Fatigue Strengths of Wrought Aluminum Alloys (Approximate Average Values as Determined in Tests of Smooth and Notched R.R. Moore Rotating Beam Fatigue Machines)

Tests were made of R.R. Moore specimens (Fig. 1) in R.R. Moore rotating beam fatigue machines in accordance with ASTM test methods in existence at the time. Stresses were completely reversed in bending (stress ratio, R, was −1.0). The tests were made over the period from about 1950 through about 1985. Test speeds ranged from about 3,500 to 10,000 rpm (no speed of testing effect was ever noted over this range). In general, each fatigue curve was generated from tests of 10 to 15 specimens often representing several different material samples (i.e., different production lots and composition). A number of these specimens were utilized to identify the highest stress that would not cause failure in 500 million cycles, which was identified as the endurance limit. An average fatigue curve was drawn through the completed data set, and the table entries are the intersections of the average line with the respective cyclic lives. There was no atmospheric control in the testing laboratories.

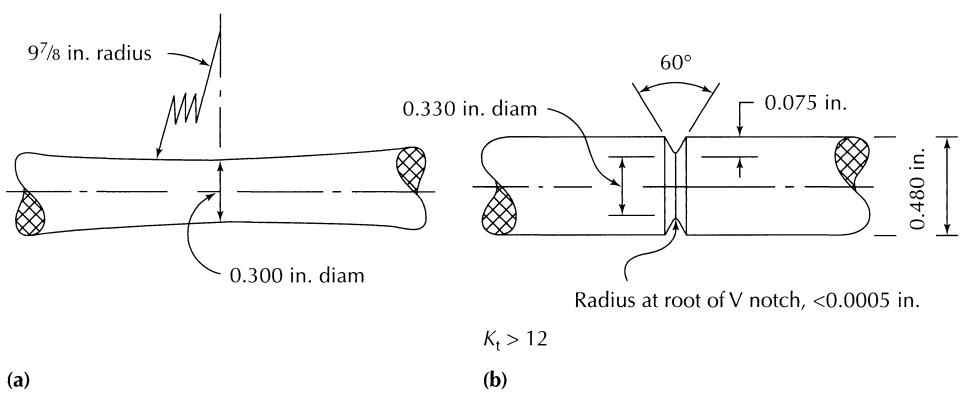

Fig. 1 Smooth (a) and notched (b) R.R. Moore rotating beam specimens

Rotating-Beam Fatigue Strengths

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
1100 smooth specimens																
O	Rolled rod and shapes	4	...	...	...	...	8	55	6.5	45	5.5	38	5	34	5	34
H14	Rolled rod and shapes	1	...	...	...	...	13	90	10	70	9	62	8	55	7	48
H16	Rolled rod and shapes	2	...	...	19	130	14	95	11.5	80	10	70	9	62	8	55
H18	Rolled rod and shapes	2	...	...	22	150	16.5	115	13.5	95	11	75	10	70	9	62
H26	Rolled rod and shapes	1	...	...	19	130	14	95	11.5	80	10	70	9	62	8	55
1100 notched specimens(a)																
H16	Rolled rod and shapes	1	...	...	18	125	13	90	8	55	5.5	38	4	28	4	28
H18	Rolled rod and shapes	2	...	...	18	125	13	90	8	55	5.5	38	4	28	4	28
H26	Rolled rod and shapes	1	...	...	18	125	13	90	8	55	5.5	38	4	28	4	28
1160 smooth specimens																
H12	Rolled rod and shapes	1	...	...	11	75	8	55	6.5	45	5.5	38	4.5	31	4	28
H18	Rolled rod and shapes	1	...	...	19	130	13	90	10	70	8.5	59	7	48	6.5	45
1160 notched specimens(a)																
H12	Rolled rod and shapes	1	...	...	11	75	7.5	52	5.5	38	4.5	31	3.5	24	3	21
H18	Rolled rod and shapes	1	...	...	18	125	11	75	7	48	5	34	4	28	3	21
1350 smooth specimens																
H12	Rolled rod and shapes, Wire	3	...	...	16	110	12.5	85	10	70	8	55	6.5	45	6	41
H19	Rolled rod and shapes	1	...	...	22.5	155	16	110	12.5	85	10	70	8	55	7	48
1350 notched specimens(a)																
H12	Rolled rod and shapes	1	...	...	10	70	7	48	4	28	3	21	2.5	17	2	14
H19	Rolled rod and shapes	1	...	...	...	...	14	95	7.5	52	4	28	3	21	3	21
2011 smooth specimens																
T3	Rolled rod and shapes	2	...	...	46	315	35	240	26.5	185	22.5	155	19.5	135	18	125
T6	Rolled rod and shapes	2	...	...	50	345	39	270	30	205	23.5	160	20	140	18	125
T8	Rolled rod and shapes	2	...	...	46	315	37	255	27.5	190	22	150	19	130	18	125
2011 notched specimens(a)																
T3	Rolled rod and shapes	1	...	...	28	195	23	160	16	110	12	85	10.5	70	10	70
T8	Rolled rod and shapes	1	...	...	24	165	17	115	11.5	80	9.5	66	8.5	59	8.5	59
2014 smooth specimens																
O	Rolled rod and shapes	2	...	...	...	...	18.5	130	15	105	13.5	95	12.5	85	12	85
T4	Rolled rod and shapes, plate, forgings, extrusions	15	...	...	58	400	42	290	34	235	27	185	22	150	20	140
T6	Rolled rod and shapes, plate, forgings, extrusions	54	...	...	52	360	39	270	30	205	24	165	19	130	18	125
T61	Forgings	2	...	...	52	360	39	270	30	205	24	165	19	130	18	125
T64	Extrusions	3	...	...	52	360	39	270	30	205	24	165	19	130	18	125
T651	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...			36	250	28	195	22	150	18	125	18	125
T652	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	50	345	36	250	29	200	23	160	19	130	18	125
2014 notched specimens(a)																
O	Rolled rod and shapes	2	...	...	13	90	9	62	8	55	7	48	6	41	6	41
T4	Rolled rod and shapes, plate, forgings, extrusions	10	...	...	31	215	21	145	14	95	10	70	9	62	9	62
T6	Rolled rod and shapes, plate, forgings, extrusions	35	...	...	31	215	21	145	14	95	10	70	9	62	9	62
T61	Forgings	1	...	...	31	215	21	145	14	95	10	70	9	62	9	62
T64	Forgings	3	...	...	31	215	21	145	14	95	10	70	9	62	9	62
T651	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	20	140	13	90	9	62	7	48	6	41
T652	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	30	205	16.5	115	10	70	5.5	38	...	...	...	...

(continued)

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
2017 smooth specimens																
O	Rolled rod and shapes	2	...	...	...	...	21	145	19	130	17	115	14.5	100	13	90
T4	Rolled rod and shapes, plate, extrusions	6	...	...	...	...	40	275	32	220	24	165	19	130	18	125
2017 notched specimens(a)																
O	Rolled rod and shapes	2	...	...	15	105	10.5	70	8	55	7	48	6.5	45	6.5	45
T4	Rolled rod and shapes, plate, extrusions	5	...	...	29	200	20	140	16	110	10	70	9	62	8	55
2018 smooth specimens																
O	Rolled rod and shapes	1	...	...	...	...	...	...	16	110	13	90	10	70	9	62
T61	Rolled rod and shapes, forgings	7	...	...	53	365	42	290	29	200	23	160	19.5	135	17	115
2018 notched specimens(a)																
O	Rolled rod and shapes	1	...	...	...	...	11	75	9	62	8	55	7	48	7	48
T61	Rolled rod and shapes, forgings	7	...	...	27	185	20	140	14	95	11	75	9	62	8.5	59
2020 smooth specimens																
O	Plate	1	...	...	21	145	18	125	16	110	15	105	14.5	100	14	95
T6	Rolled rod and shapes, plates, forgings, extrusions	9	...	...	53	365	40	275	30	205	24	165	21.5	150	21	145
T651	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	9	...	...	53	365	40	275	30	205	24	165	20.5	141	19	130
	Rolled rod and shapes; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	53	365	40	275	30	205	24	165	20.5	141	19	130
2020 notched specimens(a)																
O	Rolled rod and shapes	1	...	...	16	110	8	55	7	48	6.5	45	6.5	45	...	...
T6	Rolled rod and shapes, plates, forgings, extrusions	8	...	...	32	220	23	160	14	95	9	62	6.5	45	5.5	38
T651	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	9	...	...	33	230	22	150	12.5	85	8	55	6	41	5.5	38
	Rolled rod and shapes; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	33	230	22	150	12.5	85	8	55	6	41	5.5	38
2024 smooth specimens																
O	Rolled rod and shapes	1	...	...	...	...	22	150	20	140	17	115	15	105	13	90
T34	Rolled rod and shapes	1	...	...	56	385	43	295	31	215	24	165	21	145	20	140
T351	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	2	...	...	...	...	42	290	30	205	22	150	16.5	115	15.5	105
T36	Rolled rod and shapes, plate	2	...	...	55	380	40	275	32	220	24	165	20	140	18	125
T4	Rolled rod and shapes, plate, extrusions	20	...	...	56	385	43	295	31	215	24	165	21	145	20	140
T6	Rolled rod and shapes, plate, forgings, extrusions	8	...	...	54	370	43	295	31	215	24	165	20	140	18	125
T81	Plate	1	...	...	54	370	43	295	31	215	23	160	19	130	17	115
T84	Rolled rod and shapes	1	...	...	...	...	43	295	31	215	24	165	20	140	18	125

(continued)

Approximate average values as determined by test in R.R. Moore rotating-beam fatigue machines. Approximate completely reversed flexural stresses
(a) Values determined using specimens containing a single 60° sharp V-notch, 0.075 in. (1.91 mm) deep with root diameter of 0.330 in. (8.38 mm) and a root radius at base of notch <0.0005 in. (0.0125 mm) (K_t >12). (b) Obsolete alloy
Source data are in English units; metric values are converted and rounded.

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
2024 smooth specimens (continued)																
T851	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	8	...	...	49	340	36	250	28	195	23	160	16	110	15	105
	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	6	...	...	...	...	35	240	25	170	19	130	15	105	14	95
T8511	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	56	385	43	295	31	215	24	165	21	145	20	140
T852	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	2	...	...	...	...	39	270	28	195	21	145	16	110	15.5	105
T86	Rolled rod and shapes, plate	3	...	...	57	395	43	295	31	215	24	165	20	140	18	125
2024 notched specimens(a)																
O	Rolled rod and shapes	1	...	...	15	105	12.5	85	10	70	8	55	7	48	6	41
T34	Rolled rod and shapes	1	...	...	...	...	18	125	15	105	12	85	9	62	8	55
T351	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	2	...	...	30	205	21	145	13	90	9	62	8	55	7	48
T36	Rolled rod and shapes, plate	2	...	...	...	...	21	145	13	90	10	70	9	62	8.5	59
T4	Rolled rod and shapes, plate, extrusions	14	...	...	32	220	24	165	17	115	13	90	11	75	11	75
T6	Rolled rod and shapes, plate, forgings, extrusions	8	...	...	29	200	18	125	13	90	10	70	9	62	8	55
T81	Forgings	1	...	...	31	215	17	115	11	75	10	70	9	62	8.5	59
T84	Rolled rod and shapes	1	...	...	29	200	16	110	10	70	9	62	8	55	7.5	52
T851	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	8	...	...	29	200	17	115	11	75	8	55	7	48	6	41
	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	6	...	...	25	170	15	105	9	62	7	48	6	41	5	34
T8511	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	29	200	17	115	11	75	8	55	7	48	6	41
T852	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	2	...	...	25	170	15	105	9	62	6	41	5.5	38	5	34
T86	Rolled rod and shapes, plate	3	...	...	29	200	18	125	13	90	9	62	8	55	7	48
2025 smooth specimens																
O	Extrusions	1	...	...	...	...	...	...	...	...	...	...	...	...	9	62
T4	Rolled rod and shapes, extrusions	3	...	...	...	...	35	240	26	180	21	145	17	115	15	105
T6	Rolled rod and shapes, forgings, extrusions	27	...	...	...	...	35	240	26	180	21	145	17	115	15	105
2025 notched specimens(a)																
T6	Rolled rod and shapes, forgings	4	...	...	...	...	18	125	13	90	11	75	10	70	9	62
2027 smooth specimens																
T6	Rolled rod and shapes	1	...	...	...	...	...	...	27	185	20	140	15	105	13	90

(continued)

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
2027 notched specimens(a)																
T6	Rolled rod and shapes	1	...	...	...	...	20	140	12	85	10	70	9	62	8	55
2117 smooth specimens																
T4	Extrusions	1	...	...	...	...	...	...	...	...	21	145	16	110	14	95
2118 smooth specimens																
T61	Rolled rod and shapes	1	...	...	...	...	38	260	27	185	23	160	21	145	20	140
2125 smooth specimens																
T6	Rolled rod and shapes	1	...	...	...	...	...	...	...	...	20	140	15	105	13	90
2125 notched specimens(a)																
T6	Rolled rod and shapes	1	...	...	...	...	...	...	9	62	8	55	7.5	52	7	48
2127 smooth specimens																
T6	Rolled rod and shapes	1	...	...	...	...	...	...	28	195	20	140	13	90	12	85
2217 smooth specimens																
T4	Rolled rod and shapes	1	...	...	...	...	...	...	...	...	23	160	18	125	16	110
2218 smooth specimens																
T61	Rolled rod and shapes, forgings	4	...	...	50	345	40	275	32	220	26	180	21	145	19	130
2218 notched specimens(a)																
T61	Rolled rod and shapes, forgings	4	...	...	...	...	18	125	15	105	13	90	12	85	11	75
2219 smooth specimens																
T31	Plate	1	...	...	...	...	36	250	25	170	19	130	16	110	14	95
T37	Plate	1	...	...	...	...	36	250	25	170	19	130	16	110	14	95
T6	Forgings, extrusions	5	...	...	42	290	32	220	25	170	20	140	17	115	16	110
T62	Plate, extrusions	7	...	...	46	315	35	240	26	180	21	145	18	125	16	110
T81	Extrusions	4	...	...	46	315	35	240	26	180	21	145	18	125	16	110
T851	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	6	...	...	46	315	35	240	26	180	21	145	16.5	115	15	105
	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	46	315	35	240	26	180	21	145	16.5	115	15	105
T8511	Extrusions; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	46	315	35	240	26	180	21	145	16.5	115	16	110
	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	35	240	26	180	21	145	16.5	115	16	110
T852	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	35	240	26	180	21	145	18	125	16	110
	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	2	...	...	40	275	32	220	25	170	19	130	16	110	15	105
T87	Plate, forgings	6	...	...	46	315	35	240	26	180	19	130	16	110	14	95
2219 notched specimens(a)																
T31	Plate	1	...	...	28	195	18	125	11	75	8	55	7	48	6	41
T37	Plate	1	...	...	28	195	18	125	11	75	8	55	7	48	6	41
T6	Forgings, extrusions	3	...	...	28	195	15	105	10	70	9	62	8	55	7	48
T62	Plate, extrusions	4	...	...	27	185	15	105	9	62	7	48	6	41	5.5	38
T81	Extrusions	4	...	...	27	185	15	105	9	62	7	48	6	41	5.5	38
T851	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	6	...	...	28	195	15	105	9	62	7	48	6	41	5.5	38

(continued)

Approximate average values as determined by test in R.R. Moore rotating-beam fatigue machines. Approximate completely reversed flexural stresses
(a) Values determined using specimens containing a single 60° sharp V-notch, 0.075 in. (1.91 mm) deep with root diameter of 0.330 in. (8.38 mm) and a root radius at base of notch <0.0005 in. (0.0125 mm) (K_t >12). (b) Obsolete alloy
Source data are in English units; metric values are converted and rounded.

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
2219 notched specimens(a) (continued)																
T8511	Extrusions; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	28	195	15	105	9	62	7	48	6	41	5.5	38
	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	28	195	15	105	9	62	7	48	6	41	5.5	38
T852	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	2	...	...	...	...	15	105	10	70	8	55	7	48	6.5	45
T87	Plate, forgings	5	...	...	27	185	15	105	9	62	7	48	6	41	5	34
2225 smooth specimens																
T6	Ingot	1	...	...	41	285	28	195	18	125	13	90	11	75	10	70
2225 notched specimens(a)																
T6	Ingot	1	...	...	...	...	17	115	12	85	10	70	9	62	...	...
2227 smooth specimens																
T6	Rolled rod and shapes	1	...	...	...	...	...	...	26	180	21	145	17	115	15	105
2317 smooth specimens																
T4	Forgings	1	...	...	...	...	...	...	24	165	19	130	15	105	13.5	93
2518 smooth specimens																
T6	Rolled rod and shapes	1	...	...	...	...	42	290	31	215	24	165	19	130	17	115
2618 smooth specimens																
T6	Forgings, extrusions	2	...	...	50.5	350	39	270	30	205	24	165	20	140	19	130
T61	Forgings	2	...	...	50.5	350	39	270	30	205	24	165	20	140	19	130
T651	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	36	250	27	185	21	145	18	125	17	115
T6511	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	39	270	30	205	22	150	16.5	115	15	105
2618 notched specimens(a)																
T6	Forgings, extrusions	2	...	...	25	170	20	140	13.5	95	10	70	9	62	8.5	59
T61	Forgings	2	...	...	25	170	20	140	13.5	95	10	70	9	62	8.5	59
T651	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	16	110	10.5	70	8.5	59	7.5	52	7	48
T6511	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	27	185	13	90	9.5	66	8	55	7	48	6	41
3003 smooth specimens																
O	Rolled rod and shapes	3	14.5	100	12	85	10.5	70	9	62	8	55	7.5	52	7	48
H14	Rolled rod and shapes	1	27	185	21	145	17	115	12	85	10	70	9	62	9	62
H16	Rolled rod and shapes	1	...	...	24	165	18	125	12.5	85	10.5	70	9.5	66	9.5	66
H18	Rolled rod and shapes	3	...	...	28	195	19	130	14	95	11.5	80	10.5	70	10	70
H24	Rolled rod and shapes	1	...	...	21	145	17	115	12	85	10	70	9	62	9	62
3003 notched specimens(a)																
O	Rolled rod and shapes	1	...	...	10	70	6	41	4.5	31	4	28	3.5	24	3.5	24
H14	Rolled rod and shapes	1	...	...	17	115	11	75	6.5	45	5	34	4.5	31	4	28
H16	Rolled rod and shapes	1	...	...	18	125	11.5	80	7.5	52	6	41	5.5	38	5	34
H18	Rolled rod and shapes	1	...	...	19	130	11.5	80	8.5	59	7	48	6	41	5.5	38
H24	Rolled rod and shapes	1	...	...	17	115	11	75	6.5	45	5	34	4.5	31	4	28
3004 smooth specimens																
O	Extrusions	3	...	...	24	165	19.5	135	16.5	115	15.5	105	14.5	100	14	95
H14	Rolled rod and shapes, plate	2	38	260	31	215	25	170	20	140	17.5	120	16.5	115	16	110
H18	Rolled rod and shapes	3	42	290	34	235	28.5	195	23	160	20.5	140	19	130	18	125
H19	Rolled rod and shapes	1			37	255	29.5	205	23	160	20.5	140	19	130	18	125
H34	Rolled rod and shapes	1	38	260	31	215	25	170	20	140	17.5	120	16.5	115	16	110
H38	Rolled rod and shapes	2	42	290	34	235	28.5	195	23	160	20.5	140	19	130	18	125
H39	Rolled rod and shapes	1	...	...	37	255	29.5	205	23	160	20.5	140	19	130	18	125

(continued)

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
3004 notched specimens(a)																
O	Extrusions	1	20	140	16	110	12	85	7	48	6	41	5.5	38	5	34
H14	Rolled rod and shapes, plate	1	35	240	25	170	16	110	11	76	10	69	9	62	9	62
H18	Rolled rod and shapes	1	40	275	28	195	19	130	16	110	11	75	10	70	9	62
H19	Rolled rod and shapes	1	...	...	28	195	19	130	16	110	11	75	10	70	9	62
H34	Rolled rod and shapes	1	35	240	25	170	16	110	11	75	10	70	9	62	9	62
H38	Rolled rod and shapes	1	40	275	28	195	19	130	16	110	11	75	10	70	9	62
H39	Rolled rod and shapes	1	41	285	28	195	19	130	16	110	11	75	10	70	9	62
4032 smooth specimens																
T6	Rolled rod and shapes	2	...	...	45	310	38	260	30	205	24	165	18	125	16.5	115
4032 notched specimens(a)																
T6	Rolled rod and shapes	2	...	...	27	185	20	140	16	110	13	90	11	76	10	70
4043 smooth specimens																
O	Rolled rod and shapes	1	...	...	...	...	...	...	7.5	52	6.5	45	6	41	6	41
H18	Rolled rod and shapes	1	...	...	...	...	...	...	13.5	95	11	75	9	62	8	55
5005 smooth specimens																
H14	Rolled rod and shapes	1	...	...	25	170	19	130	14.5	100	12.5	85	12	85	12	85
H18	Rolled rod and shapes	1	...	...	28	195	22	150	17	115	14.5	100	14	95	14	95
H19	Rolled rod and shapes	1	...	...	30	205	22.5	155	18	125	16	110	16	110	16	110
5005 notched specimens(a)																
H14	Rolled rod and shapes	1	...	...	17	115	13	90	6	41	4	28	3	21	3	21
H18	Rolled rod and shapes	1	...	...	21	145	14	95	7	48	4	28	3	21	3	21
H19	Rolled rod and shapes	1	...	...	22	150	14	95	7	48	4	28	3	21	3	21
5050 smooth specimens																
O	Rolled rod and shapes	1	30	205	23	160	17.5	120	14.5	100	13.5	95	13	90	12.5	85
H34	Rolled rod and shapes	1	40	275	30.5	210	22.5	155	19	130	17.5	120	16.5	115	16	110
H38	Rolled rod and shapes	1	43	295	33	230	25	170	20.5	140	19	130	18.5	130	18	125
5050 notched specimens(a)																
O	Rolled rod and shapes	1	22	150	15	105	9.5	66	6.5	45	5.5	38	5	34	5	34
H34	Rolled rod and shapes	1	35	240	25	170	16	110	10	70	8.5	59	7.5	52	7	48
H38	Rolled rod and shapes	1	39	270	26	180	16	110	10	70	8.5	59	7.5	52	7	48
5052 smooth specimens																
O	Rolled rod and shapes	1	41	285	31	215	23.5	160	19.5	135	17.5	120	16.5	115	16	110
H14	Rolled rod and shapes	1	...	...	38	260	26	180	20.5	140	19	130	18	125	18	125
H16	Rolled rod and shapes	2	...	...	39	270	28	195	22	150	20	140	19	130	19	130
H18	Rolled rod and shapes	1	52	360	41	285	29.5	205	24	165	22.5	155	21	145	20	140
H34	Rolled rod and shapes	1	...	...	38	260	26	180	20.5	140	19	130	18	125	18	125
H36	Rolled rod and shapes	1	...	...	39	270	28	195	22	150	20	140	19	130	19	130
H38	Rolled rod and shapes	1	52	360	41	285	29.5	205	24	165	22.5	155	21	145	20	140
5052 notched specimens(a)																
O	Rolled rod and shapes	1	29	200	18	125	10.5	70	8	55	7.5	52	7	48	6.5	45
H14	Rolled rod and shapes	1	41	285	27	185	18	125	12	85	10	70	8.5	59	8	55
H18	Rolled rod and shapes	1	43	295	30	205	18.5	130	12	85	10	70	8.5	59	8	55
H34	Rolled rod and shapes	1	41	285	27	185	18	125	12	85	10	70	8.5	59	8	55
H38	Rolled rod and shapes	1	43	295	30	205	18.5	130	12	85	10	70	8.5	59	8	55
5056 smooth specimens																
O	Rolled rod and shapes	6	53	365	41	285	30	205	23	160	21	145	20	140	20	140
H16	Extrusions	1	...	...	...	...	30	205	23	160	21	145	20	140	20	140
H32	Rolled rod and shapes	1	...	...	43.5	300	32	220	25	170	25	170	22	150	22	150
H34	Rolled rod and shapes	1	...	...	46.5	320	35	240	27.5	190	24.5	170	23.5	160	23.5	160
H36	Rolled rod and shapes	1	...	...	...	...	36	250	29	200	25	170	24	165	24	165
H38	Rolled rod and shapes	1	...	...	49.5	340	38	260	29	200	25.5	175	25	170	25	170
5056 notched specimens(a)																
O	Rolled rod and shapes	2	33	230	21	145	14	95	10	70	9	62	8.5	59	8.5	59
H32	Rolled rod and shapes	1	...	...	27	185	17	115	11.5	80	10	70	9.5	66	9	62
H34	Rolled rod and shapes	1	...	...	27	185	17	115	11.5	80	10	70	9.5	66	9	62
H38	Rolled rod and shapes	1	...	...	27	185	17	115	11	75	10	70	9	62	9	62

(continued)

Approximate average values as determined by test in R.R. Moore rotating-beam fatigue machines. Approximate completely reversed flexural stresses
(a) Values determined using specimens containing a single 60° sharp V-notch, 0.075 in. (1.91 mm) deep with root diameter of 0.330 in. (8.38 mm) and a root radius at base of notch <0.0005 in. (0.0125 mm) (K_t >12). (b) Obsolete alloy
Source data are in English units; metric values are converted and rounded.

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
5083 smooth specimens																
O	Plate	1	...	...	40	275	31	215	24	165	22.5	155	22	150	22	150
H112	Rolled rod and shapes, extrusions	2	...	...	42	290	31	215	25	170	23.5	160	23	160	23	160
H113	Plate	3	...	...	42	290	31	215	25	170	23.5	160	23	160	23	160
H311	Rolled rod and shapes	1	...	...	42	290	31	215	25	170	24.5	170	24	165	24	165
H321	Plate	1	...	...	42	290	31	215	25	170	23.5	160	23	160	23	160
5083 notched specimens(a)																
O	Plate	4	...	...	24	165	16	110	11	75	9	62	8	55	8	55
H112	Extrusions	1	...	...	25	170	17	115	12	85	10	70	9	62	9	62
H113	Plate	3	...	...	27	185	17	115	10	70	8.5	59	8	55	7.5	52
5086 smooth specimens																
O	Rolled rod and shapes, plate	3	48	330	40	275	28.5	195	24	165	22.5	155	22	150	21.5	150
H112	Rolled rod and shapes, extrusions	3	...	...	40	275	28.5	195	24	165	22.5	155	22	150	21	145
H113	Plate	1	...	...	42	290	30	205	25	170	24	165	23	160	23	160
H311	Rolled rod and shapes	1	...	...	...	...	...	...	24	165	22.5	155	22	150	21.5	150
H32	Plate	1	...	...	40	275	28.5	195	24	165	22.5	155	22	150	21.5	150
H34	Plate	1	...	...	42	290	30	205	25	170	24	165	23	160	23	160
5086 notched specimens(a)																
O	Plate	2	30	205	21	145	14	95	10	70	8.5	59	8	55	7	48
H112	Extrusions	1	...	...	24	165	16	110	11	75	8.5	59	8	55	7	48
H113	Plate	1	...	...	26	180	16	110	11	75	8.5	59	8	55	7	48
H32	Plate	1	...	...	24	165	16	110	11	75	8.5	59	8	55	7	48
H34	Plate	1	...	...	24	165	15	105	11	75	8.5	59	7	48	6	41
5152 smooth specimens																
O	Rolled rod and shapes	1	...	...	...	...	...	...	...	...	17.5	120	16.5	115	16	110
H16	Rolled rod and shapes	1	...	...	...	...	...	...	...	...	20	140	19	130	19	130
H36	Rolled rod and shapes	1	...	...	...	...	...	...	22	150	20	140	19	130	19	130
5154 smooth specimens																
O	Rolled rod and shapes, plate	4	54	370	39	270	27	185	20.5	140	18	125	17.5	120	17	115
H34	Rolled rod and shapes, plate	4	...	...	39	270	29	200	23	160	21	145	20	140	20	140
H38	Rolled rod and shapes	2	62	425	44	305	32	220	26	180	24	165	23	160	22	150
5154 notched specimens(a)																
O	Rolled rod and shapes, plate	4	31	215	21	145	13.5	95	9.5	66	8	55	8	55	8	55
H34	Rolled rod and shapes, plate	4	...	...	24	165	13.5	95	9.5	66	8	55	8	55	8	55
H38	Rolled rod and shapes	2	...	...	24	165	13.5	95	9.5	66	8	55	8	55	8	55
5356 smooth specimens																
O	Rolled rod and shapes, plate	2	...	...	41	285	30	205	22	150	19	130	18	125	18	125
H32	Rolled rod and shapes	1	...	...	44	305	32	220	24	165	21	145	20	140	20	140
H321	Plate	3	...	...	44	305	32	220	24	165	21	145	20	140	20	140
H34	Rolled rod and shapes	1	...	...	44	305	32	220	24	165	21	145	20	140	20	140
5356 notched specimens(a)																
O	Rolled rod and shapes, plate	2	...	...	22	150	15	105	9	62	8	55	7	48	7	48
H32	Rolled rod and shapes	1	...	...	22	150	11	75	9	62	8	55	7	48	7	48
H321	Plate	3	37	255	21	145	14	95	10	70	9	62	8	55	8	55
H34	Rolled rod and shapes	1	...	...	21	145	11	75	9	62	8	55	8	55	8	55
5454 smooth specimens																
O	Rolled rod and shapes, plate	5	...	...	33	230	26	180	22	150	21	145	20	140	20	140
H112	Rolled rod and shapes	1	...	...	36	250	28	195	23	160	22	150	21	145	21	145
H311	Rolled rod and shapes, extrusions	2	...	...	36	250	28	195	22	150	21	145	20	140	20	140
H32	Plate	1	53	365	36	250	28	195	22	150	21	145	20	140	20	140
H34	Rolled rod and shapes, plate	3	...	...	36	250	28	195	23	160	22	150	21	145	21	145

(continued)

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
5454 notched specimens(a)																
O	Rolled rod and shapes, plate	4	30	205	21	145	14	95	10	70	8	55	7.5	52	7	48
H311	Extrusions	1	...	...	25	170	16	110	12	85	10	70	9	62	8	55
H32	Plate	1	...	...	25	170	16	110	12	85	9	62	7.5	52	7	48
H34	Rolled rod and shapes, plate	3	...	...	25	170	16	110	10	70	8	55	7.5	52	7	48
5456 smooth specimens																
O	Rolled rod and shapes, plate	5	...	...	42	290	32	220	25	170	23	160	22.5	155	22.5	155
H311	Rolled rod and shapes, extrusions	4	...	...	44	305	34	235	26	180	24	165	23.5	160	23	160
H321	Plate	6	...	...	44	305	34	235	26	180	24	165	23.5	160	23	160
H343	Forgings	2	...	...	44	305	34	235	26	180	24	165	23.5	160	23	160
5456 notched specimens(a)																
O	Plate	4	32	220	25	170	16	110	10	70	8	55	7.5	52	7	48
H311	Extrusions	3	...	...	25	170	15	105	10	70	8	55	7.5	52	7	48
H321	Plate	5	...	...	25	170	16	110	10	70	8	55	6.5	45	6.5	45
H343	Forgings	2	...	...	25	170	16	110	10	70	8	55	7.5	52	7	48
6011 notched specimens(a)																
T6	Plate	1	...	...	30	205	16	110	9	62	7	48	6	41	...	...
6051 smooth specimens																
T4	Rolled rod and shapes	1	...	...	...	...	...	...	21	145	15	105	12	85	11	75
T6	Rolled rod and shapes	2	...	...	...	...	...	...	21	145	15	105	12	85	11	75
6053 smooth specimens																
O	Rolled rod and shapes	2	...	...	...	...	12.5	85	11	75	9.5	66	8.5	59	8	55
H16	Rolled rod and shapes	1	...	...	23.5	160	19	130	15	105	13.5	95	12	85	11	75
T4	Rolled rod and shapes	1	...	...	36.5	250	29	200	22	150	17.5	120	14.5	100	13	90
T6	Rolled rod and shapes, extrusions	3	47	325	36.5	250	29	200	22	150	17.5	120	14.5	100	13	90
6053 notched specimens(a)																
O	Rolled rod and shapes	2	...	...	10.5	70	8	55	6.5	45	6	41	5.5	38	5.5	38
H16	Rolled rod and shapes	1	...	...	16	110	10	70	6	41	5	34	4	28	4	28
T4	Rolled rod and shapes	1	...	...	23	160	16.5	115	11.5	80	8	55	7.5	52	7	48
T6	Rolled rod and shapes, extrusions	3	41	285	23	160	16.5	115	11.5	80	8	55	7.5	52	7	48
6061 smooth specimens																
O	Rolled rod and shapes	2	...	...	22	150	16	110	13.5	95	11	75	9.5	66	9	62
T4	Rolled rod and shapes, extrusions	4	...	...	36	250	29	200	23	160	17	115	14	95	13	90
T6	Rolled rod and shapes, plate, forgings, extrusions	18	60	415	44	305	31	215	23	160	17	115	15	105	13.5	95
T651	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	44	305	31	215	23	160	17	115	15	105	13.5	95
T652	Forgings; stress-relieved material, thicness >3.5 in. (90 mm)	1	...	...	42	290	30	205	23	160	17	115	15	105	13.5	95
T8	Rolled rod and shapes, plate	2	...	...	...	...	...	...	23	160	17	115	14	95	13	90
6061 notched specimens(a)																
O	Rolled rod and shapes	1	...	...	12	85	10	70	8	55	7	48	6.5	45	6.5	45
T4	Rolled rod and shapes, extrusions	3	...	...	25	170	18	125	12	85	9	62	8.5	59	8	55
T6	Rolled rod and shapes, plate, forgings, extrusions	14	43	295	29	200	17	115	12	85	8	55	7	48	7	48
T651	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	29	200	17	115	12	85	8	55	7	48	7	48

(continued)

Approximate average values as determined by test in R.R. Moore rotating-beam fatigue machines. Approximate completely reversed flexural stresses
(a) Values determined using specimens containing a single 60° sharp V-notch, 0.075 in. (1.91 mm) deep with root diameter of 0.330 in. (8.38 mm) and a root radius at base of notch <0.0005 in. (0.0125 mm) (K_t >12). (b) Obsolete alloy
Source data are in English units; metric values are converted and rounded.

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
6061 notched specimens(a) (continued)																
T652	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	26	180	16	110	11	75	8	55	6	41	6	41
T8	Rolled rod and shapes	1	...	...	...	...	13.5	95	10	70	8	55	7	48	7	48
6062 smooth specimens(b)																
O	Rolled rod and shapes, extrusions	2	...	...	13	90	11	75	10	70	9	62	8	55	8	55
T4	Extrusions	1	...	...	31	215	25	170	21	145	17	115	14	95	12	85
T6	Extrusions	2	...	...	40	275	29	200	21	145	17	115	14	95	12	85
6062 notched specimens(a)(b)																
O	Extrusions	1	...	...	10	70	7	48	6	41	5	34	4.5	31	4	28
T4	Extrusions	1	...	...	22	150	15	105	10	70	8	55	7.5	52	7	48
T6	Extrusions	2	44	305	26	180	15	105	10	70	8	55	6.5	45	6	41
6063 smooth specimens																
O	Extrusions	1	...	...	11.5	80	10	70	9	62	8	55	7.5	52	7.5	52
T42	Extrusions	1	...	...	26.5	185	19.5	135	16	110	13.5	95	11	75	10	70
T5	Extrusions	1	...	...	28	195	20.5	140	15.5	105	12	85	10.5	70	10	70
T6	Extrusions	1	...	...	34	235	23.5	160	16.5	115	13.5	95	11	75	10	70
T832	Extrusions	1	...	...	...	...	26	180	19.5	135	16	110	12.5	85	12	85
6063 notched specimens(a)																
O	Extrusions	1	...	...	9	62	7	48	5	34	4	28	3.5	24	3	21
T42	Extrusions	1	...	...	28	195	18	125	11.5	80	10	70	9.5	66	9	62
T5	Extrusions	1	...	...	21	145	13	90	8	55	6.5	45	6	41	6	41
T6	Extrusions	1	...	...	28	195	18	125	11.5	80	9	62	7.5	52	7	48
T832	Extrusions	1	...	...	17	115	8	55	6	41	5	34	4.5	31	...	...
6064 smooth specimens(b)																
T3	Rolled rod and shapes	1	...	...	45	310	33	230	26	180	21	145	18	125	17	115
T6	Rolled rod and shapes	1	...	...	41	285	31	215	23	160	17	115	14.5	100	13.5	95
T81	Rolled rod and shapes	1	...	...	50	345	37	255	26	180	21	145	18	125	17	115
6064 notched specimens(a)(b)																
T3	Rolled rod and shapes	1	...	...	40	275	27	185	18	125	14.5	100	12.5	85	12	85
T6	Rolled rod and shapes	1	...	...	27	185	17.5	120	12	85	9.5	66	8.5	59	8	55
T81	Rolled rod and shapes	1	...	...	36.5	250	25	170	16	110	11	75	10	70	10	70
6070 smooth specimens																
T6	Extrusions	5	...	...	48	330	35	240	25	170	18	125	15.5	105	14	95
6070 notched specimens(a)																
T6	Extrusions	5	...	...	28	195	18	125	11	75	7	48	6	41	5	34
6071 smooth specimens(b)																
T451	Plate	1	...	...	...	...	32	220	23	160	18	125	14	95	13	90
T6	Extrusions	1	...	...	50	345	38	260	28.5	195	22	150	17.5	120	16.5	115
T651	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	32	220	23	160	18	125	14	95	13	90
6071 notched specimens(a)(b)																
T451	Plate	1	...	...	27	185	17	115	11	75	7	48	6.5	45	6	41
T6	Extrusions	1	...	...	29	200	18	125	11	75	7	48	6.5	45	6	41
T651	Plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	31	215	19	130	11	75	7	48	6.5	45	6	41
6101 smooth specimens																
T6	Rolled rod and shapes	1	...	...	30	205	22	150	17	115	13	90	10	70	9	62
T61	Extrusions	1	...	...	27	185	21	145	15.5	105	12	85	10	70	9	62
T62	Extrusions	1	...	...	30	205	23	160	16.5	115	12.5	85	10	70	9	62
T64	Extrusions	1	...	...	16	110	12	85	10	70	8.5	59	7.5	52	7	48
T8	Extrusions	1	...	...	32	220	24	165	18	125	15	105	12	85	10.5	70
6101 notched specimens(a)																
T6	Rolled rod and shapes	1	...	...	22	150	14	95	9	62	7	48	6.5	45	6	41
T61	Extrusions	1	...	...	22	150	14	95	9	62	7	48	6.5	45	6	41
T62	Extrusions	1	...	...	22	150	14	95	9	62	7	48	6.5	45	6	41
T64	Extrusions	1	...	...	13	90	9	62	7	48	6	41	4.5	31	4	28
T8	Extrusions	1	...	...	22	150	14	95	10	70	9	62	7.5	52	7	48

(continued)

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
6151 smooth specimens																
T6	Rolled rod and shapes, forgings	5	58	400	43	295	30	205	22	150	17	115	13	90	12	85
6151 notched specimens(a)																
T6	Rolled rod and shapes, forgings	3	46	315	28	195	16	110	10	70	7	48	6	41	6	41
6153 smooth specimens																
T4	Extrusions	1	...	...	...	...	...	...	...	...	19	130	14.5	100	13	90
T6	Extrusions	1	...	...	...	...	...	...	...	...	19	130	14.5	100	13	90
6201 smooth specimens																
T81	Rolled rod and shapes	1	...	...	...	...	29	200	22	150	18	125	16	110	15	105
6201 notched specimens(a)																
T81	Rolled rod and shapes	1	...	...	23	160	14	95	7.5	52	4.5	31	3	21	3	21
6262 smooth specimens																
T9	Rolled rod and shapes	13	...	...	43	295	32	220	22	150	16	110	13.5	95	13	90
6262 notched specimens(a)																
T9	Rolled rod and shapes	9	...	...	29	200	16	110	9	62	6	41	5	34	5	34
6351 smooth specimens																
T6	Extrusions	1	...	...	46	315	36	250	26	180	20	140	16.5	115	15.5	105
6351 notched specimens(a)																
T6	Extrusions	1	...	...	32	220	19	130	10	70	7.5	52	6.5	45	6	41
7001 smooth specimens(b)																
T6	Plate	1	...	...	...	...	40	275	32	220	26	180	24	165	23	160
T7	Plate	1	...	...	...	...	37	255	30	205	25	170	22	150	21.5	150
W51	Plate	1	...	...	...	...	37	255	30	205	25	170	22	150	21.5	150
7001 notched specimens(a)(b)																
T6	Plate	1	...	...	25	170	17	115	11	75	8	55	7	48	7	48
T7	Plate	1	...	...	...	...	17	115	10	70	8	55	7.5	52	7	48
W51	Plate	1	...	...	...	...	16	110	9.5	66	6.5	45	6	41	5.5	38
7002 smooth specimens(b)																
T6	Plate	1	...	...	...	...	40	275	30	205	26	180	25	170	24	165
7002 notched specimens(a)(b)																
T6	Plate	1	...	...	...	...	20	140	13	90	9	62	8	55	7.5	52
7005 smooth specimens																
T53	Extrusions	1	...	...	...	...	36	250	29	200	24	165	19.5	135	18	125
T6	Extrusions	1	...	...	...	...	36	250	29	200	24	165	21	145	20	140
T63	Extrusions	1	...	...	...	...	36	250	29	200	24	165	21	145	20	140
7005 notched specimens(a)																
T53	Extrusions	1	...	...	25	170	17	115	11	75	8	55	6	41	5.5	38
T6	Extrusions	1	...	...	25	170	17	115	11	75	7	48	5	34	4.5	31
T63	Extrusions	1	...	...	25	170	17	115	11	75	6	41	4	28	3.5	24
7006 smooth specimens(b)																
T53	Extrusions	1	...	...	...	...	...	...	...	...	24	165	23	160	22	150
T6	Rolled rod and shapes, plate, extrusions	4	...	...	...	...	36	250	29	200	25	170	22	150	21.5	150
T63	Plate	1	...	...	...	...	38	260	31	215	26	180	24	165	23	160
7006 notched specimens(a)(b)																
T53	Extrusions	1	...	...	...	...	...	...	11	75	8	55	6	41	5	34
T6	Rolled rod and shapes, plate, extrusions	3	...	...	26	180	19	130	13	90	9	62	8	55	7.5	52
T63	Plate	1	...	...	26	180	19	130	13	90	9	62	8	55	7.5	52

(continued)

Approximate average values as determined by test in R.R. Moore rotating-beam fatigue machines. Approximate completely reversed flexural stresses
(a) Values determined using specimens containing a single 60° sharp V-notch, 0.075 in. (1.91 mm) deep with root diameter of 0.330 in. (8.38 mm) and a root radius at base of notch <0.0005 in. (0.0125 mm) (K_t >12). (b) Obsolete alloy
Source data are in English units; metric values are converted and rounded.

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
7038 smooth specimens(b)																
T6	Plate	1	...	...	...	...	40	275	32	220	26	180	24	165	...	...
7038 notched specimens(a)(b)																
T6	Plate	1	...	...	30	205	22	150	15	105	10	70	9	62	8	55
7039 smooth specimens																
T53	Extrusions	1	...	...	...	...	...	...	28	195	25	170	23	160	22	150
T6	Plate, extrusions	4	...	...	52	360	39	270	31	215	25	170	23	160	22	150
7039 notched specimens(a)																
T6	Plate, extrusions	3	...	...	26	180	18	125	11	75	8	55	6.5	45	6	41
7070 smooth specimens(b)																
O	Rolled rod and shapes	1	...	...	...	...	...	...	23	160	21	145	20	140	19	130
T6	Rolled rod and shapes, forgings	2	...	...	...	...	...	...	26	180	24	165	22	150	21	145
7070 notched specimens(a)(b)																
O	Rolled rod and shapes	1	...	...	27	185	18	125	11	75	8.5	59	7.5	52	7	48
T6	Rolled rod and shapes	1	...	...	...	...	18	125	11	75	8.5	59	7.5	52	7	48
7073 smooth specimens																
T6	Plate, forgings	2	...	...	...	...	...	...	26	180	20	140	16	110	15	105
7074 smooth specimens																
T6	Rolled rod and shapes, forgings, extrusions	4	...	...	...	...	40	275	30	205	26	180	22	150	21	145
7074 notched specimens(a)																
T6	Rolled rod and shapes, extrusions	3	...	...	...	...	23	160	18	125	14	95	11.5	80	10.5	70
7075 smooth specimens																
O	Rolled rod and shapes	1	33	230	27	185	22	150	19	130	18	125	17.5	120	17	115
T6	Rolled rod and shapes, plate, forgings, extrusions	59	...	...	55	380	40	275	29	200	24	165	22	150	22	150
T651	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	8	...	...	55	380	40	275	29	200	24	165	22	150	22	150
	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	7	...	...	53	365	34	235	24	165	19	130	16.5	115	16	110
T6510	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	40	275	29	200	24	165	22	150	22	150
	Extrusions; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	...	...	40	275	29	200	24	165	22	150	22	150
T652	Forgings; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	...	...	37	255	29	200	24	165	21	145	20	140
T73	Rolled rod and shapes, plate, forgings	13	...	...	53	365	37	255	29	200	24	165	22	150	22	150
T7351	Plate	7	...	...	53	365	37	255	29	200	24	165	21	145	20	140
T7352	Forgings	1	...	...	...	...	34	235	25	170	23	160	...	...	...	...
W	Rolled rod and shapes, extrusions	4	...	...	60	415	44	305	32	220	28	195	26	180	25	170
7075 notched specimens(a)																
O	Rolled rod and shapes	2	28	195	18	125	12	85	10	70	9	62	8	55	7.5	52
T6	Rolled rod and shapes, plate, forgings, extrusions	52	54	370	31	215	21	145	14	95	11	75	10	70	9	62

(continued)

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
7075 notch specimens(a) (continued)																
T651	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	7	...	...	29	200	18	125	11.5	80	8	55	7	48	6.5	45
	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	7	...	...	29	200	18	125	11.5	80	8	55	7	48	6.5	45
T6510	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	29	200	18	125	11.5	80	8	55	7	48	6.5	45
	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	1	...	...	29	200	18	125	11.5	80	8	55	7	48	6.5	45
T652	Forgings	1	...	...	29	200	18	125	11.5	80	8	55	7	48	6.5	45
T73	Rolled rod and shapes, plate, forgings	12	...	...	29	200	18	125	11.5	80	8	55	7	48	6.5	45
T7351	Plate	7	...	...	29	200	18	125	11.5	80	8	55	7	48	6.5	45
T7352	Forgings	1	...	...	24	165	15	105	10	70	7.5	52	6	41	...	...
W	Rolled rod and shapes, extrusions	4	...	...	32	220	20	140	13	90	10	70	8	55	7.5	52
7076 smooth specimens																
T6	Rolled rod and shapes, forgings	28	...	...	...	...	38	260	29	200	24	165	22	150	21	145
T61	Forgings	4	...	...	51.5	355	38.5	265	30.5	210	26.5	185	24	165	22	150
7076 notched specimens(a)																
T6	Rolled rod and shapes, forgings	28	...	...	32	220	22	150	14	95	10	70	9	62	8.5	59
T61	Forgings	4	48	330	31	215	21.5	150	14	95	9	62	6.5	45	6	41
7079 smooth specimens(b)																
T6	Rolled rod and shapes, plate, forgings, extrusions	26	...	...	54	370	40	275	29	200	24	165	22	150	22	150
T651	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	8	...	...	54	370	40	275	29	200	24	165	22	150	22	150
	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	7	...	...	52	360	34	235	23.5	160	18.5	130	16.5	115	16	110
T652	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	54	370	40	275	29	200	24	165	22	150	22	150
7079 notched specimens(a)(b)																
T6	Rolled rod and shapes, plate, forgings, extrusions	21	...	...	29	200	16	110	11.5	80	9	62	8	55	7.5	52
T651	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	7	...	...	29	200	16	110	11.5	80	9	62	8	55	7.5	52
	Plate; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	29	200	16	110	10	70	8.5	59	7	48	6.5	45
T652	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	29	200	18	125	11.5	80	8	55	6.5	45	...	...
7080 smooth specimens(b)																
T7	Forgings	1	...	...	...	...	37	255	29	200	25	170	23	160	22	150

(continued)

Approximate average values as determined by test in R.R. Moore rotating-beam fatigue machines. Approximate completely reversed flexural stresses
(a) Values determined using specimens containing a single 60° sharp V-notch, 0.075 in. (1.91 mm) deep with root diameter of 0.330 in. (8.38 mm) and a root radius at base of notch <0.0005 in. (0.0125 mm) (K_t >12). (b) Obsolete alloy
Source data are in English units; metric values are converted and rounded.

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
7080 notched specimens(a)(b)																
T7	Forgings	1	...	...	...	...	18	125	11	75	8.5	59	...	...	...	...
7106 smooth specimens(b)																
T53	Extrusions	1	...	...	48	330	36	250	28	195	23.5	160	21.5	150	21	145
T6	Plate, extrusions	3	...	...	48	330	36	250	28	195	23.5	160	21.5	150	21	145
T6351	Plate	4	...	...	48	330	36	250	28	195	23.5	160	21.5	150	21	145
7106 notched specimens(a)(b)																
T53	Extrusions	1	...	...	...	...	17.5	120	10	70	7.5	52	6	41	5.5	38
T6	Plate, extrusions	3	...	...	...	...	17.5	120	10	70	7.5	52	6	41	5.5	38
T6351	Plate	4	...	...	...	...	17.5	120	10	70	7.5	52	6	41	5.5	38
7139 smooth specimens(b)																
T53	Extrusions	1	...	...	...	...	...	...	28	195	25	170	24	165	23	160
T6	Plate, extrusions	3	...	...	54	370	38	260	30	205	26	180	24	165	23	160
T6351	Plate	2	...	...	54	370	38	260	30	205	26	180	24	165	23	160
7139 notched specimens(a)(b)																
T53	Extrusions	1	...	...	...	...	...	...	...	...	...	...	6	41	5.5	38
T6	Plate, extrusions	2	...	...	27	185	16	110	9.5	66	7	48	6	41	5.5	38
T6351	Plate	2	...	...	27	185	16	110	9.5	66	7	48	6	41	5.5	38
7175 smooth specimens																
T6	Rolled rod and shapes, extrusions	3	...	...	...	...	40	275	29	200	24	165	22	150	21	145
T7352	Forgings	1	...	...	48	330	34	235	25	170	23	160	21	145	20	140
7175 notched specimens(a)																
T6	Rolled rod and shapes, extrusions	2	...	...	...	...	23	160	18	125	14	95	13	90	12	85
T7352	Forgings	1	...	...	25	170	15	105	10	70	7	48	6.5	45	6	41
7177 smooth specimens																
T6	Rolled rod and shapes	1	...	...	...	...	42	290	31	215	27	185	24	165	23	160
7178 smooth specimens																
T6	Rolled rod and shapes, plate, forgings, extrusions	9	...	...	59	405	47	325	36	250	29	200	25.5	175	24.5	170
T651	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	4	...	...	...	...	47	325	36	250	29	200	25	170	23	160
T6510	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	2	...	...	...	...	42	290	33	230	29	200	25.5	175	24.5	170
7178 notched specimens(a)																
T6	Rolled rod and shapes, plate, forgings, extrusions	8	...	...	28	195	19	130	13	90	10	70	9	62	8	55
T651	Rolled rod and shapes, plate; stress-relieved material, thickness ≤3.5 in. (90 mm)	4	...	...	28	195	19	130	13	90	9	62	6	41	5.5	38
T6510	Extrusions; stress-relieved material, thickness ≤3.5 in. (90 mm)	2	...	...	28	195	17	115	11	75	7.5	52	6.5	45	6	41
7179 smooth specimens(b)																
T652	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	...	...	36	250	26	180	23	160	23	160	22	150

(continued)

Rotating-Beam Fatigue Strengths (continued)

			Fatigue strengths at indicated cycles													
			10^3 cycles		10^4 cycles		10^5 cycles		10^6 cycles		10^7 cycles		10^8 cycles		5×10^8 cycles	
Temper	Product form	No. of samples	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa	ksi	MPa
7179 notched specimens(a)(b)																
T652	Forgings; stress-relieved material, thickness >3.5 in. (90 mm)	1	...	...	...	...	17	115	11	75	8.5	59	7	48	6.5	45
7270 smooth specimens																
T6	Forgings	1	...	...	...	...	...	...	21	145	21	145	19	130	18.5	130
7277 smooth specimens																
T6	Rolled rod and shapes, forgings, extrusions	2	...	...	...	...	42	290	31	215	25.5	175	22	150	20	140
7277 notched specimens(a)																
T6	Rolled rod and shapes, forgings, extrusions	3	...	...	30	205	20	140	14.5	100	11	75	10	70	9.5	66
7370 smooth specimens																
T6	Rolled rod and shapes, forgings	2	...	...	...	...	33	230	26	180	22.5	155	21	145	20	140
7370 notched specimens(a)																
T6	Rolled rod and shapes, forgings	3	...	...	...	...	20.5	140	12.5	85	9.5	66	8.5	59	8	55
8280 smooth specimens																
H12	Plate	1	...	...	...	...	14.5	100	12	85	10.5	70	10	70	9.5	66
8280 notched specimens(a)																
H12	Plate	1	...	...	...	...	...	...	...	...	3.5	24	3	21	3	21

Approximate average values as determined by test in R.R. Moore rotating-beam fatigue machines. Approximate completely reversed flexural stresses
(a) Values determined using specimens containing a single 60° sharp V-notch, 0.075 in. (1.91 mm) deep with root diameter of 0.330 in. (8.38 mm) and a root radius at base of notch <0.0005 in. (0.0125 mm) (K_t >12). (b) Obsolete alloy
Source data are in English units; metric values are converted and rounded.