RA 602 CA® vs HR-120® & HR-160®

A Quick Comparison of Three Heat Resistant Nickel Alloys

RA 602 CA is one of the most oxidation resistant, high strength and heat resistant alloys available. Elevated levels of chromium and aluminum along with the addition of yttrium permit RA 602 CA to develop a tightly adhering oxide scale with an alumina based subscale. This allows it to be considered for applications up to 2250°F. RA 602 CA is often used for applications where it is important to minimize product contamination at extreme temperatures. The high strengths achieved are due to carbon contents around 0.2% and the addition of zirconium helps RA 602 CA maintain its ductility over time by restricting grain growth that would normally be seen in other alloys above 1800°F.

While HR-160 and HR-120 have been used over other grades due to higher strengths or better corrosion resistance, RA 602 CA should be considered for more applications due to its availability. RA 602 CA is readily available (from stock) in plate, sheet, round bar and welding consumables.

Chemical Composition, %

	Cr	Ni	Co	Mo	Si	Al	Fe	C	N	W	Mn	Y	Ti	Cb	Zr
RA 602 CA® UNS N06025	25.0	63.0	–	–	–	2.2	9.5	0.18	–	–	0.1	0.1	0.1	–	0.08
HR-120® UNS N08120	25.0	37.0	–	2.5	0.6	0.1	33.0	0.05	0.2	2.5	0.7	–	–	–	–
HR-160® UNS N12160	28.0	37.0	29.0	1.0	2.75	–	2.0	0.05	–	1.0	0.5	–	0.5	1.0	–

Typical Elevated Temperature Tensile Properties, Plate

	Temperature, °F	70	1000	1500	1600	1800	2000	2200
RA 602 CA	Ultimate Tensile Strength, ksi	105.0	93.4	41.2	32.8	17.1	13.0	5.8
	0.2% Offset Yield Strength, ksi	50.5	38.3	34.8	28.7	15.2	11.6	5.0
HR-120	Ultimate Tensile Strength, ksi	106.5	80.4	–	47.5	27.9	15.1	4.9
	0.2% Offset Yield Strength, ksi	45.6	25.7	–	27.0	19.4	9.1	3.9
HR-160	Ultimate Tensile Strength, ksi	111.2	81.8	–	38.3	20.4	10.8	4.4
	0.2% Offset Yield Strength, ksi	45.6	25.5	–	22.1	10.8	5.0	1.6

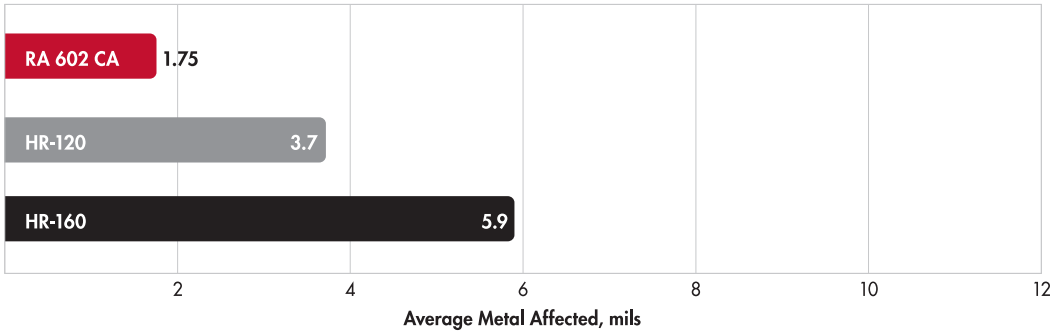
Stress for 1% Total Creep in 10,000 hours, ksi

Temperature, °F	1400	1600	1800	2000
RA 602 CA	9.4	2.4	1.0	0.4
HR-120	10.0	5.1	1.1	–
HR-160	4.2	2.1	1.1	–

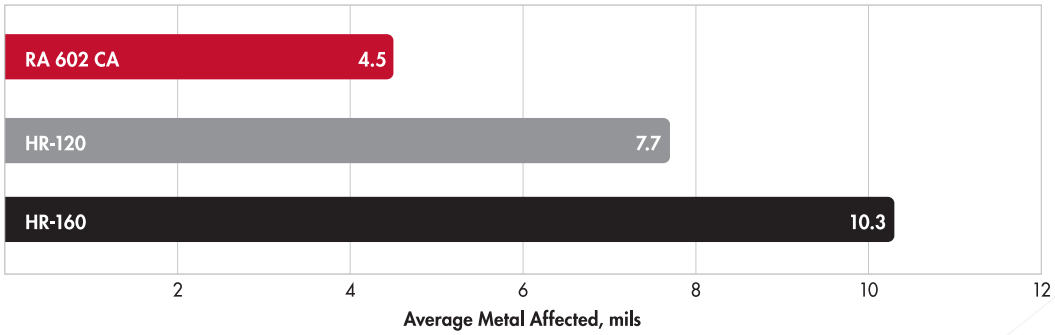
Average Metal Affected

	1800°F		2000°F	
	mils	mm	mils	mm
RA 602 CA	1.75	0.044	4.5	0.113
HR-120	3.7	0.093	7.7	0.196
HR-160	5.9	0.149	10.3	0.262

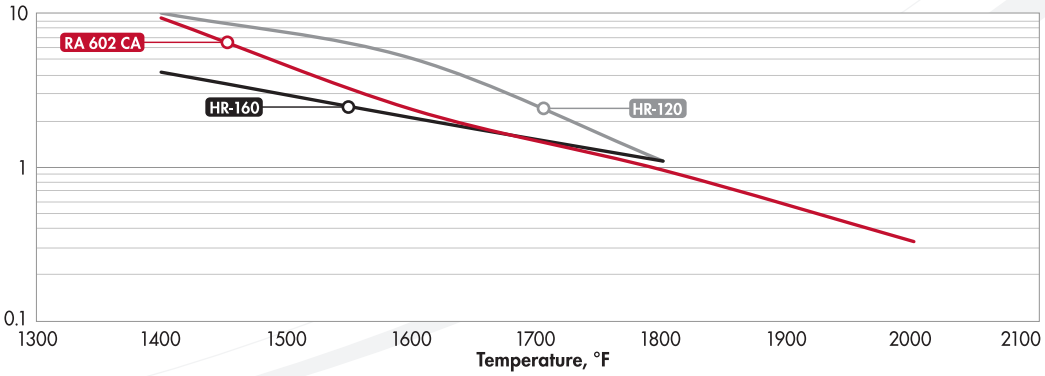
Oxidation Resistance, 1800°F

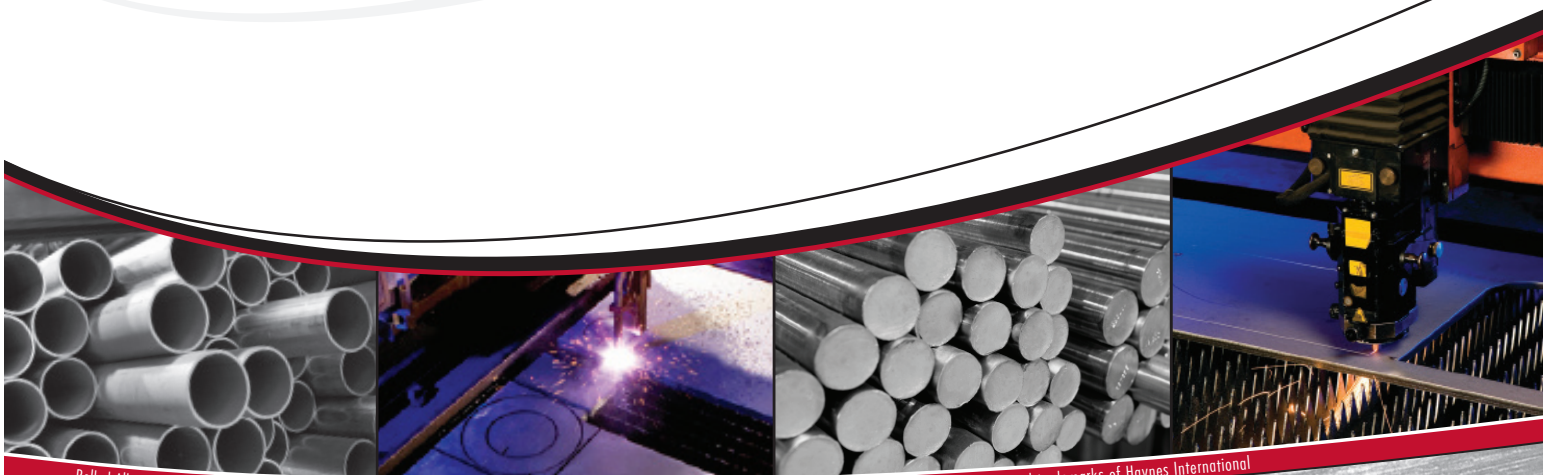


Oxidation Resistance, 2000°F



Stress for 1% Total Creep, 10,000 hours, ksi





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