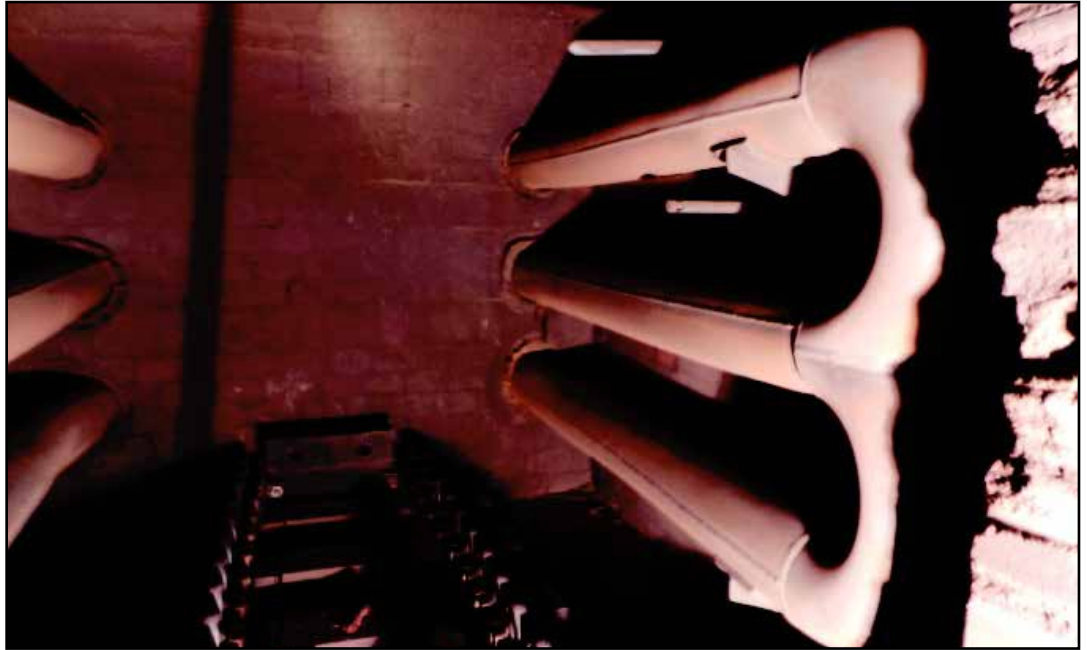


RA 602 CA® Radiant Tubes Double Life of Tubes Compared to Cast HX Alloy.



Specifications

UNS: N06025 W. Nr./EN: 2.4633 ASTM: B 168, B 166 ASME: SB-168, SB-166, Code Case 2359

Chemical Composition, %

	Cr	Ni	Cu	P	S	Fe	C	Al	Ti	Y	Zr	Si	Mn
MIN	24.0	—	—	—	—	8.0	0.15	1.8	0.1	0.05	0.01	—	—
MAX	26.0	Balance	0.1	0.02	0.01	11.0	0.25	2.4	0.2	0.12	0.1	0.5	0.15

Case History

Euclid Heat Treating Co. has been using RA 602 CA three-legged radiant tubes in one of its carburizing furnaces since 2006. The tubes have been in continuous use since installation. According to Plant Engineer, Roger Robbins, the furnace is not cooled to room temperature. It is idled at 1500°F during down time. The furnace is used for carburizing approximately 80% of the time, almost all of this being high temperature carburization at 1750°F with high carbon potentials between 0.9 to 1.4%.

Euclid Heat Treating Company was established in 1945 with salt and open fired furnaces. Their continual investment in new equipment and technologies help maintain their position as the most diversified commercial heat treating company in northeastern Ohio. They offer endothermic atmosphere furnaces, an entire building devoted to induction hardening, a VFS 10 bar furnace, pit furnaces, nitriding equipment and much more. Their new services include intensive quenching, eddy current inspection, dimensional inspection and custom packaging and shipping.

According to Euclid Heat Treating Co. President John Vanas, the experience with other materials has been short lived. They have seen up to a two year life with 601 alloy fabricated tubes, and four years with 3/8" cast HX tubes. The 11 gage (0.120") RA 602 CA tubes are still in good operating condition. Given current conditions of the RA 602 CA tubes, they are expected to easily double the life of the cast HX tubes. Due to the outstanding performance of the first set of RA 602 CA radiant tubes, a second furnace was fitted with a set of RA 602 CA tubes.

Case History, Continued

During a rare complete shutdown, the tubes were examined. There were no signs of the typical “pancaking down” indicating advanced stage creep and end of life. The right tube shows little evidence of any sag: the only noticeable evidence is a slight indication on the bottom of the top leg where it is in contact with the saddle.

Another sign of superior performance is the fact that there is no sign of either blackening or greening of the tubes, which is typically associated with the end of the tube life as previously experienced. This evidence supports the hypothesis that RA 602 CA is a viable alloy for components that will operate in highly carburizing atmospheres.

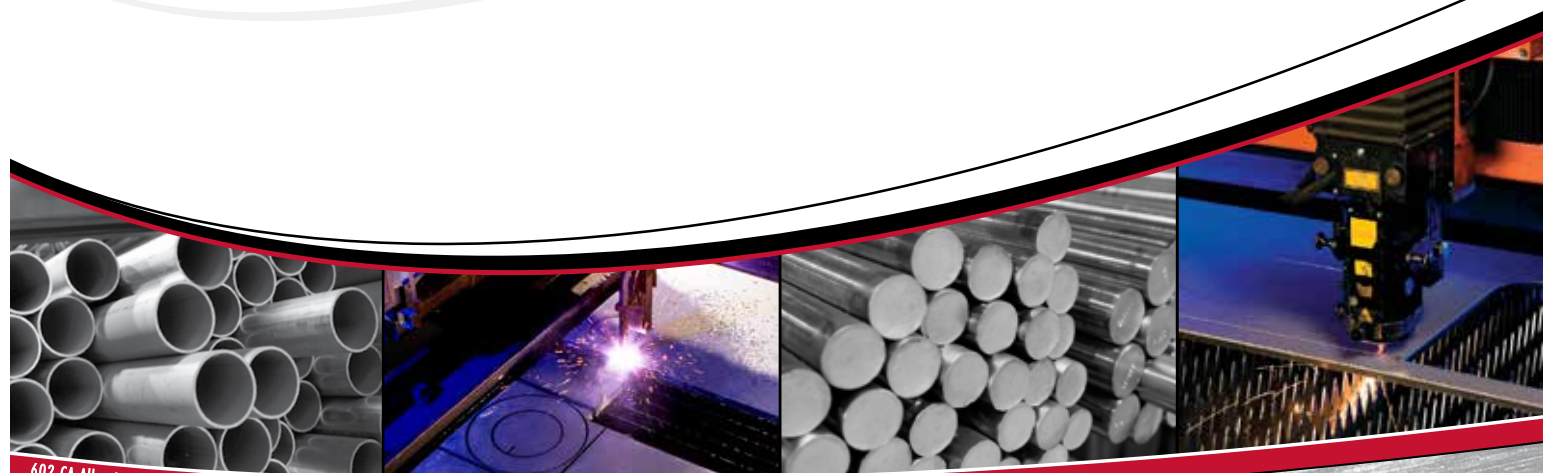
The excellent oxidation and carburization resistance of RA 602 CA comes from the chemistry. The addition of aluminum to the alloy results in the formation of a continuous, self healing, alumina subscale. In addition, the yttrium addition makes this subscale very adherent, and significantly impedes carbon from being absorbed into the base metal.

Cyclic Carburization

Cyclic Carburization in CH_4/H_2 Environment ($A_c=0.8$), Weight Change (mg/m^2h)

Temperature, °F	1562	1832	2102
310	130	305	—
800AT	143	339	813
600	50	190	626
601	64	170	508
RA 602 CA	13	70	175

Roller Alloys stocks RA 602 CA in plate, sheet, and round bar products. Matching welding consumables are also available in MIG, TIG, and covered electrodes. For more information on the RA 602 CA, contact Rolled Alloys.



602 CA Alloy is a registered trademark of ThyssenKrupp VDM



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