W-Shapes | ASTM A992, $F_y = 50$ ksi, $F_u = 65$ ksi
S-Shapes | ASTM A36, $F_y = 36$ ksi, $F_u = 58$ ksi
C- and MC-Shapes | ASTM A36, $F_y = 36$ ksi, $F_u = 58$ ksi

CONDITION			ASD	LRFD	RELATED INFO
Tension			$0.6F_yA_g \le 0.5F_uA_e$	$0.9F_yA_g \le 0.75F_uA_e$	For A_e, see Equation D3-1.
Bending	Strong Axis	$L_b \le L_p$	$0.66F_yS_x$	$0.99F_yS_x$	See Note 1. $L_p = 300\,r_y/\sqrt{F_y}$ L_r and strengths when $L_b > L_r$ are given in the AISC Manual.
		$L_p < L_b \le L_r$	Use linear interpolation between L_p and L_r.		
		$L_b = L_r$	$0.42F_yS_x$	$0.63F_yS_x$	
	Weak Axis		$0.9F_yS_y$	$1.35F_yS_y$	
Shear (in strong axis)			$0.4F_yA_w$	$0.6F_yA_w$	See Note 2.
Compression	$Kl/r \le 800/\sqrt{F_y}$		$0.6F_yA_g \times 0.658^P$	$0.9F_yA_g \times 0.658^P$	$P = F_y\left(Kl/r\right)^2/286{,}000$ See Note 3.
	$Kl/r > 800/\sqrt{F_y}$		$150{,}000A_g/\left(Kl/r\right)^2$	$226{,}000A_g/\left(Kl/r\right)^2$	

Notes:

1. Multiply equations given for $L_b \le L_p$ by value in parentheses for W14×90 (0.97), W12×65 (0.98), and W6×15 (0.95).
2. Multiply equations given by 0.9 for W44×230, W40×149, W36×135, W33×118, W30×90, W24×55, W16×26, W12×14 and all C- and MC-shapes. In weak axis, equations given can be adapted by using $A_w = 1.8b_ft_f$.
3. Not applicable to slender shapes. For slender shapes, use QF_y in place of F_y, where $Q = Q_sQ_a$ from Section E7. For C- and MC-shapes, also check Section E4.

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Bolts | ASTM A325, F_u = 120 ksi or ASTM A490, F_u = 150 ksi
Welds | F_{EXX} = 70 ksi
Connected Parts

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CONDITION			ASD	LRFD	RELATED INFO
Bolts	Tension		$0.38F_u A_b$	$0.56F_u A_b$	--
Bolts	Shear (N bolts, per shear plane)		$0.2F_u A_b$	$0.3F_u A_b$	Multiply by 1.25 for X bolts.
Bolts	Slip Resistance (Class A, STD holes)		$0.14F_u A_b$	$0.21F_u A_b$	Per slip plane. See Note 1.
Bolts	Bearing		$0.6F_u L_c t \le 1.2F_u d_b t$	$0.9F_u L_c t \le 1.8F_u d_b t$	See Note 2.
Welds	Shear (all welds except CJP)		$0.3F_{EXX} A_w$	$0.45F_{EXX} A_w$	See Note 3.
Welds	PJP Groove Welds	Tension	$0.32F_{EXX} A_w$	$0.48F_{EXX} A_w$	See Section J2.1a.
Welds	PJP Groove Welds	Compression	$0.48F_{EXX} A_w \le 0.6F_y A_{BM}$	$0.72F_{EXX} A_w \le 0.9F_y A_{BM}$	Joint not finished to bear.
Welds	CJP Groove Welds		Strength equal to base metal.		--
Connected Parts	Tension		$0.6F_y A_g \le 0.5F_u A_e$	$0.9F_y A_g \le 0.75F_u A_e$	For A_e, see Equation D3-1.
Connected Parts	Shear		$0.4F_y A_g \le 0.3F_u A_n$	$0.6F_y A_g \le 0.45F_u A_n$	--
Connected Parts	Block Shear		$0.3F_u A_{nv} + 0.5U_{bs} F_u A_{nt}$	$0.45F_u A_{nv} + 0.75U_{bs} F_u A_{nt}$	See Note 4.
Connected Parts	Compression	$Kl/r \le 25$	$0.6F_y A$	$0.9F_y A$	--
Connected Parts	Compression	$Kl/r > 25$	Same as for W-shapes with $A_g = A$.		

Notes:

1. Slip checked as a serviceability limit state using ASD load combinations for ASD, LRFD load combinations for LRFD. For Class B surfaces, multiply by 1.43. For OVS or SSL holes, multiply by 0.85. For LSL holes, multiply by 0.7.
2. For LSL holes parallel to the direction of load, multiply by 0.83.
3. For fillet welds, multiply by 1.5 for transverse loading (90-degree load angle). For other load angles, see Section J2.
4. For calculation purposes, $F_u A_{nv}$ cannot exceed $F_y A_{gv}$. U_{bs} = 1 for a uniform tension stress; 0.5 for non-uniform tension stress.

HSS | ASTM A500 grade B, Rectangular $F_y = 46$ ksi, $F_u = 58$ ksi , Round $F_y = 42$ ksi, $F_u = 58$ ksi
Pipe | ASTM A53 grade B, $F_y = 35$ ksi, $F_u = 60$ ksi

CONDITION		ASD	LRFD	RELATED INFO
Tension		$0.6F_yA_g \le 0.5F_uA_e$	$0.9F_yA_g \le 0.75F_uA_e$	For A_e, see Equation D3-1.
Bending	Rectangular HSS	$0.66F_yS$	$0.99F_yS$	See Note 1.
	Round HSS, Pipe	$0.78F_yS$	$1.17F_yS$	See Note 2.
Shear	Rectangular HSS	$0.36F_yA_w$	$0.54F_yA_w$	See Note 3.
	Round HSS, Pipe	$0.18F_yA_g$	$0.27F_yA_g$	See Note 4.
Compression	$Kl/r \le 800/\sqrt{F_y}$	$0.6F_yA_g \times 0.658^P$	$0.9F_yA_g \times 0.658^P$	See Note 5. $P = F_y\left(Kl/r\right)^2/286{,}000$
	$Kl/r > 800/\sqrt{F_y}$	$150{,}000A_g/\left(Kl/r\right)^2$	$226{,}000A_g/\left(Kl/r\right)^2$	

Notes:
1. Not applicable if limit at right is exceeded (see Section F7).
2. Not applicable if $D/t > 2{,}030/F_y$. (see Section F8).
3. Not applicable if limit at right is exceeded (see Section G5).
4. Not applicable if $L_v/D > 75$ (see Section G6).
5. For rectangular HSS, if limit at right is exceeded, use QF_y in place of F_y, where $Q = Q_a$ from Section E7.2. For round HSS and pipe with $D/t > 3{,}190/F_y$, use QF_y in place of F_y, where $Q = Q_a$ from Section E7.2.

Size Limits for Rectangular HSS, in.*		**Nominal Wall Thickness**						
		$^5/_8$	$^1/_2$	$^3/_8$	$^5/_{16}$	$^1/_4$	$^3/_{16}$	$^1/_8$
Bending	Flange	18	14	10	9	7	5	$3^1/_2$
	Web	20	20	20	18	14	10	7
Shear		20	20	20	18	14	10	7
Compression		20	16	12	10	8	6	4

*Table only covers up to 64-in. periphery limit in ASTM A500.

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Simplified Method (see Note 1)

Step 1. Perform first-order analysis. Use 0.2% of total story gravity load as minimum lateral load in all load combinations.
Step 2. Establish the design story drift limit and determine the lateral load required to produce it.
Step 3. Determine the ratio of the total story gravity load to the lateral load determined in Step 2. For ASD, multiply by 1.6.
Step 4. Multiply first-order results by the tabular value. K=1, except for moment frames when the tabular value is greater than 1.1.

Design Story Drift Limit	**Ratio from Step 3 (times 1.6 for ASD, 1.0 for LRFD)**										
	0	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**80**	**100**	**120**
H/100	1	1.1	1.1	1.3	1.4				When ratio exceeds 1.5, simplified method requires a stiffer structure.		
H/200	1	1	1.1	1.1	1.2	1.3	1.3	1.4			
H/300	1	1	1	1.1	1.1	1.2	1.2	1.3	1.4	1.5	
H/400	1	1	1	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.4
H/500	1	1	1	1	1.1	1.1	1.1	1.2	1.2	1.3	1.3

K = 1

Other Elastic Methods (for plastic design, see Appendix 1)	**Effective Length**	**Forces and Moments**	**Limitations**	**Reference**
First-order analysis method – second-order effects captured from effects of additional lateral load	K = 1 for all frames (see Note 2)	From analysis	$\Delta_{2nd}/\Delta_{1st} \leq 1.5$; Axial load limited	Section C2.2b
Effective length method – second-order analysis with 0.2% of total story gravity load as minimum lateral load in all load combinations (see Note 3)	K = 1, except for moment frames with $\Delta_{2nd}/\Delta_{1st} > 1.1$	From analysis (see Note 3)	$\Delta_{2nd}/\Delta_{1st} \leq 1.5$	Section C2.2a
Direct analysis method – second-order analysis with notional lateral load and reduced EI and AE (see Note 3)	K = 1 for all frames	From analysis (see Note 3)	None	Appendix 7

Notes:

1. Derived from the effective length method, using the B_1-B_2 approximation with B_1 taken equal to B_2.
2. An additional amplification for member curvature effects is required for columns in moment frames.
3. The B_1-B_2 approximation (Section C2.1b) can be used to accomplish a second-order analysis within the limitation that $B_2 \leq 1.5$. Also, B_1 and B_2 can be taken equal to the multiplier tabulated for the simplified method above.
4. $\Delta_{2nd}/\Delta_{1st}$ is the ratio of second-order drift to first-order drift, which is also represented by B_2.