

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1	Allowable Stress Slenderness Between S_1 and S_2	Slenderness Limit S_2	Allowable Stress Slenderness $\geq S_2$
COMPRESSION IN BEAMS, extreme fiber gross section	Single web beams bent about strong axis	11	14.5	$L_d/r_y = 26$	$16.8 - 0.089 L_d/r_y$	$L_d/r_y = 125$	$88,000 / (L_d/r_y)^2$
	Round or oval tubes	12*	8	$L_d/r_y = 99$	$16.8 - 0.089 L_d/r_y$	$L_d/r_y = 125$	
	Solid rectangular and round section beams	13	17	$R_d/t = 44$	$28.9 - 1.79 \sqrt{R_d/t}$	$R_d/t = 120$	Same as Section 3.4.10
	Rectangular tubes and box sections	14	9	$R_d/t = 67$	$15.2 - 0.76 \sqrt{R_d/t}$	$R_d/t = 181$	
	Flat plates supported on one edge	15	19	$d/t \sqrt{L_b/d} = 16$	$26.7 - 0.49 d/t \sqrt{L_b/d}$	$d/t \sqrt{L_b/d} = 36$	$11,500 / (d/t)^2 (L_b/d)$
COMPRESSION IN COMPONENTS OF BEAMS, (component under uniform compression), gross section	Flat plates supported on one edge	15	10	$d/t \sqrt{L_b/d} = 34$	$26.7 - 0.49 d/t \sqrt{L_b/d}$	$d/t \sqrt{L_b/d} = 36$	
	Flat plates with both edges supported	16	14.5	$L_b S_c / \sqrt{S_1 J_y} = 179$	$16.8 - 0.172 \sqrt{L_b S_c / \sqrt{S_1 J_y}}$	$L_b S_c / \sqrt{S_1 J_y} = 4220$	$24,000 / (L_b S_c / \sqrt{S_1 J_y})$
	Curved plates supported on both edges	16.1*	8	$L_b S_c / \sqrt{S_1 J_y} = 2620$	$16.8 - 0.172 \sqrt{L_b S_c / \sqrt{S_1 J_y}}$	$L_b S_c / \sqrt{S_1 J_y} = 4220$	
	Flat plates with one edge supported and the other edge with stiffener	16.2	17	$R_d/t = 9.2$	$19.3 - 0.76 \sqrt{R_d/t}$	$R_d/t = 250$	$3800 / (R_d/t)(1 + \sqrt{R_d/t(35)})^2$
	Flat plates with both edges supported and with an intermediate stiffener	16.3	9	$R_d/t = 12$	$10.1 - 0.32 \sqrt{R_d/t}$	$R_d/t = 460$	
COMPRESSION IN COMPONENTS OF BEAMS, (component under bending in own plane) gross section	Flat plates with compression edge free, tension edge supported	17	19	$b/t = 10$	$26.7 - 0.75 b/t$	$b/t = 24$	$5,000/(b/t)^2$
	Flat plate with both edges supported	18	10	$b/t = 25$	$26.7 - 0.75 b/t$	$b/t = 24$	$5,000/(b/t)^2$
	Flat plate with horizontal stiffener, both edges supported	19	19	$h/t = 53$	$26.7 - 0.144 h/t$	$h/t = 93$	$1240/(h/t)$
	Unstiffened flat webs	20	10	—	10	$h/t = 124$	$1240/(h/t)$
	Stiffened flat webs	21	19	$h/t = 124$	$26.7 - 0.062 h/t$	$h/t = 214$	$2900/(h/t)$
SHEAR IN WEBS, gross section	Unstiffened flat webs	20	9	$h/t = 42$	$12.7 - 0.088 h/t$	$h/t = 96$	$39,000/(h/t)^2$
	Stiffened flat webs	21	4.5	—	4.5	$h/t = 93$	$39,000/(h/t)^2$
	Stiffened flat webs	21	9	$a_e/t = 70$	$17.5 - 0.121 a_e/t$	$a_e/t = 96$	$54,000/(a_e/t)^2$

Table 2-11
Allowable Stresses for BUILDING
and Similar Type Structures

5083—H111

Extrusions

WHITE BARS apply to nonwelded members and to welded members at locations farther than 1.0 in. from a weld.

SHADED BARS apply within 1.0 in. of a weld.

Equations that straddle the shaded and unshaded areas apply to both.

*For tubes with circumferential welds, equations of Sections 3.4.10, 3.4.12, and 3.4.16.1 apply for $R_b/t \leq 20$.

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress	
TENSION, axial	Any tension member	1	14.5	12.5
	Rectangular tubes, structural shapes bent around strong axis	2	14.5	12.5
	Round or oval tubes	3	17	15
	Shapes bent about weak axis, bars, plates	4	19	17
BEARING	On rivets and bolts	5	41	40
	On flat surfaces and pins and on bolts in slotted holes	6	27	27
Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1
COMPRESSION IN COLUMNS, axial, gross section	All columns	7	—	$kL/r = 0$
	Flat plates supported along one edge - columns buckling about a symmetry axis	8	11.5	$kL/r = 11$
	Flat plates supported along one edge - columns not buckling about a symmetry axis	8.1	12.5	$b/t = 4.6$
	Flat plates with both edges supported	9	11.5	$b/t = 6.7$
COMPRESSION IN COMPONENTS OF COLUMNS gross section	Flat plates with one edge supported and other edge with stiffener	9.1	12.5	$b/t = 15$
	Flat plates with both edges supported and with an intermediate stiffener	9.2	11.5	$b/t = 21$
	Curved plates supported on both edges, walls of round or oval tubes	10*	12.5	$R_b/t = 10$
			11.5	$R_b/t = 16$

See Section 3.4.9.1

See Section 3.4.9.2

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1	Allowable Stress Slenderness Between S_1 and S_2	Slenderness Limit S_2	Allowable Stress Slenderness $\geq S_2$
COMPRESSION IN BEAMS, extreme fiber gross section	Single web beams bent about strong axis	11	12.5	$L_y/r_y = 28$	14.5 - 0.072 L_y/r_y	$L_y/r_y = 136$	90,000 $(L_b/r_y)^2$
	Round or oval tubes	12*	12.5	$L_y/r_y = 28$	14.5 - 0.072 L_y/r_y	$L_y/r_y = 136$	
	Solid rectangular and round section beams	13	15	$R_y/t = 47$	25.2 - 1.48 $\sqrt{R_y/t}$	$R_y/t = 134$	Same as Section 3.4.10
	Rectangular tubes and box sections	14	17	$d/t \sqrt{L_b/d} = 16$	23.1 - 0.39 $d/t \sqrt{L_b/d}$	$d/t \sqrt{L_b/d} = 39$	11,800 $(d/t)^2 (L_b/d)$
	Flat plates supported on one edge	15	12.5	$b/t = 8.4$	17.3 - 0.57 b/t	$b/t = 15$	132,000 $(b/t)^2$
COMPRESSION IN COMPONENTS OF BEAMS, (component under uniform compression), gross section	Flat plates with both edges supported	16	12.5	$b/t = 27$	17.3 - 0.178 b/t	$b/t = 49$	420,000 $(b/t)^2$
	Curved plates supported on both edges	16.1*	15	$R_y/t = 8.2$	16.8 - 0.63 $\sqrt{R_y/t}$	$R_y/t = 290$	3900 $(R_y/t)(1 + \sqrt{R_y/t/35})^2$
	Flat plates with one edge supported and the other edge with stiffener	16.2	14	$R_y/t = 10$	15.9 - 0.59 $\sqrt{R_y/t}$	$R_y/t = 300$	
	Flat plates with both edges supported and with an intermediate stiffener	16.3			See Section 3.4.16.2		
					See Section 3.4.16.3		
COMPRESSION IN COMPONENTS OF BEAMS, (component under bending in own plane) gross section	Flat plates with compression edge free, tension edge supported	17	17	$b/t = 10$	23.1 - 0.60 b/t	$b/t = 26$	5,100 $(b/t)^2$
	Flat plate with both edges supported	18	16	$b/t = 12$	23.1 - 0.60 b/t	$b/t = 26$	5,100 $(b/t)^2$
	Flat plate with horizontal stiffener, both edges supported	19	17	$h/t = 53$	23.1 - 0.115 h/t	$h/t = 101$	1160 $(h/t)^2$
			16	$h/t = 62$	23.1 - 0.115 h/t	$h/t = 101$	1160 $(h/t)^2$
			17	$h/t = 122$	23.1 - 0.050 h/t	$h/t = 233$	2700 $(h/t)^2$
SHEAR IN WEBS, gross section	Unstiffened flat webs	20	8.5	$h/t = 42$	11.8 - 0.078 h/t	$h/t = 101$	40,000 $(h/t)^2$
	Stiffened flat webs	21	7.5	$h/t = 55$	11.8 - 0.078 h/t	$h/t = 101$	40,000 $(h/t)^2$
			8.5	$a_e/t = 72$	16.2 - 0.107 a_e/t	$a_e/t = 101$	55,000 $(a_e/t)^2$
			7.5	$a_e/t = 81$	16.2 - 0.107 a_e/t	$a_e/t = 101$	55,000 $(a_e/t)^2$

Table 2-12
Allowable Stresses for BUILDING
and Similar Type Structures
5083—H116, -H321

Sheet and Plate

(Thickness—0.188 to 1.500 in.)

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress	
TENSION, axial	Any tension member	1	19	14.5
	Rectangular tubes, structural shapes bent around strong axis	2	19	14.5
	Round or oval tubes	3	22	17
	Shapes bent about weak axis, bars, plates	4	24	19
BEARING	On rivets and bolts	5	45	41
	On flat surfaces and pins and on bolts in slotted holes	6	30	27
Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1
COMPRESSION IN COLUMNS, axial, gross section	All columns	7	—	$kL/r = 0$
	Flat plates supported along one edge - columns buckling about a symmetry axis	8	16	$b/t = 3.7$
	Flat plates supported along one edge - columns not buckling about a symmetry axis	8.1	16	$b/t = 3.7$
	Flat plates with both edges supported	9	16	$b/t = 12$
COMPRESSION IN COMPONENTS OF COLUMNS gross section	Flat plates with one edge supported and other edge with stiffener	9.1	14.5	$b/t = 19$
	Flat plates with both edges supported and with an intermediate stiffener	9.2		
	Curved plates supported on both edges, walls of round or oval tubes	10*	16	$R_b/t = 5.6$

WHITE BARS apply to nonwelded members and to welded members at locations farther than 1.0 in. from a weld.

SHADED BARS apply within 1.0 in. of a weld.

Equations that straddle the shaded and unshaded areas apply to both.

*For tubes with circumferential welds, equations of Sections 3.4.10, 3.4.12, and 3.4.16.1 apply for $R_b/t \leq 20$.

See Section 3.4.9.1

See Section 3.4.9.2

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1	Allowable Stress Slenderness Between S_1 and S_2	Slenderness Limit S_2	Allowable Stress Slenderness $\geq S_2$
COMPRESSION IN BEAMS, extreme fiber gross section	Single web beams bent about strong axis	11	16	$L_y/r_y = 23$	$18.3 - 0.101 L_y/r_y$	$L_y/r_y = 121$	$90,000 / (L_y/r_y)^2$
	Round or oval tubes	12*	18	$R_y/t = 46$	$31.5 - 1.99 \sqrt{R_y/t}$	$R_y/t = 118$	Same as Section 3.4.10
	Solid rectangular and round section beams	13	19	$d/t \sqrt{L_y/d} = 16$	$29.2 - 0.56 d/t \sqrt{L_y/d}$	$d/t \sqrt{L_y/d} = 35$	$11,800 / (d/t)^2 (L_y/d)$
	Rectangular tubes and box sections	14	16	$L_y S_c / 5 \sqrt{I_y} = 142$	$18.3 - 0.193 \sqrt{L_y S_c / 5 \sqrt{I_y}}$	$L_y S_c / 5 \sqrt{I_y} = 3980$	$24,000 / (L_y S_c / 5 \sqrt{I_y})$
	Flat plates supported on one edge	15	16	$b/t = 7.3$	$21.9 - 0.81 b/t$	$b/t = 14$	$149/(b/t)$
	Flat plates with both edges supported	16	16	$b/t = 24$	$21.9 - 0.25 b/t$	$b/t = 43$	$470/(b/t)$
	Curved plates supported on both edges	16.1*	18	$R_y/t = 12$	$21 - 0.85 \sqrt{R_y/t}$	$R_y/t = 235$	$3900 / (R_y/t)(1 + \sqrt{R_y/t(35)})^2$
	Flat plates with one edge supported and the other edge with stiffener	16.2	17	$R_y/t = 9.2$	$19.3 - 0.76 \sqrt{R_y/t}$	$R_y/t = 250$	
	Flat plates with both edges supported and with an intermediate stiffener	16.3					
	Flat plates with compression edge free, tension edge supported	17	20	$b/t = 11$	$29.2 - 0.85 b/t$	$b/t = 23$	$5,100/(b/t)^2$
COMPRESSION OF BEAMS, (component under uniform compression), gross section	Flat plate with both edges supported	18	20	$h/t = 56$	$29.2 - 0.163 h/t$	$h/t = 90$	$1310/(h/t)$
	Flat plate with horizontal stiffener, both edges supported	19	20	$h/t = 131$	$29.2 - 0.070 h/t$	$h/t = 207$	$3000/(h/t)$
	Unstiffened flat webs	20	11	$h/t = 38$	$15.5 - 0.118 h/t$	$h/t = 88$	$40,000/(h/t)^2$
	Stiffened flat webs	21	8.5	$a_e/t = 64$	$21.3 - 0.162 a_e/t$	$a_e/t = 88$	$55,000/(a_e/t)^2$

Table 2-13
Allowable Stresses for BUILDING
and Similar Type Structures

5086—H34

Sheet and Plate
Drawn Tube

WHITE BARS apply to nonwelded members and to welded members at locations farther than 1.0 in. from a weld.

SHADED BARS apply within 1.0 in. of a weld.

Equations that straddle the shaded and unshaded areas apply to both.

*For tubes with circumferential welds, equations of Sections 3.4.10, 3.4.12, and 3.4.16.1 apply for $R_b/t \leq 20$.

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress	
TENSION, axial	Any tension member	1	21	11.5
	Rectangular tubes, structural shapes bent around strong axis	2	21	11.5
	Round or oval tubes	3	24	13.5
	Shapes bent about weak axis, bars, plates	4	27	15
BEARING	On rivets and bolts	5	45	36
	On flat surfaces and pins and on bolts in slotted holes	6	30	24
Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1
COMPRESSION IN COLUMNS, axial, gross section	All columns	7	19	$kL/r = 2.1$
	Flat plates supported along one edge - columns buckling about a symmetry axis	8	11.5	$kL/r = 55$
	Flat plates supported along one edge - columns not buckling about a symmetry axis	8.1	19	$b/t = 4.5$
	Flat plates with both edges supported	9	19	$b/t = 14$
COMPRESSION IN COMPONENTS OF COLUMNS gross section	Flat plates with one edge supported and other edge with stiffener	9.1	19	—
	Flat plates with both edges supported and with an intermediate stiffener	9.2	19	—
	Curved plates supported on both edges, walls of round or oval tubes	10*	19	—

See Section 3.4.9.1

See Section 3.4.9.2

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1	Allowable Stress Slenderness Between S_1 and S_2	Slenderness Limit S_2	Allowable Stress Slenderness $\geq S_2$
COMPRESSION IN BEAMS, extreme fiber gross section	Single web beams bent about strong axis	11	19 11.5	$L_b/r_y = 27$ $L_b/r_y = 81$	22.8 - 0.140 L_b/r_y 22.8 - 0.140 L_b/r_y	$L_b/r_y = 108$ $L_b/r_y = 108$	90,000 $(L_b/r_y)^2$
	Round or oval tubes	12*	23 13.5	$R_b/t = 36$ $R_b/t = 52$	$39.2 - 2.7 \sqrt{R_b/t}$ $22.7 - 1.28 \sqrt{R_b/t}$	$R_b/t = 97$ $R_b/t = 146$	Same as Section 3.4.10
	Solid rectangular and round section beams	13	25 15	$d/t \sqrt{L_b/d} = 15$ $d/t \sqrt{L_b/d} = 27$	$36.7 - 0.79 d/t \sqrt{L_b/d}$ $36.7 - 0.79 d/t \sqrt{L_b/d}$	$d/t \sqrt{L_b/d} = 31$ $d/t \sqrt{L_b/d} = 31$	11,800 $(d/t)^2 (L_b/d)$
	Rectangular tubes and box sections	14	19 11.5	$L_b S_c / 5 \sqrt{I_y} = 198$ $L_b S_c / 5 \sqrt{I_y} = 1750$	$22.8 - 0.27 \sqrt{L_b S_c / 5 \sqrt{I_y}}$ $22.8 - 0.27 \sqrt{L_b S_c / 5 \sqrt{I_y}}$	$L_b S_c / 5 \sqrt{I_y} = 3160$ $L_b S_c / 5 \sqrt{I_y} = 3160$	24,000 $(L_b S_c / 5 \sqrt{I_y})$
	Flat plates supported on one edge	15	19 11.5	$b/t = 7.5$	27.5 - 1.13 b/t 11.5	$b/t = 12$ $b/t = 15$	167/(b/t) 167/(b/t)
COMPRESSION IN COMPONENTS OF BEAMS, (component under uniform compression), gross section	Flat plates with both edges supported	16	19 11.5	$b/t = 24$	27.5 - 0.36 b/t 11.5	$b/t = 39$ $b/t = 46$	530/(b/t) 530/(b/t)
	Curved plates supported on both edges	16.1*	23 13.5	$R_b/t = 7.5$ $R_b/t = 8.5$	$26.1 - 1.13 \sqrt{R_b/t}$ $15.1 - 0.55 \sqrt{R_b/t}$	$R_b/t = 192$ $R_b/t = 320$	3900 $(R_b/t)(1 + \sqrt{R_b/t/35})^2$
	Flat plates with one edge supported and the other edge with stiffener	16.2	See Section 3.4.16.2				
	Flat plates with both edges supported and with an intermediate stiffener	16.3	See Section 3.4.16.3				
COMPRESSION IN COMPONENTS OF BEAMS, (component under bending in own plane) gross section	Flat plates with compression edge free, tension edge supported	17	25 15	$b/t = 9.7$ $b/t = 18$	$36.7 - 1.20 b/t$ $36.7 - 1.20 b/t$	$b/t = 20$ $b/t = 20$	5,100/(b/t) ² 5,100/(b/t) ²
	Flat plate with both edges supported	18	25 15	$h/t = 51$	$36.7 - 0.23 h/t$ 15	$h/t = 80$ $h/t = 97$	1460/(h/t) 1460/(h/t)
	Flat plate with horizontal stiffener, both edges supported	19	25 15	$h/t = 118$	$36.7 - 0.099 h/t$ 15	$h/t = 185$ $h/t = 227$	3400/(h/t) 3400/(h/t)
	Unstiffened flat webs	20	12 6.5	$h/t = 39$	$17.5 - 0.140 h/t$ 6.5	$h/t = 83$ $h/t = 78$	40,000/(h/t) ² 40,000/(h/t) ²
SHEAR IN WEBS, gross section	Stiffened flat webs	21	12 6.5	$a_e/t = 62$	$24.0 - 0.193 a_e/t$ 6.5	$a_e/t = 83$ $a_e/t = 92$	55,000/(a_e/t) ² 55,000/(a_e/t) ²

Table 2-14
Allowable Stresses for BUILDING
and Similar Type Structures
5086—H111
Extrusions

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress	
TENSION, axial	Any tension member	1	12.5	11
	Rectangular tubes, structural shapes bent around strong axis	2	12.5	11
	Round or oval tubes	3	15	13
	Shapes bent about weak axis, bars, plates	4	17	14
BEARING	On rivets and bolts	5	37	36
	On flat surfaces and pins and on bolts in slotted holes	6	25	24
Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1
COMPRESSION IN COLUMNS, axial, gross section	All columns	7	—	$kL/r = 0$
	Flat plates supported along one edge - columns buckling about a symmetry axis	8	11	$b/t = 3.8$
	Flat plates supported along one edge - columns not buckling about a symmetry axis	8.1	11	$b/t = 3.8$
	Flat plates with both edges supported	9	11	$b/t = 12$
	Flat plates with one edge supported and other edge with stiffener	9.1	11	$b/t = 12$
	Flat plates with both edges supported and with an intermediate stiffener	9.2		
COMPRESSION IN COMPONENTS OF COLUMNS gross section	Curved plates supported on both edges, walls of round or oval tubes	10*	11	$R_b/t = 6.5$

WHITE BARS apply to nonwelded members and to welded members at locations farther than 1.0 in. from a weld.

SHADED BARS apply within 1.0 in. of a weld.

Equations that straddle the shaded and unshaded areas apply to both.
*For tubes with circumferential welds, equations of Sections 3.4.10, 3.4.12, and 3.4.16.1 apply for $R_b/t \leq 20$.

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1	Allowable Stress Slenderness Between S_1 and S_2	Slenderness Limit S_2	Allowable Stress Slenderness $\geq S_2$
COMPRESSION IN BEAMS, extreme fiber gross section	Single web beams bent about strong axis	11	11	$L_b/r_y = 25$	$12.4 - 0.056 L_b/r_y$	$L_b/r_y = 148$	$90,000 / (L_b/r_y)^2$
	Round or oval tubes	12*	11	$L_b/r_y = 25$	$12.4 - 0.056 L_b/r_y$	$L_b/r_y = 148$	
	Solid rectangular and round section beams	13	13	$R_b/t = 50$	$21.4 - 1.19 \sqrt{R_b/t}$	$R_b/t = 150$	Same as Section 3.4.10
	Rectangular tubes and box sections	14	13.5	$d/t \sqrt{L_b/d} = 18$	$19.5 - 0.31 d/t \sqrt{L_b/d}$	$d/t \sqrt{L_b/d} = 43$	$11,800 / (d/t)^2 (L_b/d)$
	Flat plates supported on one edge	15	11	$b/t = 8.4$	$14.7 - 0.44 b/t$	$b/t = 17$	$122/(b/t)$
COMPRESSION IN COMPONENTS OF BEAMS, (component under uniform compression), gross section	Flat plates with both edges supported	16	11	$b/t = 27$	$14.7 - 0.139 b/t$	$b/t = 53$	$390/(b/t)$
	Curved plates supported on both edges	16.1*	13	$R_b/t = 5.5$	$14.2 - 0.51 \sqrt{R_b/t}$	$R_b/t = 340$	$3900 / (R_b/t)(1 + \sqrt{R_b/t(35)})^2$
	Flat plates with one edge supported and the other edge with stiffener	16.2	12	$R_b/t = 10$	$13.5 - 0.47 \sqrt{R_b/t}$	$R_b/t = 350$	
	Flat plates with both edges supported and with an intermediate stiffener	16.3					
COMPRESSION IN COMPONENTS OF BEAMS, (component under bending in own plane) gross section	Flat plates with compression edge free, tension edge supported	17	14	$b/t = 12$	$19.5 - 0.46 b/t$	$b/t = 28$	$5,100/(b/t)^2$
	Flat plate with both edges supported	18	13.5	$b/t = 13$	$19.5 - 0.46 b/t$	$b/t = 28$	$5,100/(b/t)^2$
	Flat plate with horizontal stiffener, both edges supported	19	14	$h/t = 62$	$19.5 - 0.089 h/t$	$h/t = 110$	$1070/(h/t)$
			13.5	$h/t = 67$	$19.5 - 0.089 h/t$	$h/t = 110$	$1070/(h/t)$
			14	$h/t = 145$	$19.5 - 0.038 h/t$	$h/t = 250$	$2500/(h/t)$
SHEAR IN WEBS, gross section	Unstiffened flat webs	20	7.5	$h/t = 39$	$9.9 - 0.061 h/t$	$h/t = 110$	$40,000/(h/t)^2$
	Stiffened flat webs	21	6	$h/t = 64$	$9.9 - 0.061 h/t$	$h/t = 110$	$40,000/(h/t)^2$
			7.5	$a_e/t = 75$	$13.7 - 0.083 a_e/t$	$a_e/t = 110$	$55,000/(a_e/t)^2$
			6	$a_e/t = 93$	$13.7 - 0.083 a_e/t$	$a_e/t = 110$	$55,000/(a_e/t)^2$

Table 2-15
Allowable Stresses for BUILDING
and Similar Type Structures
5086—H116, -H32

Sheet and Plate
Drawn Tube

WHITE BARS apply to nonwelded members and to welded members at locations farther than 1.0 in. from a weld.

SHADED BARS apply within 1.0 in. of a weld.

Equations that straddle the shaded and unshaded areas apply to both.

*For tubes with circumferential welds, equations of Sections 3.4.10, 3.4.12, and 3.4.16.1 apply for $R_b/t \leq 20$.

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress	
TENSION, axial	Any tension member	1	17	11.5
	Rectangular tubes, structural shapes bent around strong axis	2	17	11.5
	Round or oval tubes	3	20	13.5
	Shapes bent about weak axis, bars, plates	4	22	15
BEARING	On rivets and bolts	5	41	36
	On flat surfaces and pins and on bolts in slotted holes	6	27	24
Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1
COMPRESSION IN COLUMNS, axial, gross section	All columns	7	—	$kL/r = 0$
	Flat plates supported along one edge - columns buckling about a symmetry axis	8	16	$b/t = 3.7$
		8.1	16	$b/t = 3.7$
	COMPRESSION IN COMPONENTS OF COLUMNS gross section	Flat plates with both edges supported	9	16
Flat plates with one edge supported and other edge with stiffener		9.1	16	$b/t = 12$
Flat plates with both edges supported and with an intermediate stiffener		9.2	16	$R_b/t = 2.4$
Curved plates supported on both edges, walls of round or oval tubes		10*	16	$R_b/t = 2.4$

See Section 3.4.9.1

See Section 3.4.9.2

Type of Stress	Type of Member or Component	Sec. 3.4.	Allowable Stress Slenderness $\leq S_1$	Slenderness Limit S_1	Allowable Stress Slenderness Between S_1 and S_2	Slenderness Limit S_2	Allowable Stress Slenderness $\geq S_2$
COMPRESSION IN BEAMS, extreme fiber gross section	Single web beams bent about strong axis	11	16	$L_b/r_y = 23$	$18.3 - 0.101 L_b/r_y$	$L_b/r_y = 121$	$90,000 / (L_b/r_y)^2$
	Round or oval tubes	12*	18	$R_b/t = 46$	$31.5 - 1.99 \sqrt{R_b/t}$	$R_b/t = 118$	Same as Section 3.4.10
	Solid rectangular and round section beams	13	15.5	$R_b/t = 50$	$21.4 - 1.19 \sqrt{R_b/t}$	$R_b/t = 150$	
	Rectangular tubes and box sections	14	16	$d/t \sqrt{L_b/d} = 16$	$29.2 - 0.56 d/t \sqrt{L_b/d}$	$d/t \sqrt{L_b/d} = 35$	$11,800 / (d/t)^2 (L_b/d)$
			15.5	$L_b S_c / 5 \sqrt{I_y J} = 1430$	$18.3 - 0.193 \sqrt{L_b S_c / 5 \sqrt{I_y J}}$	$L_b S_c / 5 \sqrt{I_y J} = 3980$	$24,000 / (L_b S_c / 5 \sqrt{I_y J})$
COMPRESSION IN COMPONENTS OF BEAMS, (component under uniform compression), gross section	Flat plates supported on one edge	15	16	$b/t = 7.3$	$21.9 - 0.81 b/t$	$b/t = 14$	$149/(b/t)$
	Flat plates with both edges supported	16	16	$b/t = 24$	$21.9 - 0.25 b/t$	$b/t = 43$	$470/(b/t)$
	Curved plates supported on both edges	16.1*	18	$R_b/t = 12$	$21 - 0.85 \sqrt{R_b/t}$	$R_b/t = 235$	$3900 / (R_b/t)(1 + \sqrt{R_b/t}/35)^2$
	Flat plates with one edge supported and the other edge with stiffener	16.2	13.5	$R/t = 8.5$	$15.1 - 0.55 \sqrt{R/t}$	$R/t = 340$	
	Flat plates with both edges supported and with an intermediate stiffener	16.3			See Section 3.4.16.2		
COMPRESSION IN COMPONENTS OF BEAMS, (component under bending in own plane) gross section	Flat plates with compression edge free, tension edge supported	17	20	$b/t = 11$	$29.2 - 0.85 b/t$	$b/t = 23$	$5,100/(b/t)^2$
	Flat plate with both edges supported	18	15	$b/t = 18$	$29.2 - 0.85 b/t$	$b/t = 23$	$5,100/(b/t)^2$
	Flat plate with horizontal stiffener, both edges supported	19	20	$h/t = 56$	$29.2 - 0.163 h/t$	$h/t = 90$	$1310/(h/t)$
			15		14	$h/t = 94$	$1310/(h/t)$
			20	$h/t = 131$	$29.2 - 0.070 h/t$	$h/t = 207$	$3000/(h/t)$
SHEAR IN WEBS, gross section	Unstiffened flat webs	20	9.5	$h/t = 42$	$13.6 - 0.097 h/t$	$h/t = 94$	$40,000/(h/t)^2$
	Stiffened flat webs	21	6.5	$h/t = 73$	$13.6 - 0.097 h/t$	$h/t = 94$	$40,000/(h/t)^2$
			9.5	$a_e/t = 69$	$18.7 - 0.133 a_e/t$	$a_e/t = 94$	$55,000/(a_e/t)^2$