Table 2-18W
ALLOWABLE STRESSES F/Ω (k/in^2) FOR BUILDING-TYPE STRUCTURES (WELDED)

Axial Tension	Section	F/Ω
axial tension stress on net effective area	D.2b	12.3
axial tension stress on gross area	D.2a	6.7
Shear or torsion		
Shear or torsion rupture	G, H.2	7.4
Bearing		
bolts or rivets on holes	J.3.6a, J.4.6	24.6
bolts on slots, pins on holes, flat surfaces	J.3.6b, J.6.5, J.8	16.4
screws in holes	J.5.5.1	16.0

6061 - T6	ASTM B209 0.010 to 4.000 in. thick
6061 - T651	ASTM B209 0.010 to 4.000 in. thick
6061 - T6	ASTM B210 0.025 to 0.500 in. thick
6061 - T6	ASTM B211 0.125 to 8.000 in. thick
6061 - T651	ASTM B211 0.125 to 8.000 in. thick
6061 - T6	ASTM B632 0.010 to 0.625 in. thick
6061 - T6	ASTM B221, B241, B429
6061 - T6510	ASTM B221
6061 - T6511	ASTM B221
6061 - T6	ASTM B247 0.000 to 4.000 thick
6061 - T6	ASTM B308 0.062 thick and greater
6351 - T5	ASTM B221 0.000 to 1.000 in. thick

F_{tyw} = 11 k/in^2 E = 10,100 k/in^2
F_{cyw} = 11 k/in^2 k_t = 1
F_{tuw} = 24 k/in^2

For thicknesses > 0.375" welded with 4043, 5554, or 5654 alloy filler

		λ	F/Ω for $\lambda \le \lambda_1$	λ_1	F/Ω for $\lambda_1 < \lambda < \lambda_2$	λ_2	F/Ω for $\lambda \ge \lambda_2$
Axial Compression - member buckling	E.2	kL/r	6.7	22.3	$0.00003\,\lambda^2 - 0.040\,\lambda + 7.5$	157	$51{,}352/\lambda^2$
Flexure - lateral-torsional buckling	F.4	see F.4.2		-	see F.4	157	$60{,}414/\lambda^2$
Elements - Uniform Compression							
flat elements supported on one edge in columns whose buckling axis is not an axis of symmetry	B.5.4.1	b/t	6.7	9.8	$8.6 - 0.198\,\lambda$	29	$2{,}417/\lambda^2$
flat elements supported on one edge in all other columns and all beams	B.5.4.1	b/t	6.7	9.8	$8.6 - 0.198\,\lambda$	21.8	$94/\lambda$
flat elements supported on both edges	B.5.4.2	b/t	6.7	30.8	$8.6 - 0.063\,\lambda$	68	$293/\lambda$
flat elements supported on both edges and with an intermediate stiffener	B.5.4.4	λ_s	6.7	22.3	$7.4 - 0.031\,\lambda$	157	$60{,}414/\lambda^2$
round hollow elements	B.5.4.5	R_b/t	6.7	52.2	$8.5 - 0.257\,\lambda^{1/2}$	389	$3{,}776/(\lambda k_n)$†
flat elements - direct strength method	B.5.4.6	λ_{eq}	6.7	49.2	$8.6 - 0.040\,\lambda$	109	$468/\lambda$
Elements - Flexural Compression							
flat elements supported on both edges	B.5.5.1	b/t	10.0	36.3	$11.4 - 0.039\,\lambda$	145	$830/\lambda$
flat elements supported on tension edge, compression edge free	B.5.5.2	b/t	10.0	6.7	$11.4 - 0.212\,\lambda$	36	$4{,}932/\lambda^2$
flat elements supported on both edges and with a longitudinal stiffener	B.5.5.3	b/t	10.0	81.4	$11.4 - 0.018\,\lambda$	326	$1{,}861/\lambda$
pipes and round tubes	B.5.5.4	R_b/t	$12.8 - 0.606\,\lambda^{1/2}$	149.9	$8.5 - 0.257\,\lambda^{1/2}$	389	$3{,}776/(\lambda k_n)$†
flat elements - direct strength method	B.5.5.5	λ_{eq}	M_{np}/S_{xc}	49.2	see B.5.5.5	145	$468/\lambda$
Elements - Shear							
flat elements supported on both edges	G.2	b/t	4.0	51.9	$5.2 - 0.023\,\lambda$	149	$38{,}665/\lambda^2$
flat elements supported on one edge	G.3	b/t	4.0	21.6	$5.2 - 0.056\,\lambda$	62	$6{,}713/\lambda^2$
pipes and round or oval tubes	G.4	λ_p*	4.0	91.3	$6.8 - 0.030\,\lambda$	149	$50{,}264/\lambda^2$
Torsion - pipes and round or oval tubes	H.2.1	λ_p*	4.0	51.9	$5.2 - 0.023\,\lambda$	149	$38{,}665/\lambda^2$

*$\lambda_p = 2.9(R_b/t)^{5/8}(L/R_b)^{1/4}$
†$k_n = (1+\lambda^{1/2}/35)^2$

Table 2-19W
ALLOWABLE STRESSES F/Ω (k/in^2) FOR BUILDING-TYPE STRUCTURES (WELDED)

Axial Tension	Section	F/Ω
axial tension stress on net effective area	D.2b	12.3
axial tension stress on gross area	D.2a	9.1
Shear or torsion		
Shear or torsion rupture	G, H.2	7.4
Bearing		
bolts or rivets on holes	J.3.6a, J.4.6	24.6
bolts on slots, pins on holes, flat surfaces	J.3.6b, J.6.5, J.8	16.4
screws in holes	J.5.5.1	16.0

6061 - T6	ASTM B209 0.010 to 4.000 in. thick
6061 - T651	ASTM B209 0.010 to 4.000 in. thick
6061 - T6	ASTM B210 0.025 to 0.500 in. thick
6061 - T6	ASTM B211 0.125 to 8.000 in. thick
6061 - T651	ASTM B211 0.125 to 8.000 in. thick
6061 - T6	ASTM B632 0.010 to 0.625 in. thick
6061 - T6	ASTM B221, B241, B429
6061 - T6510	ASTM B221
6061 - T6511	ASTM B221
6061 - T6	ASTM B247 0.000 to 4.000 thick
6061 - T6	ASTM B308 0.062 thick and greater
6351 - T5	ASTM B221 0.000 to 1.000 in. thick

F_{tyw} = 15 k/in^2 E = 10,100 k/in^2
F_{cyw} = 15 k/in^2 k_t = 1
F_{tuw} = 24 k/in^2

For thicknesses ≤ 0.375" welded with 4043, 5554, or 5654 and for any thickness welded with 5183, 5356, or 5556

		λ	F/Ω for $\lambda \le \lambda_1$	λ_1	F/Ω for $\lambda_1 < \lambda < \lambda_2$	λ_2	F/Ω for $\lambda \ge \lambda_2$
Axial Compression - member buckling	E.2	kL/r	9.1	21.8	$0.00007\lambda^2 - 0.066\lambda + 10.5$	133	$51{,}352/\lambda^2$
Flexure - lateral-torsional buckling	F.4	see F.4.2		-	see F.4	133	$60{,}414/\lambda^2$
Elements - Uniform Compression							
flat elements supported on one edge in columns whose buckling axis is not an axis of symmetry	B.5.4.1	b/t	9.1	9.0	$12.0 - 0.327\lambda$	25	$2{,}417/\lambda^2$
flat elements supported on one edge in all other columns and all beams	B.5.4.1	b/t	9.1	9.0	$12.0 - 0.327\lambda$	18.4	$111/\lambda$
flat elements supported on both edges	B.5.4.2	b/t	9.1	28.2	$12.0 - 0.105\lambda$	58	$346/\lambda$
flat elements supported on both edges and with an intermediate stiffener	B.5.4.4	λ_s	9.1	21.8	$10.2 - 0.051\lambda$	133	$60{,}414/\lambda^2$
round hollow elements	B.5.4.5	R_b/t	9.1	46.4	$11.8 - 0.396\lambda^{1/2}$	389	$3{,}776/(\lambda k_n)$†
flat elements - direct strength method	B.5.4.6	λ_{eg}	9.1	45.1	$12.0 - 0.065\lambda$	92	$554/\lambda$
Elements - Flexural Compression							
flat elements supported on both edges	B.5.5.1	b/t	13.6	36.2	$16.0 - 0.065\lambda$	123	$982/\lambda$
flat elements supported on tension edge, compression edge free	B.5.5.2	b/t	13.6	6.7	$16.0 - 0.350\lambda$	30	$4{,}932/\lambda^2$
flat elements supported on both edges and with a longitudinal stiffener	B.5.5.3	b/t	13.6	81.2	$16.0 - 0.029\lambda$	275	$2{,}201/\lambda$
pipes and round tubes	B.5.5.4	R_b/t	$17.7 - 0.933\lambda^{1/2}$	120.8	$11.8 - 0.396\lambda^{1/2}$	389	$3{,}776/(\lambda k_n)$†
flat elements - direct strength method	B.5.5.5	λ_{eg}	M_{np}/S_{xc}	45.1	see B.5.5.5	123	$554/\lambda$
Elements - Shear							
flat elements supported on both edges	G.2	b/t	5.5	47.5	$7.3 - 0.038\lambda$	126	$38{,}665/\lambda^2$
flat elements supported on one edge	G.3	b/t	5.5	19.8	$7.3 - 0.092\lambda$	53	$6{,}713/\lambda^2$
pipes and round or oval tubes	G.4	λ_p*	5.5	80.0	$9.5 - 0.050\lambda$	126	$50{,}264/\lambda^2$
Torsion - pipes and round or oval tubes	H.2.1	λ_p*	5.5	47.5	$7.3 - 0.038\lambda$	126	$38{,}665/\lambda^2$

*$\lambda_p = 2.9(R_b/t)^{5/8}(L/R_b)^{1/4}$
†$k_n = (1+\lambda^{1/2}/35)^2$