

Nominal Chemistry

Alloy	UNS	Cr	Ni	Mo	Si	Mn	N	C	Ce	Fe	Other
410	S41000	12.2	—	—	0.3	0.4	—	0.14	—	87	—
446	S44600	25	—	—	0.5	0.7	0.1	0.05	—	73	—
304L	S30403	18.3	9	—	0.5	1.7	0.08	0.02	—	70	—
316L	S31603	16.4	10.2	2.1	0.5	1.6	0.05	0.02	—	69	—
321	S32100	17.3	9.3	—	0.7	1.8	—	0.04	—	70	0.4 Ti
321H	S32109	17.3	9.3	—	0.7	1.8	—	0.05	—	70	0.4Ti
347, 347H	S34700	17	9.5	—	0.7	1.5	—	0.04	—	70	0.5 Cb
RA 253 MA®	S30815	21	11	—	1.7	0.6	0.17	0.08	0.04	65	—
309	S30908	23	13	—	0.8	1.6	—	0.05	—	62	—
RA 602 CA®	N06025	25	63	—	—	—	—	0.2	—	9	0.1 Y, 0.08 Zr, 2.2 Al
310	S31008	25	20	—	0.5	1.6	—	0.05	—	52	—
800H/AT	N08811	21	31	—	0.4	0.9	—	0.06	—	45	0.6 Ti, 0.4 Al
RA330®	N08330	19	35	—	1.2	1.5	—	0.05	—	43	—
RA333®	N06333	25	45	3	1	1.5	—	0.05	—	18	3 W, 3 Co
625	N06625	21.5	61	9	0.1	0.1	—	0.05	—	4	3.6 Cb
601	N06601	22.5	61.5	—	0.2	0.3	—	0.05	—	14	—
718	N07718	19	52	3	0.1	0.1	—	0.04	—	18	5 Cb, 0.9 Ti, 0.5 Al
600	N06600	15.5	76	—	0.2	—	—	—	—	8	0.2 Ti, 0.2 Al
Alloy X	N06002	22	47	9	—	—	—	—	—	18	0.15 Ti, 0.5 Al, 0.6 W, 1.7 Co
Alloy 20	N08020	20	33	2.2	0.4	0.4	—	0.02	—	40	3.3 Cu, 0.5 Cb, 0.4 Mn

Ultimate Tensile Strength
Average Short-Time Ultimate Tensile Strength, ksi

Alloy	Temperature, °F													
	RT	200	400	600	800	1000	1200	1400	1600	1800	1900	2000	2100	2200
446	68	70.7	69.3	80	77	52.7	15	5	—	—	—	—	—	—
304L	90	—	70	—	66	—	48	23	—	—	—	—	—	—
316L	88.2	78.25	69	67.45	66	64.35	54.2	42	26.9	—	—	—	—	—
321	84	72.8	62	62	62	59.5	45.5	27.5	—	—	—	—	—	—
321H	75.5	67	62.5	62	62	59	45.5	27	—	—	—	—	—	—
347,347H	93.25	—	73.57	—	69.5	63.51	52.3	39.28	26.4	—	—	—	—	—
RA 253 MA®	104	90.2	83.8	82.4	79.7	75	69	36.9	21.85	10.8	9.5	9.4	7.5	3.7
309	90	—	80	—	72	66	55	36	21	10	—	—	—	—
RA 602 CA®	105	—	—	—	95.4	93.4	84	54.4	32.8	17.1	13.6	13	10.2	5.8
310	82.6	78.1	72.5	72.2	71.8	67.8	54.1	35.1	19.1	10.4	—	—	—	—
RA330®	86.6	79.2	75.3	74.4	74.2	71	56.7	35.9	21.1	10.4	—	—	—	3.2
RA333®	107	100.2	96.1	92.5	89.9	85.4	73.6	53.9	27.5	15.7	—	7.4	6.6	4.0
625	144	—	134	132	131.5	130	119	78	40	17	—	—	—	—
601	100	—	—	—	—	90	60	34	18	—	—	—	—	—
718	210	204	198	195	191	185	168	110	—	—	—	—	—	—
600	93	—	—	—	—	84	65	27.5	15	7.5	—	—	—	—
Alloy X	104.5	—	103.4	100	99.7	94	83	63.1	36.5	22.5	13	5.4	—	—
Alloy 20	91	—	—	—	—	—	—	—	—	—	—	—	—	—

Yield Strength

Average Short-Time 0.2% Offset Yield Strength, ksi

Alloy	Temperature, °F													
	RT	200	400	600	800	1000	1200	1400	1600	1800	1900	2000	2100	2200
446	49.7	45	40.7	39.7	45	42.3	12	4.0	-	-	-	-	-	-
304L	33.7	28.7	23.6	21	19.6	17.9	15.2	-	-	-	-	-	-	-
316L	43.85	36.65	32.4	28.05	26.75	25.9	25.3	22	16.8	-	-	-	-	-
321	31.4	-	23.5	-	19.38	19.01	19	18.85	-	-	-	-	-	-
321H	-	-	-	-	-	-	-	-	-	-	-	-	-	-
347,347H	36.5	-	36.6	-	29.68	27.4	24.48	22	-	-	-	-	-	-
RA 253 MA®	50.8	39.5	32	29	28	25	24	22	14	7.0	5.5	4.0	3.0	2.0
309	42	-	35	-	30	24	22	20	18.5	-	-	-	-	-
RA 602 CA®	50.5	-	-	-	39.2	38.3	37.7	36.5	28.7	15.2	12.2	11.6	9.0	5.0
310	35.1	32.5	28.3	26.3	24.3	20.8	20.7	19.3	12.2	6.4	-	-	-	-
RA330®	37.2	35.6	31.6	29.6	27.8	25	22	20.7	15.4	8.5	-	-	-	2
RA333®	47	41.6	37	32.5	31.5	30.8	30.7	28.9	23.9	12.1	-	6.5	5.0	3.5
625	84	-	66	63	61	60.5	60	58.9	39.0	17.0	-	-	-	-
601	54	-	-	-	-	48	41	26	15	-	-	-	-	-
718	175	170	163	159	156	155	149	110	-	-	-	-	-	-
600	37	-	-	-	-	28.5	26.5	17	9.0	4.0	-	-	-	-
Alloy X	47	-	48.7	42.6	43.7	41.5	39.5	37.8	25.7	16.0	-	8.0	-	3.7
Alloy 20	48	-	-	-	-	-	-	-	-	-	-	-	-	-

Creep Strength

Average Stress, ksi, for 1% Total Creep in 10,000 Hours

ALLOY	Temperature, °F									
	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
RA 253 MA®	18	10	6.4	4.2	2.7	1.7	1.0	0.45	0.25	0.18
RA330®	-	6.6	-	3.8	-	1.8	-	0.22	-	-
RA 602 CA®	-	26.8	-	9.4	-	2.38	1.52	0.96	0.59	0.33
RA333®	19.5	-	-	6.4	-	2.7	-	0.88	-	-

1% total creep includes the primary stage creep when the specimen is first loaded, as well as secondary stage creep. Minimum creep rate data is based entirely on second stage creep.

Creep Strength
Average Stress, ksi, for 0.0001% Per Hour Minimum Creep Rate, Extrapolated

Alloy	Temperature, °F											
	RT	200	400	600	800	1000	1200	1400	1600	1800	1900	2000
446	13	4.5	2	0.9	0.33	0.12	—	—	—	—	—	—
304L	—	7.8	5.1	3.25	2.1	1.34	0.88	—	—	—	—	—
304, 304H	—	17.9	11.1	7.2	4.5	2.9	1.8	—	—	—	—	—
316L	—	22.5	12	6.4	3.5	1.85	1	—	—	—	—	—
321	—	—	9.2	3.9	1.7	0.74	0.32	—	—	—	—	—
321H	—	—	12.4	7	4	2.25	1.28	—	—	—	—	—
347, 347H	—	30.5	16.2	8.7	4.7	2.5	1.3	—	—	—	—	—
RA 253 MA®	—	—	12	8.2	5.7	3.8	2.25	1.75	1.15	0.55	0.32	0.15
309	—	—	—	—	—	—	—	—	—	—	—	—
310	—	—	—	—	—	—	—	—	—	—	—	—
RA330®	—	14.5	7.4	5.8	3.9	2.6	1.9	1.5	0.52	0.29	—	—
RA333®	—	—	—	6.8	5.4	4.6	2.9	1.9	1.1	0.56	—	—
625	—	—	—	—	—	—	—	—	—	—	—	—
601	—	—	—	1.4	5.2	2.9	1.9	1.4	—	0.48	—	0.3

Average Stress, ksi, for 0.0001% Per Hour Minimum Creep Rate

Alloy	Temperature, °F											
	RT	200	400	600	800	1000	1200	1400	1600	1800	1900	2000
446	16	6.0	3	1.5	0.68	0.26	0.13	—	—	—	—	—
304L	—	—	7.7	4.95	3.2	2.05	1.3	—	—	—	—	—
304, 304H	—	25.5	16.5	10.8	7	4.6	2.95	—	—	—	—	—
316L	—	23.5	14	8.3	4.9	2.9	1.75	—	—	—	—	—
321	—	—	20	8.8	3.85	1.7	0.75	—	—	—	—	—
321H	—	—	20.3	12	7.1	4.2	2.5	—	—	—	—	—
347, 347H	—	53	27.5	14.8	7.8	4.1	2.15	—	—	—	—	—
RA 253 MA®	—	—	18	11.6	7.7	5.0	3.35	2.3	1.5	0.89	0.49	0.25
309	—	—	—	16	8.8	3.4	2.4	1.4	0.6	0.22	—	—
310	—	—	—	14.9	5.9	3.3	2.1	1.1	0.57	0.28	—	—
RA330®	—	21	10.5	7.6	5.3	3.6	2.7	2.1	1.0	0.5	—	—
800 H/AT	—	—	—	17	9.1	6.0	—	3.6	1.5	1.05	—	—
RA333®	—	—	22	9.8	7.7	6.4	4.2	2.7	1.656	0.88	—	—
601	—	41	27	18	7.2	4.1	2.7	2.0	—	0.76	—	0.43
718	—	—	100	74	43+	—	—	—	—	—	—	—
600	—	—	—	—	—	3.6	—	0.75	—	0.56	—	0.27

Rupture Strength

Average Extrapolated 100,000 Hour Rupture Strength, ksi

Alloy	Temperature, °F												
	RT	200	400	600	800	1000	1200	1400	1600	1800	1900	2000	2100
446	-	-	2.3	1.8	-	0.74	-	0.27	-	0.14	-	-	-
304L	-	19.5	11.6	6.9	4.1	2.4	1.45	-	-	-	-	-	-
304, 304H	-	25.8	15.8	9.8	6.0	3.7	2.3	-	-	-	-	-	-
316L	-	34.5	18.5	10.1	5.5	3.0	1.6	-	-	-	-	-	-
321	-	-	16.5	8.7	4.6	2.45	1.27	-	-	-	-	-	-
321H	-	29	17.4	10.3	6.1	3.6	2.1	-	-	-	-	-	-
347, 347H	-	37.5	20.8	11.5	6.4	3.55	1.95	-	-	-	-	-	-
RA 253 MA®	-	-	15	8.7	4.6	2.9	2.1	1.45	0.97	0.7	-	-	-
309	-	-	-	-	-	-	-	-	-	-	-	-	-
RA 602 CA®	-	-	-	20.3	-	5.8	-	1.75	1.1	0.74	0.485	0.31	0.2
310	-	-	-	-	-	-	-	-	-	-	-	-	-
RA330®	-	20	12	7.8	4.8	2.7	1.65	1.0	0.58	0.33	-	-	-
800 H/AT	-	-	-	13	8.0	5.3	3.7	2.5	1.2	0.8	-	-	-
RA333®	-	-	-	11.5	8.4	6.5	3.7	1.9	1.05	0.58	-0.33	0.17	-
625	-	-	-	-	-	-	-	-	-	-	-	-	-
601	-	-	-	1.5	6.8	4.0	-	-	-	0.7	-	0.38	0.3

Average 10,000 Hour Rupture Strength, ksi

Alloy	Temperature, °F													
	RT	200	400	600	800	1000	1200	1400	1600	1800	1900	2000	2100	2200
446	-	-	3.5	2.7	-	1.1	-	0.45	-	0.23	-	-	-	-
304L	-	25	15.6	9.7	6	3.7	2.3	1.4	-	-	-	-	-	-
304, 304H	-	36	22.2	13.8	8.5	5.3	3.25	-	-	-	-	-	-	-
316L	-	39	23.5	14.2	8.5	5.1	3.05	-	-	-	-	-	-	-
321	42.5	34.5	23.5	12.9	7.2	4	2.28	-	-	-	-	-	-	-
321H	-	-	24.8	15.2	9.2	5.6	3.4	-	-	-	-	-	-	-
347, 347H	-	48	27.5	15.6	9	5.1	2.9	-	-	-	-	-	-	-
RA 253 MA®	-	-	22	14	8.5	5.2	3.75	2.5	1.65	1.15	0.86	0.68	-	-
309	-	-	-	17	8	4.8	2.7	1.6	1.0	0.56	-	-	-	-
RA 602 CA®	-	-	-	31.2	-	11.3	-	3.2	2.18	1.49	0.99	0.67	0.44	-
310	-	-	-	14.4	7.4	4.5	2.8	1.5	0.94	0.66	-	-	-	-
RA330®	-	29	17	11	7.2	4.3	2.7	1.7	1.05	0.63	0.4	-0.28	-	-
800 H/AT	-	-	-	17.5	11	7.3	5.2	3.5	1.9	1.2	-	-	-	-
RA333®	-	-	25	16.5	12	9.2	5.7	3.1	1.8	1.05	0.63	0.36	-	0.14
625	-	-	-	42.5	22.5	12	-	-	-	-	-	-	-	-
601	-	42	29	21	10	6.2	4	2.6	-	1.2	-	0.62	0.48	-
718	-	128	98	70	-	-	-	-	-	-	-	-	-	-
600	-	-	21.5	13.5	9	6.2	3.7	2.35	1.65	1.15	-	-	-	-
X	-	-	-	-	-	7.6	-	2.3	-	-	-	-	-	-