607	363	544
	21	654	981	595	893	523	784	458	688	386	579	346	519
	22	639	958	581	871	498	747	437	655	368	551	329	493
	23	623	935	566	849	473	710	416	623	349	524	312	468
	24	607	911	551	826	449	674	395	592	331	497	295	443
	25	591	886	536	803	425	637	374	560	313	470	279	419
	26	574	862	520	780	401	602	353	529	295	443	263	394
	27	558	837	505	757	378	567	333	499	278	417	247	371
	28	541	812	489	733	356	534	313	470	261	392	232	348
	29	524	786	473	710	336	505	294	441	245	367	216	325
	30	508	761	457	686	317	477	275	412	229	343	202	303
	32	474	711	426	639	280	421	241	362	201	301	178	267
	34	441	661	395	593	248	373	214	321	178	267	158	236
	36	408	612	365	547	221	333	191	286	159	238	140	211
	38	376	563	335	502	199	299	171	257	142	214	126	189
	40	345	517	306	459	179	269	154	232	129	193	114	171
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	301	453	258	388	354	532	297	446	236	355	203	306
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	240	361	205	308	210	315	175	263	138	207	118	177
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		29700		26400		29700		26400		22100		19600	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		18200		16100		9200		8110		6760		5980	
r_{mx}/r_{my}		1.28		1.28		1.80		1.80		1.81		1.81	
r_{my}, in.		4.91		4.94		3.27		3.32		3.37		3.40	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS16–HSS14

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS16x8x		HSS14x10x									
		¼		⅝		½		⅜		5/16		¼	
t_{des}, in,		0.233		0.581		0.465		0.349		0.291		0.233	
Steel, lb/ft		39.4		93.3		76.1		58.1		48.9		39.4	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	501	752	883	1320	774	1160	663	994	603	905	543	815
	1	500	751	882	1320	773	1160	662	993	603	904	543	814
	2	499	748	880	1320	772	1160	661	991	601	902	541	812
	3	496	744	877	1320	769	1150	658	987	599	899	539	808
	4	492	738	872	1310	765	1150	655	982	596	894	536	804
	5	487	730	867	1300	760	1140	650	975	592	887	532	798
	6	480	720	859	1290	754	1130	645	967	586	880	527	791
	7	473	709	851	1280	746	1120	638	957	580	870	521	782
	8	465	697	842	1260	738	1110	631	946	573	860	515	772
	9	456	683	831	1250	729	1090	623	934	566	849	508	762
	10	445	668	819	1230	719	1080	614	920	557	836	500	750
	11	435	652	806	1210	708	1060	604	906	548	822	491	737
	12	423	634	793	1190	696	1040	593	890	538	807	482	723
	13	411	616	778	1170	683	1020	582	873	528	791	472	708
	14	398	597	762	1140	669	1000	570	855	516	774	462	692
	15	385	577	746	1120	655	982	557	836	505	757	451	676
	16	371	556	729	1090	640	960	544	816	492	738	439	659
	17	357	535	711	1070	625	937	530	796	480	719	427	641
	18	342	513	693	1040	609	913	516	774	466	700	415	623
	19	328	492	674	1010	592	888	502	753	453	679	402	604
	20	313	469	654	981	575	863	487	730	439	659	390	584
	21	298	447	634	951	558	837	472	708	425	637	377	565
	22	284	425	614	921	540	811	456	685	411	616	363	545
	23	269	403	594	891	523	784	441	661	396	594	350	525
	24	254	382	573	860	505	757	425	638	382	573	337	505
	25	240	360	553	829	487	730	409	614	367	551	323	485
	26	226	339	532	798	469	703	394	590	353	529	310	465
	27	213	319	511	767	450	676	378	567	338	507	297	445
	28	199	299	490	736	432	649	362	543	324	485	283	425
	29	186	279	470	705	415	622	347	520	309	464	270	405
	30	174	261	450	674	397	595	331	497	295	443	257	386
	32	153	229	410	614	362	543	301	451	267	401	232	348
	34	135	203	371	557	328	492	272	408	241	361	208	312
	36	121	181	333	500	295	443	244	365	215	322	185	278
	38	108	162	299	449	265	397	219	328	193	289	166	250
	40	97.7	147	270	405	239	359	197	296	174	261	150	225
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	169	254	329	494	276	414	218	328	188	282	156	234
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	94.8	142	255	384	214	321	168	253	144	217	118	177
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		16900		25000		22200		18400		16300		14000	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		5130		14200		12600		10400		9150		7890	
r_{mx}/r_{my}		1.82		1.33		1.33		1.33		1.33		1.33	
r_{my}, in.		3.42		3.98		4.04		4.09		4.12		4.14	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

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COMPOSITE
HSS12

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS12x10x								HSS12x8x			
		½		⅜		5/16		¼		⅝		½	
t_{des}, in,		0.465		0.349		0.291		0.233		0.581		0.465	
Steel, lb/ft		69.3		53.0		44.6		36.0		76.3		62.5	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	688	1030	588	882	533	800	481	722	682	1020	596	894
	1	687	1030	588	882	533	799	481	721	681	1020	595	893
	2	686	1030	586	880	532	797	479	719	679	1020	593	890
	3	683	1020	584	876	530	794	477	716	675	1010	590	885
	4	680	1020	581	871	527	790	475	712	669	1000	585	878
	5	675	1010	577	865	523	784	471	707	662	993	579	868
	6	669	1000	572	858	518	777	467	700	654	980	572	857
	7	663	994	566	849	513	769	462	693	644	966	563	845
	8	655	983	559	839	507	760	456	684	633	949	553	830
	9	647	970	552	828	500	750	450	674	620	930	543	814
	10	638	956	544	816	492	739	442	664	606	910	531	796
	11	627	941	535	803	484	726	435	652	592	887	518	777
	12	617	925	526	788	475	713	426	640	576	864	505	757
	13	605	907	515	773	466	699	418	626	559	839	490	735
	14	593	889	505	757	456	684	408	612	542	813	475	713
	15	580	870	493	740	445	668	399	598	524	785	460	689
	16	566	849	482	722	435	652	388	582	505	757	443	665
	17	552	828	469	704	423	635	378	567	486	729	427	640
	18	538	807	457	685	412	617	367	550	466	699	410	615
	19	523	784	444	665	400	599	356	533	446	669	393	589
	20	508	761	430	645	387	581	344	516	426	640	375	563
	21	492	738	417	625	375	562	333	499	406	609	358	537
	22	476	714	403	604	362	543	321	481	386	579	341	511
	23	460	690	389	584	349	524	309	464	366	550	323	485
	24	444	666	375	563	336	505	297	446	347	520	306	459
	25	428	642	361	541	323	485	285	428	327	491	289	434
	26	411	617	347	520	311	466	273	410	308	463	273	409
	27	395	593	333	499	298	446	261	392	292	438	257	385
	28	379	568	319	478	285	427	250	374	275	413	241	361
	29	363	544	305	457	272	408	238	357	259	389	225	338
	30	347	520	291	437	260	389	227	340	243	366	210	316
	32	316	474	264	396	235	353	204	306	214	321	185	277
	34	286	428	238	358	211	317	183	274	189	285	164	246
	36	256	384	213	320	189	283	163	244	169	254	146	219
	38	230	345	191	287	169	254	146	219	152	228	131	197
	40	208	311	173	259	153	229	132	198	137	206	118	178
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	217	327	173	259	148	223	123	185	222	334	187	282
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	190	285	150	226	129	193	106	160	164	247	138	208
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		14800		12400		11000		9460		13900		12300	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		10900		9070		8030		6930		7000		6220	
r_{mx}/r_{my}		1.17		1.17		1.17		1.17		1.41		1.41	
r_{my}, in.		3.96		4.01		4.04		4.07		3.16		3.21	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE HSS12

Table 4-B (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS12x8x				HSS12x6x							
		3/8		1/4		5/8		1/2		3/8		5/16	
t_{des}, in,		0.349		0.233		0.581		0.465		0.349		0.291	
Steel, lb/ft		47.9		32.6		67.8		55.7		42.8		36.1	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	505	758	409	613	578	867	501	752	422	633	379	569
	1	505	757	408	612	577	866	500	751	421	632	379	568
	2	503	754	407	610	574	860	497	746	419	628	376	564
	3	500	750	404	606	568	852	492	739	415	622	373	559
	4	496	744	401	601	560	840	486	728	409	613	367	551
	5	491	736	396	594	550	824	477	715	402	603	361	541
	6	484	727	391	586	537	806	467	700	393	590	353	530
	7	477	716	385	577	523	785	455	682	383	575	344	516
	8	469	703	377	566	507	761	441	662	372	558	334	501
	9	460	689	370	554	490	735	426	640	360	539	323	484
	10	450	674	361	542	471	707	410	616	346	519	311	466
	11	439	658	352	528	452	677	394	590	332	498	298	447
	12	427	641	342	513	431	646	376	564	317	476	285	427
	13	415	622	332	497	410	616	358	536	302	453	271	407
	14	402	603	321	481	390	586	339	508	286	430	257	385
	15	389	583	309	464	370	556	320	479	270	406	243	364
	16	375	562	298	447	349	525	300	451	254	381	228	342
	17	361	541	286	429	329	494	281	422	238	357	214	320
	18	346	519	274	411	308	463	262	393	222	333	199	299
	19	332	497	261	392	288	433	243	365	207	310	185	278
	20	317	475	249	374	268	403	226	339	191	287	171	257
	21	302	453	237	355	248	373	210	316	176	265	158	237
	22	287	431	225	337	229	345	195	293	162	243	145	217
	23	273	409	212	319	211	317	180	270	148	222	132	199
	24	258	387	200	301	194	291	165	248	136	204	122	182
	25	244	366	189	283	178	268	152	229	125	188	112	168
	26	230	345	177	266	165	248	141	211	116	174	104	155
	27	216	324	166	249	153	230	130	196	107	161	96.1	144
	28	203	304	155	232	142	214	121	182	99.9	150	89.3	134
	29	189	284	144	216	133	199	113	170	93.1	140	83.3	125
	30	177	265	135	202	124	186	106	159	87.0	130	77.8	117
	32	155	233	118	178	109	164	92.9	140	76.5	115	68.4	103
	34	138	206	105	157	96.4	145	82.2	124	67.7	102	60.6	90.9
	36	123	184	93.6	140	86.0	129	73.4	110	60.4	90.6	54.0	81.1
	38	110	165	84.0	126	77.2	116	65.8	99.0	54.2	81.3	48.5	72.8
	40	99.4	149	75.8	114			59.4	89.3	48.9	73.4	43.8	65.7
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	149	225	107	161	184	277	157	235	125	188	108	163
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	110	165	77.8	117	110	165	92.8	140	74.1	111	63.7	95.8
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		10400		7970		10900		9730		8350		7500	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		5220		3980		3410		3020		2570		2300	
r_{mx}/r_{my}		1.41		1.42		1.79		1.79		1.80		1.81	
r_{my}, in.		3.27		3.32		2.39		2.44		2.49		2.52	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS12–HSS10

Table 4-B (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS12x6x				HSS10x8x							
		¼		3/16		5/8		½		3/8		5/16	
t_{des}, in,		0.233		0.174		0.581		0.465		0.349		0.291	
Steel, lb/ft		29.2		22.2		67.8		55.7		42.8		36.1	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	336	504	281	421	595	893	518	778	439	659	396	594
	1	336	503	280	420	595	892	518	777	439	658	396	594
	2	334	500	278	418	592	889	516	774	437	656	394	592
	3	330	495	276	413	589	883	513	769	434	652	392	588
	4	325	488	272	407	584	876	509	763	431	646	389	583
	5	319	479	267	400	577	866	503	755	426	639	385	577
	6	312	469	260	391	570	855	497	745	421	631	379	569
	7	304	456	253	380	561	841	489	733	414	622	374	560
	8	295	442	246	368	551	826	480	720	407	611	367	550
	9	285	427	237	356	539	809	471	706	399	598	359	539
	10	274	411	228	342	527	791	460	690	390	585	351	527
	11	262	394	218	327	514	771	449	673	381	571	342	514
	12	250	375	208	312	500	750	437	655	370	555	333	500
	13	238	357	197	296	485	727	424	636	359	539	323	485
	14	225	338	186	280	469	704	410	616	348	522	313	469
	15	212	318	175	263	453	679	396	595	336	505	302	453
	16	199	298	164	247	436	654	382	573	324	486	291	437
	17	186	279	153	230	419	628	367	551	312	468	280	420
	18	173	260	143	214	401	602	352	528	299	449	268	402
	19	160	241	132	198	384	576	337	506	286	430	256	385
	20	148	222	122	183	366	549	322	483	273	410	245	367
	21	136	204	112	168	348	522	306	460	260	391	233	349
	22	124	187	102	153	330	496	291	437	248	371	221	332
	23	114	171	93.2	140	313	470	276	414	235	352	209	314
	24	105	157	85.6	128	297	446	261	391	222	333	198	297
	25	96.3	145	78.9	118	281	422	246	369	210	314	187	280
	26	89.1	134	72.9	109	266	399	232	347	197	296	175	263
	27	82.6	124	67.6	101	251	377	217	326	185	278	165	247
	28	76.8	115	62.9	94.3	236	354	204	305	174	260	154	231
	29	71.6	107	58.6	87.9	221	333	190	285	162	243	143	215
	30	66.9	100	54.8	82.2	207	311	177	266	151	227	134	201
	32	58.8	88.2	48.2	72.2	182	274	156	234	133	199	118	177
	34	52.1	78.1	42.7	64.0	161	242	138	207	118	177	104	157
	36	46.5	69.7	38.0	57.1	144	216	123	185	105	158	93.1	140
	38	41.7	62.6	34.1	51.2	129	194	111	166	94.3	141	83.5	125
	40	37.6	56.5	30.8	46.2	116	175	99.7	150	85.1	128	75.4	113
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	90.6	136	71.2	107	167	250	141	212	113	169	97.2	146
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	52.7	79.2	39.8	59.8	141	212	120	180	95.2	143	82.0	123
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		6460		5340		8590		7640		6520		5780	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		1980		1620		5900		5240		4470		3960	
r_{mx}/r_{my}		1.81		1.82		1.21		1.21		1.21		1.21	
r_{my}, in.		2.54		2.57		3.09		3.14		3.19		3.22	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE HSS10

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS10x8x				HSS10x6x							
		¼		3/16		5/8		½		3/8		5/16	
t_{des}, in,		0.233		0.174		0.581		0.465		0.349		0.291	
Steel, lb/ft		29.2		22.2		59.3		48.9		37.7		31.8	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	353	530	308	463	500	750	435	652	365	547	327	491
	1	353	529	308	462	499	749	434	651	364	546	327	490
	2	352	527	307	460	496	744	431	647	362	542	325	487
	3	349	524	305	457	491	736	427	640	358	537	321	482
	4	346	519	302	453	484	725	421	631	353	529	317	475
	5	342	514	298	448	474	712	413	619	347	520	311	467
	6	338	507	294	441	463	695	404	605	339	508	304	456
	7	332	498	289	433	451	676	393	589	330	495	296	445
	8	326	489	283	425	437	655	381	571	320	480	288	431
	9	319	479	277	415	421	632	368	552	309	464	278	417
	10	312	468	270	405	405	609	354	530	298	446	267	401
	11	304	456	263	394	389	585	339	508	285	428	256	384
	12	295	443	255	382	372	560	323	484	272	408	245	367
	13	286	429	246	370	355	533	307	460	259	388	233	349
	14	277	415	238	357	337	506	290	435	245	368	220	330
	15	267	400	229	343	319	479	273	410	231	347	208	312
	16	257	385	220	329	300	451	256	384	217	325	195	293
	17	246	369	210	315	282	423	239	359	203	304	182	274
	18	236	353	201	301	263	396	223	334	189	283	170	255
	19	225	337	191	287	245	369	208	312	175	263	158	237
	20	214	321	181	272	228	342	193	291	162	243	146	219
	21	204	305	172	258	210	316	179	269	149	224	134	201
	22	193	289	162	243	194	291	166	249	136	205	123	184
	23	182	274	153	229	177	266	152	229	125	187	112	169
	24	172	258	144	216	163	245	140	210	115	172	103	155
	25	162	243	135	202	150	225	129	194	106	158	95.1	143
	26	152	228	126	189	139	208	119	179	97.6	146	87.9	132
	27	142	213	117	176	129	193	110	166	90.5	136	81.5	122
	28	132	198	109	163	120	180	103	154	84.2	126	75.8	114
	29	123	185	102	152	111	168	95.7	144	78.5	118	70.7	106
	30	115	173	94.8	142	104	157	89.4	134	73.3	110	66.0	99.1
	32	101	152	83.4	125	91.5	138	78.6	118	64.4	96.7	58.0	87.1
	34	89.7	135	73.8	111	81.1	122	69.6	105	57.1	85.6	51.4	77.1
	36	80.0	120	65.9	98.8	72.3	109	62.1	93.3	50.9	76.4	45.9	68.8
	38	71.8	108	59.1	88.7	64.9	97.6	55.7	83.8	45.7	68.6	41.2	61.7
	40	64.8	97.3	53.4	80.0					41.2	61.9	37.1	55.7
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	80.9	122	63.2	94.9	137	205	116	175	93.5	141	81.0	122
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	68.1	102	52.8	79.3	93.5	140	79.5	119	63.6	95.5	54.7	82.3
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		4980		4110		6700		5970		5150		4670	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		3410		2800		2840		2540		2170		1950	
r_{mx}/r_{my}		1.21		1.21		1.54		1.53		1.54		1.55	
r_{my}, in.		3.25		3.28		2.34		2.39		2.44		2.47	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE HSS10

Table 4-B (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS10x6x				HSS10x5x							
		¼		3/16		3/8		5/16		¼		3/16	
t_{des}, in,		0.233		0.174		0.349		0.291		0.233		0.174	
Steel, lb/ft		25.8		19.6		35.1		29.7		24.1		18.4	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	290	434	250	375	327	490	293	439	258	386	221	331
	1	289	433	250	374	326	488	292	438	257	385	220	330
	2	287	431	248	372	323	484	289	434	255	382	218	327
	3	284	426	245	368	318	477	285	428	251	376	215	322
	4	280	420	242	362	312	468	280	419	246	369	210	316
	5	275	412	237	355	304	456	272	409	240	359	205	307
	6	269	403	231	347	295	442	264	396	232	348	198	297
	7	261	392	225	337	284	426	254	382	224	336	191	286
	8	253	380	217	326	272	408	244	366	214	321	182	273
	9	245	367	209	314	259	388	232	349	204	306	173	260
	10	235	353	201	301	245	368	220	330	193	290	163	245
	11	225	338	192	288	231	346	207	311	182	273	153	230
	12	215	322	183	274	216	324	194	291	170	255	143	215
	13	204	306	173	259	201	302	181	271	158	238	133	199
	14	193	289	163	244	186	279	168	251	147	220	122	184
	15	181	272	153	229	171	257	154	232	135	202	112	168
	16	170	255	143	214	157	235	141	212	123	185	102	153
	17	159	238	133	199	143	214	129	193	112	168	92.5	139
	18	148	221	123	185	129	194	117	175	101	152	83.1	125
	19	137	205	114	170	117	176	105	157	91.1	137	74.6	112
	20	126	189	104	156	106	159	94.5	142	82.2	123	67.3	101
	21	116	174	95.1	143	96.2	145	85.7	129	74.6	112	61.0	91.6
	22	106	158	86.7	130	87.6	132	78.1	117	68.0	102	55.6	83.4
	23	96.7	145	79.3	119	80.2	121	71.4	107	62.2	93.3	50.9	76.3
	24	88.8	133	72.8	109	73.6	111	65.6	98.4	57.1	85.7	46.7	70.1
	25	81.8	123	67.1	101	67.9	102	60.5	90.7	52.6	78.9	43.1	64.6
	26	75.7	113	62.1	93.1	62.7	94.3	55.9	83.9	48.7	73.0	39.8	59.7
	27	70.2	105	57.6	86.3	58.2	87.5	51.8	77.8	45.1	67.7	36.9	55.4
	28	65.2	97.8	53.5	80.3	54.1	81.3	48.2	72.3	42.0	62.9	34.3	51.5
	29	60.8	91.2	49.9	74.8	50.4	75.8	44.9	67.4	39.1	58.7	32.0	48.0
	30	56.8	85.2	46.6	69.9	47.1	70.8	42.0	63.0	36.5	54.8	29.9	44.9
	32	49.9	74.9	41.0	61.5	41.4	62.3	36.9	55.4	32.1	48.2	26.3	39.4
	34	44.2	66.4	36.3	54.4	36.7	55.2	32.7	49.0	28.5	42.7	23.3	34.9
	36	39.5	59.2	32.4	48.6								
	38	35.4	53.1	29.1	43.6								
	40	32.0	47.9	26.2	39.3								
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	67.8	102	53.2	79.9	83.7	126	72.7	109	60.9	91.5	48.0	72.1
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	45.6	68.5	35.4	53.3	49.6	74.5	42.8	64.3	35.7	53.7	27.7	41.7
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		4010		3310		4430		4040		3520		2900	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		1680		1380		1370		1240		1080		884	
r_{mx}/r_{my}		1.54		1.55		1.80		1.81		1.81		1.81	
r_{my}, in.		2.49		2.52		2.05		2.07		2.10		2.13	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS9

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS9x7x											
		5/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.581		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		59.3		48.9		37.7		31.8		25.8		19.6	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	507	760	441	662	371	556	334	500	296	444	256	385
	1	506	759	441	661	370	556	333	500	295	443	256	384
	2	503	755	438	658	369	553	332	497	294	441	255	382
	3	499	749	435	652	366	549	329	494	292	438	253	379
	4	494	741	430	645	362	543	325	488	288	433	250	375
	5	487	730	424	636	357	535	321	481	284	427	246	369
	6	478	717	417	625	351	526	316	473	279	419	241	362
	7	468	702	408	613	344	516	309	464	274	411	236	354
	8	457	685	399	598	336	504	302	453	267	401	230	345
	9	445	667	388	583	327	491	294	442	260	390	224	336
	10	431	647	377	565	318	477	286	429	252	378	217	325
	11	417	625	365	547	308	462	277	415	244	366	209	314
	12	402	603	352	528	297	446	267	401	235	353	201	302
	13	386	579	338	507	286	429	257	385	226	339	193	290
	14	369	554	324	486	274	411	246	370	217	325	184	277
	15	353	531	310	464	262	393	236	353	207	310	176	264
	16	337	507	295	442	250	375	225	337	197	295	167	250
	17	321	483	280	420	238	356	213	320	187	280	158	237
	18	305	459	265	397	225	338	202	303	177	265	149	223
	19	289	435	250	375	213	319	191	286	166	250	140	210
	20	273	411	235	353	200	300	180	270	156	235	131	196
	21	257	387	220	331	188	282	169	253	147	220	122	183
	22	242	363	206	309	176	264	158	237	137	205	114	171
	23	226	340	192	288	164	246	147	221	127	191	105	158
	24	211	317	179	269	153	229	137	205	118	177	97.2	146
	25	196	295	167	251	141	212	127	190	109	164	89.6	134
	26	182	273	155	234	131	196	117	176	101	151	82.8	124
	27	169	253	144	217	121	182	109	163	93.5	140	76.8	115
	28	157	236	134	201	113	169	101	151	87.0	130	71.4	107
	29	146	220	125	188	105	157	94.1	141	81.1	122	66.6	99.9
	30	137	205	117	175	98.1	147	87.9	132	75.8	114	62.2	93.3
	32	120	180	103	154	86.2	129	77.3	116	66.6	99.9	54.7	82.0
	34	106	160	90.8	137	76.3	115	68.5	103	59.0	88.5	48.4	72.7
	36	94.9	143	81.0	122	68.1	102	61.1	91.6	52.6	78.9	43.2	64.8
	38	85.1	128	72.7	109	61.1	91.7	54.8	82.2	47.2	70.8	38.8	58.2
	40	76.8	115	65.6	98.7	55.2	82.7	49.5	74.2	42.6	63.9	35.0	52.5
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	128	193	109	164	87.7	132	75.8	114	63.3	95.1	49.5	74.3
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	107	160	90.6	136	72.4	109	62.6	94.1	52.1	78.3	40.6	61.0
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		5780		5180		4440		3980		3430		2830	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		3790		3380		2900		2600		2240		1840	
r_{mx}/r_{my}		1.23		1.24		1.24		1.24		1.24		1.24	
r_{my}, in.		2.68		2.73		2.78		2.81		2.84		2.87	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Note: Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE HSS9

Table 4-B (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS9x5x											
		5/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.581		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		50.8		42.1		32.6		27.6		22.4		17.1	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	419	630	359	539	300	450	269	403	236	355	202	303
	1	418	628	358	537	299	449	268	402	236	354	202	302
	2	414	623	355	533	296	445	266	398	234	350	200	300
	3	409	614	350	525	292	438	262	393	230	345	197	295
	4	400	602	343	514	286	429	257	385	226	338	193	289
	5	390	587	334	500	279	418	250	375	220	330	187	281
	6	378	568	323	484	270	405	242	363	213	319	181	272
	7	364	548	310	466	260	390	233	350	205	308	174	262
	8	349	525	297	445	249	373	223	335	196	294	167	250
	9	333	500	282	423	237	355	213	319	187	280	158	237
	10	315	473	266	400	224	336	201	302	177	265	149	224
	11	297	446	250	376	211	316	190	284	166	249	140	210
	12	278	418	235	353	197	296	177	266	156	233	131	196
	13	259	389	220	330	183	275	165	248	145	217	121	182
	14	239	360	204	307	170	254	153	229	134	201	112	168
	15	220	331	189	284	156	234	141	211	123	184	102	153
	16	202	303	173	261	142	214	129	193	112	169	93.2	140
	17	184	276	159	238	129	194	117	175	102	153	84.3	126
	18	166	250	144	217	117	176	106	159	92.2	138	75.7	114
	19	149	224	130	196	107	160	94.9	142	82.8	124	67.9	102
	20	135	202	117	177	96.5	145	85.6	128	74.7	112	61.3	92.0
	21	122	184	107	160	87.5	131	77.6	116	67.7	102	55.6	83.4
	22	111	167	97.1	146	79.7	120	70.8	106	61.7	92.6	50.7	76.0
	23	102	153	88.8	134	72.9	110	64.7	97.1	56.5	84.7	46.4	69.5
	24	93.5	141	81.6	123	67.0	101	59.5	89.2	51.9	77.8	42.6	63.9
	25	86.2	130	75.2	113	61.7	92.8	54.8	82.2	47.8	71.7	39.2	58.8
	26	79.7	120	69.5	104	57.1	85.8	50.7	76.0	44.2	66.3	36.3	54.4
	27	73.9	111	64.5	96.9	52.9	79.5	47.0	70.5	41.0	61.5	33.6	50.5
	28	68.7	103	59.9	90.1	49.2	74.0	43.7	65.5	38.1	57.2	31.3	46.9
	29	64.1	96.3	55.9	84.0	45.9	69.0	40.7	61.1	35.5	53.3	29.2	43.7
	30	59.9	90.0	52.2	78.5	42.9	64.4	38.0	57.1	33.2	49.8	27.2	40.9
	32	52.6	79.1	45.9	69.0	37.7	56.6	33.4	50.2	29.2	43.8	23.9	35.9
	34							29.6	44.4	25.8	38.8	21.2	31.8
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	102	153	87.0	131	70.4	106	61.2	91.9	51.4	77.2	40.3	60.6
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	65.5	98.5	56.2	84.5	45.4	68.2	39.1	58.8	32.6	48.9	25.5	38.3
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		4330		3900		3350		3040		2670		2200	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		1610		1450		1240		1120		981		805	
r_{mx}/r_{my}		1.64		1.64		1.64		1.65		1.65		1.65	
r_{my}, in.		1.92		1.97		2.03		2.05		2.08		2.10	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS8

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS8x6x											
		5/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.581		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		50.8		42.1		32.6		27.6		22.4		17.1	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	420	630	366	549	306	459	275	413	243	364	209	313
	1	419	629	365	547	306	458	274	412	242	363	208	312
	2	416	625	363	544	304	456	273	409	241	361	207	310
	3	412	619	359	538	301	451	270	405	238	357	204	307
	4	406	610	353	530	296	444	266	399	235	352	201	302
	5	398	599	347	520	291	436	261	392	230	345	197	296
	6	389	585	339	508	284	426	255	383	225	337	193	289
	7	379	570	329	494	276	415	248	373	219	328	187	281
	8	368	553	319	478	268	402	241	361	212	318	181	272
	9	355	534	307	461	258	388	232	349	205	307	174	262
	10	342	514	295	443	248	373	223	335	196	295	167	251
	11	327	492	282	423	238	356	214	321	188	282	160	239
	12	312	469	268	403	226	340	204	306	179	269	152	227
	13	297	446	254	382	215	322	193	290	170	255	143	215
	14	281	422	240	360	203	305	183	274	160	241	135	203
	15	265	398	226	338	191	287	172	258	151	226	127	190
	16	248	373	211	316	179	269	161	242	141	212	118	178
	17	232	349	197	297	167	251	151	226	132	198	110	165
	18	216	325	184	277	155	233	140	210	122	184	102	153
	19	200	301	171	258	144	215	130	195	113	170	93.8	141
	20	185	278	159	239	132	199	120	179	104	156	86.1	129
	21	170	256	147	220	121	182	110	165	95.5	143	78.4	118
	22	156	234	135	202	111	166	100	150	87.1	131	71.5	107
	23	142	214	123	185	101	152	91.7	138	79.7	119	65.4	98.1
	24	131	196	113	170	93.1	140	84.2	126	73.2	110	60.1	90.1
	25	120	181	104	157	85.8	129	77.6	116	67.4	101	55.3	83.0
	26	111	167	96.4	145	79.3	119	71.8	108	62.3	93.5	51.2	76.8
	27	103	155	89.4	134	73.5	110	66.5	99.8	57.8	86.7	47.5	71.2
	28	96.0	144	83.1	125	68.4	103	61.9	92.8	53.8	80.6	44.1	66.2
	29	89.5	135	77.5	116	63.7	95.6	57.7	86.5	50.1	75.2	41.1	61.7
	30	83.7	126	72.4	109	59.6	89.3	53.9	80.8	46.8	70.2	38.4	57.7
	32	73.5	111	63.6	95.7	52.3	78.5	47.4	71.1	41.2	61.7	33.8	50.7
	34	65.1	97.9	56.4	84.7	46.4	69.6	42.0	62.9	36.5	54.7	29.9	44.9
	36	58.1	87.3	50.3	75.6	41.4	62.0	37.4	56.1	32.5	48.8	26.7	40.0
	38			45.1	67.8	37.1	55.7	33.6	50.4	29.2	43.8	24.0	35.9
	40							30.3	45.5	26.3	39.5	21.6	32.4
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	95.2	143	81.6	123	65.8	98.9	57.1	85.8	47.7	71.7	37.6	56.6
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	77.0	116	65.8	98.9	53.2	79.9	45.9	69.0	38.3	57.6	30.0	45.2
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		3700		3320		2860		2590		2250		1850	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		2290		2050		1760		1590		1380		1140	
r_{mx}/r_{my}		1.27		1.27		1.27		1.28		1.28		1.27	
r_{my}, in.		2.27		2.32		2.38		2.40		2.43		2.46	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS8

Table 4-B (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS8x4x											
		5/8		1/2		3/8		5/16		1/4		3/16	
t_{des}, in,		0.581		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		42.3		35.2		27.5		23.3		19.0		14.5	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	350	526	292	438	241	361	214	322	187	281	159	238
	1	349	524	290	436	239	359	214	320	187	280	158	237
	2	344	517	287	431	236	354	211	316	184	276	156	234
	3	336	505	280	422	231	346	206	309	180	270	152	229
	4	325	489	272	409	224	335	200	299	175	262	148	222
	5	312	469	262	393	215	322	192	288	168	252	142	213
	6	297	446	250	375	204	306	183	274	160	240	135	202
	7	279	420	236	355	192	289	172	258	151	226	127	191
	8	261	392	221	332	180	269	161	242	141	212	119	178
	9	241	362	205	309	166	249	149	224	131	196	110	165
	10	221	332	189	284	152	229	137	206	120	180	101	151
	11	200	301	173	260	139	209	125	187	109	164	91.7	138
	12	180	271	156	235	126	190	113	169	98.8	148	82.6	124
	13	161	241	140	211	114	172	101	151	88.4	133	73.8	111
	14	142	213	125	188	102	154	89.1	134	78.4	118	65.2	97.9
	15	124	186	110	165	91.0	137	78.9	119	68.7	103	57.1	85.6
	16	109	163	96.6	145	80.1	120	69.7	105	60.4	90.6	50.2	75.3
	17	96.4	145	85.6	129	71.0	107	61.7	92.7	53.5	80.3	44.4	66.7
	18	85.9	129	76.4	115	63.3	95.1	55.0	82.7	47.7	71.6	39.6	59.5
	19	77.1	116	68.5	103	56.8	85.4	49.4	74.2	42.8	64.2	35.6	53.4
	20	69.6	105	61.9	93.0	51.3	77.1	44.6	67.0	38.7	58.0	32.1	48.2
	21	63.1	94.9	56.1	84.3	46.5	69.9	40.4	60.8	35.1	52.6	29.1	43.7
	22	57.5	86.5	51.1	76.8	42.4	63.7	36.8	55.4	31.9	47.9	26.5	39.8
	23	52.6	79.1	46.8	70.3	38.8	58.3	33.7	50.7	29.2	43.8	24.3	36.4
	24	48.3	72.7	43.0	64.6	35.6	53.5	31.0	46.5	26.8	40.3	22.3	33.5
	25	44.6	67.0	39.6	59.5	32.8	49.3	28.5	42.9	24.7	37.1	20.6	30.8
	26			36.6	55.0	30.3	45.6	26.4	39.6	22.9	34.3	19.0	28.5
	27							24.5	36.8	21.2	31.8	17.6	26.4
	28											16.4	24.6
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	71.6	108	62.2	93.5	50.8	76.3	44.2	66.4	37.2	55.9	29.4	44.1
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	42.6	64.0	37.0	55.6	30.2	45.3	26.2	39.4	21.9	33.0	17.2	25.8
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		2600		2360		2050		1860		1650		1380	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		805		733		636		577		508		422	
r_{mx}/r_{my}		1.80		1.79		1.80		1.80		1.80		1.81	
r_{my}, in.		1.51		1.56		1.61		1.63		1.66		1.69	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS8–HSS7

Table 4-B (continued)

Available Strength in Axial Compression, kips

Filled Rectangular HSS

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS8x4x		HSS7x5x									
		⅛		½		⅜		5/16		¼		3/16	
t_{des}, in,		0.116		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		9.9		35.2		27.5		23.3		19.0		14.5	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	125	188	296	443	247	370	221	331	194	291	165	248
	1	125	187	295	442	246	369	220	330	193	290	165	247
	2	123	184	292	438	244	366	218	327	192	287	163	245
	3	120	180	287	431	240	360	215	322	189	283	161	241
	4	116	174	281	422	235	353	211	316	185	277	157	236
	5	111	167	273	410	229	343	205	307	180	270	153	229
	6	106	158	264	396	221	332	198	297	174	261	148	222
	7	99.3	149	253	380	213	319	191	286	168	251	142	213
	8	92.5	139	242	364	203	305	182	273	160	240	136	203
	9	85.4	128	231	347	193	290	173	260	152	228	129	193
	10	78.1	117	219	328	182	274	164	246	144	216	121	182
	11	70.7	106	206	309	171	257	154	231	135	203	114	171
	12	63.5	95.2	192	289	160	239	143	215	126	189	106	159
	13	56.4	84.6	179	269	148	222	133	200	117	176	98.0	147
	14	49.7	74.5	166	249	136	204	123	184	108	162	90.2	135
	15	43.3	64.9	152	229	125	187	113	169	99.2	149	82.5	124
	16	38.0	57.1	139	209	114	170	103	154	90.5	136	75.0	112
	17	33.7	50.6	127	190	104	156	92.9	139	82.0	123	67.7	102
	18	30.1	45.1	114	172	94.2	142	83.5	125	73.8	111	60.6	90.9
	19	27.0	40.5	103	154	85.1	128	75.0	112	66.2	99.3	54.4	81.6
	20	24.4	36.5	92.7	139	76.8	115	67.7	101	59.7	89.6	49.1	73.7
	21	22.1	33.1	84.1	126	69.6	105	61.4	92.0	54.2	81.3	44.5	66.8
	22	20.1	30.2	76.6	115	63.4	95.4	55.9	83.9	49.4	74.1	40.6	60.9
	23	18.4	27.6	70.1	105	58.0	87.2	51.2	76.7	45.2	67.8	37.1	55.7
	24	16.9	25.4	64.4	96.8	53.3	80.1	47.0	70.5	41.5	62.2	34.1	51.2
	25	15.6	23.4	59.3	89.2	49.1	73.8	43.3	64.9	38.2	57.4	31.4	47.1
	26	14.4	21.6	54.9	82.5	45.4	68.3	40.0	60.0	35.4	53.0	29.1	43.6
	27	13.4	20.0	50.9	76.5	42.1	63.3	37.1	55.7	32.8	49.2	26.9	40.4
	28	12.4	18.6	47.3	71.1	39.2	58.9	34.5	51.8	30.5	45.7	25.1	37.6
	29			44.1	66.3	36.5	54.9	32.2	48.3	28.4	42.6	23.4	35.0
	30			41.2	61.9	34.1	51.3	30.1	45.1	26.6	39.8	21.8	32.7
	32					30.0	45.1	26.4	39.6	23.3	35.0	19.2	28.8
	34											17.0	25.5
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	21.1	31.7	58.0	87.2	47.3	71.0	41.1	61.7	34.6	52.0	27.2	40.9
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	11.8	17.7	45.3	68.0	36.7	55.1	32.0	48.0	26.8	40.2	21.0	31.6
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		1050		1990		1720		1570		1390		1150	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		320		1130		982		889		785		645	
r_{mx}/r_{my}		1.81		1.33		1.32		1.33		1.33		1.34	
r_{my}, in.		1.71		1.91		1.97		1.99		2.02		2.05	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE HSS7

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS7x5x		HSS7x4x									
		⅛		½		⅜		5/16		¼		3/16	
t_{des}, in,		0.116		0.465		0.349		0.291		0.233		0.174	
Steel, lb/ft		9.86		31.8		24.9		21.2		17.3		13.3	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	136	204	264	396	216	324	193	289	168	252	142	213
	1	135	203	263	395	215	322	192	288	167	251	142	212
	2	134	201	259	389	212	318	189	284	165	248	140	210
	3	132	198	253	381	207	311	185	277	162	242	137	205
	4	129	193	245	369	201	301	179	269	156	235	132	198
	5	125	187	236	354	192	288	172	258	150	225	127	190
	6	120	181	224	337	183	274	163	245	143	214	121	181
	7	115	173	212	318	172	258	154	231	135	202	114	170
	8	110	165	198	297	160	241	144	216	126	189	106	159
	9	104	156	183	275	148	222	133	200	117	175	98.1	147
	10	97.4	146	168	253	136	203	122	183	107	161	89.9	135
	11	90.8	136	153	230	124	186	111	166	97.4	146	81.6	122
	12	84.1	126	138	207	112	169	99.8	150	87.8	132	73.4	110
	13	77.4	116	123	185	101	152	89.0	134	78.4	118	65.5	98.2
	14	70.8	106	109	164	90.1	135	79.0	119	69.4	104	57.8	86.7
	15	64.3	96.4	95.7	144	79.7	120	70.2	106	60.8	91.2	50.5	75.8
	16	58.0	87.0	84.1	126	70.0	105	61.8	92.9	53.4	80.2	44.4	66.6
	17	51.9	77.8	74.5	112	62.0	93.2	54.8	82.3	47.3	71.0	39.3	59.0
	18	46.3	69.4	66.4	99.9	55.3	83.2	48.9	73.4	42.2	63.3	35.1	52.6
	19	41.5	62.3	59.6	89.6	49.7	74.6	43.8	65.9	37.9	56.8	31.5	47.2
	20	37.5	56.2	53.8	80.9	44.8	67.4	39.6	59.5	34.2	51.3	28.4	42.6
	21	34.0	51.0	48.8	73.4	40.7	61.1	35.9	53.9	31.0	46.5	25.8	38.7
	22	31.0	46.5	44.5	66.8	37.0	55.7	32.7	49.2	28.3	42.4	23.5	35.2
	23	28.3	42.5	40.7	61.2	33.9	50.9	29.9	45.0	25.9	38.8	21.5	32.2
	24	26.0	39.1	37.4	56.2	31.1	46.8	27.5	41.3	23.7	35.6	19.7	29.6
	25	24.0	36.0	34.4	51.8	28.7	43.1	25.3	38.1	21.9	32.8	18.2	27.3
	26	22.2	33.3			26.5	39.9	23.4	35.2	20.2	30.4	16.8	25.2
	27	20.6	30.9							18.8	28.1	15.6	23.4
	28	19.1	28.7										
	29	17.8	26.7										
	30	16.7	25.0										
	32	14.6	22.0										
	34	13.0	19.5										
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	19.4	29.1	49.5	74.5	40.6	61.0	35.7	53.6	30.0	45.1	23.7	35.7
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	14.7	22.0	32.6	49.0	26.8	40.2	23.4	35.2	19.6	29.5	15.4	23.2
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		876		1640		1430		1300		1160		970	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		492		642		560		508		449		373	
r_{mx}/r_{my}		1.33		1.60		1.60		1.60		1.61		1.61	
r_{my}, in.		2.07		1.53		1.58		1.61		1.64		1.66	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS7–HSS6

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS7x4x		HSS6x5x							
		⅛		½		⅜		5/16		¼	
t_{des}, in.		0.116		0.465		0.349		0.291		0.233	
Steel, lb/ft		9.01		31.8		24.9		21.2		17.3	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	115	173	264	396	220	330	197	295	172	259
	1	115	172	263	395	220	329	196	295	172	258
	2	113	170	261	392	218	326	195	292	170	256
	3	110	166	257	386	214	321	192	287	168	252
	4	107	160	251	378	210	314	188	281	164	246
	5	102	153	245	368	204	306	182	274	160	240
	6	96.8	145	237	356	197	295	176	264	155	232
	7	90.8	136	228	342	189	284	169	254	149	223
	8	84.4	127	218	327	180	271	162	243	142	213
	9	77.6	116	207	311	171	257	154	230	135	202
	10	70.7	106	195	293	161	242	145	217	127	191
	11	63.8	95.7	183	275	151	226	136	204	119	179
	12	57.0	85.5	171	257	140	211	126	190	111	167
	13	50.5	75.7	159	238	130	195	117	176	103	155
	14	44.1	66.2	146	220	119	179	108	162	95.0	143
	15	38.5	57.7	134	201	109	164	98.6	148	87.0	130
	16	33.8	50.7	122	183	99.2	149	89.6	134	79.2	119
	17	29.9	44.9	110	166	90.2	136	81.0	121	71.6	107
	18	26.7	40.1	99.3	149	81.6	123	72.6	109	64.2	96.4
	19	24.0	35.9	89.1	134	73.3	110	65.1	97.7	57.7	86.5
	20	21.6	32.4	80.4	121	66.2	99.5	58.8	88.2	52.0	78.1
	21	19.6	29.4	72.9	110	60.0	90.2	53.3	80.0	47.2	70.8
	22	17.9	26.8	66.4	99.9	54.7	82.2	48.6	72.9	43.0	64.5
	23	16.4	24.5	60.8	91.4	50.0	75.2	44.4	66.7	39.3	59.0
	24	15.0	22.5	55.8	83.9	46.0	69.1	40.8	61.2	36.1	54.2
	25	13.8	20.8	51.5	77.3	42.4	63.7	37.6	56.4	33.3	50.0
	26	12.8	19.2	47.6	71.5	39.2	58.9	34.8	52.2	30.8	46.2
	27	11.9	17.8	44.1	66.3	36.3	54.6	32.3	48.4	28.6	42.8
	28	11.0	16.6	41.0	61.6	33.8	50.8	30.0	45.0	26.5	39.8
	29			38.2	57.5	31.5	47.3	28.0	41.9	24.7	37.1
	30			35.7	53.7	29.4	44.2	26.1	39.2	23.1	34.7
	32					25.9	38.9	23.0	34.4	20.3	30.5
Properties											
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	17.0	25.6	45.3	68.0	37.0	55.6	32.3	48.5	27.2	40.9
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	10.8	16.3	39.7	59.7	32.4	48.7	28.2	42.4	23.8	35.7
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		743		1330		1150		1050		928	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		284		978		850		772		684	
r_{mx}/r_{my}		1.62		1.17		1.16		1.17		1.16	
r_{my}, in.		1.69		1.87		1.92		1.95		1.98	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE
HSS6

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS6x5x				HSS6x4x							
		3/16		1/8		1/2		3/8		5/16		1/4	
t_{des}, in,		0.174		0.116		0.465		0.349		0.291		0.233	
Steel, lb/ft		13.3		9.01		28.4		22.4		19.1		15.6	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	147	220	120	180	236	355	191	287	171	256	149	223
	1	146	219	120	179	235	353	191	286	170	255	148	222
	2	145	217	118	177	232	348	188	282	168	251	146	219
	3	143	214	116	175	226	340	183	275	164	245	143	214
	4	139	209	114	170	219	329	177	266	158	238	138	207
	5	136	203	110	165	210	315	170	255	152	228	133	199
	6	131	196	106	159	199	300	161	242	144	216	126	189
	7	126	189	102	153	188	282	151	227	136	204	119	178
	8	120	180	96.8	145	175	263	141	211	127	190	111	166
	9	114	171	91.4	137	161	243	130	195	117	175	102	154
	10	107	161	85.8	129	148	222	119	179	107	160	93.8	141
	11	100	151	80.0	120	134	201	109	164	96.9	145	85.1	128
	12	93.5	140	74.0	111	120	181	98.4	148	87.0	131	76.5	115
	13	86.5	130	68.1	102	107	161	88.2	133	77.4	116	68.1	102
	14	79.5	119	62.2	93.3	94.3	142	78.4	118	68.9	104	60.1	90.2
	15	72.6	109	56.4	84.7	82.3	124	68.9	104	60.9	91.6	52.5	78.7
	16	65.9	98.9	50.9	76.3	72.3	109	60.5	91.0	53.5	80.5	46.1	69.2
	17	59.5	89.2	45.5	68.2	64.0	96.2	53.6	80.6	47.4	71.3	40.9	61.3
	18	53.2	79.8	40.6	60.8	57.1	85.9	47.8	71.9	42.3	63.6	36.4	54.7
	19	47.8	71.6	36.4	54.6	51.3	77.1	42.9	64.5	38.0	57.1	32.7	49.1
	20	43.1	64.7	32.9	49.3	46.3	69.5	38.7	58.2	34.3	51.5	29.5	44.3
	21	39.1	58.6	29.8	44.7	42.0	63.1	35.1	52.8	31.1	46.7	26.8	40.2
	22	35.6	53.4	27.2	40.7	38.2	57.5	32.0	48.1	28.3	42.6	24.4	36.6
	23	32.6	48.9	24.8	37.3	35.0	52.6	29.3	44.0	25.9	38.9	22.3	33.5
	24	29.9	44.9	22.8	34.2	32.1	48.3	26.9	40.4	23.8	35.8	20.5	30.8
	25	27.6	41.4	21.0	31.5	29.6	44.5	24.8	37.3	21.9	33.0	18.9	28.3
	26	25.5	38.3	19.4	29.2					20.3	30.5	17.5	26.2
	27	23.7	35.5	18.0	27.0								
	28	22.0	33.0	16.8	25.1								
	29	20.5	30.8	15.6	23.4								
	30	19.2	28.7	14.6	21.9								
	32	16.8	25.3	12.8	19.3								
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	21.5	32.4	15.3	23.0	38.3	57.5	31.7	47.7	27.8	41.8	23.5	35.3
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	18.7	28.1	13.2	19.9	28.5	42.8	23.5	35.3	20.5	30.9	17.3	26.0
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		771		588		1080		950		865		770	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		566		432		551		481		440		388	
r_{mx}/r_{my}		1.17		1.17		1.40		1.41		1.40		1.41	
r_{my}, in.		2.01		2.03		1.50		1.55		1.58		1.61	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

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COMPOSITE HSS6

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

A500 Gr. C
F_y = 50 ksi
f'_c = 5 ksi

Shape		HSS6x4x				HSS6x3x							
		3/16		1/8		1/2		3/8		5/16		1/4	
t_{des}, in,		0.174		0.116		0.465		0.349		0.291		0.233	
Steel, lb/ft		12.0		8.16		25.0		19.8		17.0		13.9	
Design		P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$	P_n/Ω_c	$\phi_c P_n$
		ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
Effective length, L_c (ft), with respect to the least radius of gyration, r_y	0	126	189	102	153	208	313	164	247	145	217	126	189
	1	125	188	101	152	206	310	163	245	144	215	125	187
	2	123	185	99.9	150	201	302	159	239	140	210	122	183
	3	121	181	97.5	146	193	290	153	230	134	202	117	175
	4	117	175	94.2	141	182	273	145	218	127	190	111	166
	5	112	168	90.0	135	169	254	135	203	118	177	103	154
	6	106	160	85.3	128	154	231	124	187	108	162	94.2	141
	7	100	150	80.0	120	138	207	113	169	97.3	146	84.9	127
	8	93.5	140	74.2	111	122	183	100	151	87.1	131	75.2	113
	9	86.4	130	68.2	102	105	158	88.0	132	76.7	115	65.6	98.5
	10	79.1	119	62.1	93.2	89.9	135	76.0	114	66.6	100	56.7	85.2
	11	71.7	108	56.0	84.0	75.2	113	64.7	97.2	57.0	85.7	48.8	73.4
	12	64.5	96.7	50.0	74.9	63.2	95.0	54.4	81.7	48.0	72.2	41.4	62.3
	13	57.4	86.1	44.1	66.2	53.8	80.9	46.3	69.6	40.9	61.5	35.3	53.1
	14	50.6	76.0	38.6	57.8	46.4	69.8	39.9	60.0	35.3	53.0	30.4	45.7
	15	44.2	66.3	33.6	50.4	40.4	60.8	34.8	52.3	30.7	46.2	26.5	39.9
	16	38.9	58.3	29.5	44.3	35.5	53.4	30.6	46.0	27.0	40.6	23.3	35.0
	17	34.4	51.6	26.1	39.2	31.5	47.3	27.1	40.7	23.9	36.0	20.6	31.0
	18	30.7	46.0	23.3	35.0	28.1	42.2	24.2	36.3	21.4	32.1	18.4	27.7
	19	27.6	41.3	20.9	31.4			21.7	32.6	19.2	28.8	16.5	24.8
	20	24.9	37.3	18.9	28.3							14.9	22.4
	21	22.6	33.8	17.1	25.7								
	22	20.6	30.8	15.6	23.4								
	23	18.8	28.2	14.3	21.4								
	24	17.3	25.9	13.1	19.7								
	25	15.9	23.9	12.1	18.1								
	26	14.7	22.1	11.2	16.8								
	27	13.6	20.5	10.4	15.6								
Properties													
M_{nx}/Ω_b	$\phi_b M_{nx}$ kip-ft	18.6	28.0	13.3	20.1	31.5	47.3	26.2	39.4	23.1	34.7	19.6	29.5
M_{ny}/Ω_b	$\phi_b M_{ny}$ kip-ft	13.7	20.5	9.69	14.6	18.6	28.0	15.6	23.5	13.8	20.7	11.6	17.5
$P_{ex}(L_c)^2/10^4$, kip-in.^{2}		651		495		841		746		685		609	
$P_{ey}(L_c)^2/10^4$, kip-in.^{2}		327		248		261		232		213		189	
r_{mx}/r_{my}		1.41		1.41		1.80		1.79		1.79		1.80	
r_{my}, in.		1.63		1.66		1.12		1.17		1.19		1.22	

ASD	LRFD
Ω_b = 1.67	ϕ_b = 0.90
Ω_c = 2.00	ϕ_c = 0.75

Notes: Heavy line indicates L_c/r_{my} equal to or greater than 200.
Dashed line indicates the L_c beyond which the bare steel strength controls.

Documents
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