

# HAYNES<sup>®</sup> 242<sup>®</sup> alloy

## Tensile Properties

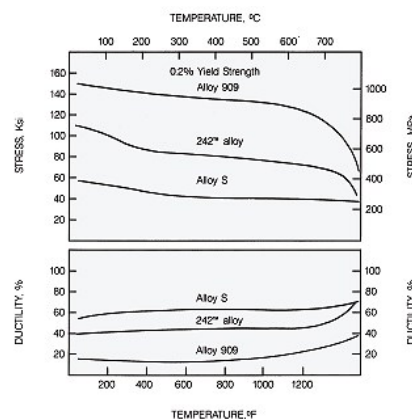
### Bar and Rings - Annealed and Aged

Test Temperature		Yield Strength 0.2% Offset		Ultimate Tensile Strength		Elongation	Reduction in Area
°F	°C	ksi	MPa	ksi	MPa	%	%
RT	RT	122.4	845	187.4	1290	33.7	45.7
200	93	110.4	760	180.7	1245	31.7	47.0
400	204	102.3	705	173.5	1195	33.0	51.8
600	316	96.5	665	168.6	1160	33.4	48.4
800	427	86.3	595	161.3	1110	37.6	45.9
1000	538	78.3	540	156.3	1080	38.3	49.9
1200	649	82.7	570	144.9	1000	33.2	41.1
1400	760	44.9	310	106.2	730	44.3	54.1
1600	871	44.8	310	72.5	500	49.7	85.1
1800	982	30.6	210	42.0	290	54.0	97.8

RT= Room Temperature

### Comparison of Yield Strengths and Elongations\*

HAYNES<sup>®</sup> 242<sup>®</sup> alloy exhibits much higher yield strength than typical solid-solution-strengthened nickel-base alloys, such as HASTELLOY<sup>®</sup> S alloy, but also possesses excellent ductility in the fully heat-treated condition. This can translate into excellent containment characteristics for gas turbine rings and casings, particularly when coupled with 242 alloy's lower expansion coefficient and excellent ductility retention following thermal exposure. This combination is also well suited for a range of fastener and bolting applications up to 1300°F (705°C).



\*Plate material or manufacturer's data.

### Hot-Rolled Plate - Annealed and Aged (a)

Test Temperature		Yield Strength 0.2% Offset		Ultimate Tensile Strength		Elongation	Reduction in Area
°F	°C	ksi	MPa	ksi	MPa	%	%
RT	RT	126	868	193	1330	36	-

400	204	101	696	176	1213	43	52
800	427	91	627	165	1137	45	52
1000	538	89	613	164	1130	44	51
1100	593	89	613	160	1102	44	51
1200	649	87	599	141	971	29	31
1300	704	73	503	118	813	28	30
1400	760	48	331	94	648	93	71

**Cold-Rolled Sheet- Annealed and Aged (a)**

Test Temperature		Yield Strength 0.2% Offset		Ultimate Tensile Strength		Elongation
°F	°C	ksi	MPa	ksi	MPa	%
RT	RT	120	827	187	1288	38
1000	538	106	730	165	1137	31
1100	593	102	703	150	1034	18
1200	649	96	661	135	930	14
1300	704	83	572	109	751	10
1400	760	57	393	92	634	98

(a)Average of two tests per heat, two heats of each product form. Solution Annealed + Aged 1200°F-48 h.

**Cold-Reduced Sheet- As Cold-Worked and Cold-Worked Plus Aged**

HAYNES® 242 alloy has excellent strength and ductility as a cold-reduced and directly aged product. Coupled with its low thermal expansion characteristics, this makes it an excellent choice for fasteners and springs.

	Test Temperature		0.2% Yield Strength		Ultimate Tensile Strength		Elongation
	°F	°C	ksi	MPa	ksi	MPa	%
-							
M.A.	RT	RT	65.3	450	137.6	950	47
M.A. + 20% C.W.	RT	RT	139.5	960	169.6	1170	20
M.A. + 40% C.W.	RT	RT	181.3	1250	217.9	1500	8
M.A. + Age	RT	RT	130.0	895	192.0	1325	32
M.A. + 20% C.W. + Age	RT	RT	173.0	1195	209.5	1445	21
M.A. + 40% C.W. + Age	RT	RT	219.7	1515	244.7	1685	11
M.A. + 40% C.W. + Age	1100	595	191.4	1320	201.9	1390	11
M.A. + 40% C.W. + Age	1200	649	145.9	1005	198.7	1370	8
M.A. + 40% C.W. + Age	1300	705	134.3	925	183.7	1265	11

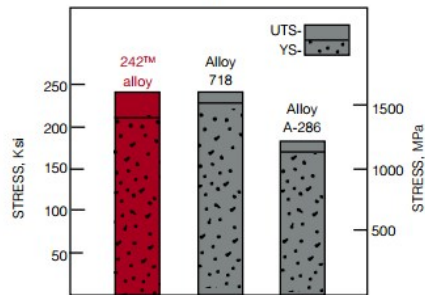
M.A. + 40% C.W. + Age	1400	760	94.1	650	156.0	1075	32
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\*RT= Room Temperature

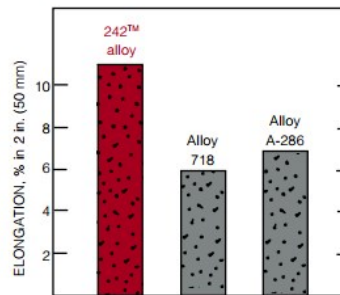
### Comparative Fastener Alloy Tensile Properties\*

HAYNES® 242® alloy compares very favorably with other cold-worked and directly aged fastener alloys. The graphs below present comparative room temperature tensile properties for 40% cold-reduced and aged sheet product.

Ultimate and Yield Strength



Elongation



\*Alloys cold-rolled to 40% reduction. 242 alloy aged 1200°F (650°C)/24 hours/AC; alloy 718 aged 1325°F (720°C)/8 hours/FC to 1150°F (620°C)/8 hours/AC; alloy A-286 aged 1200°F (650°C)/16 hours/AC.