RA 253 MA® vs 309

A Quick Comparison of Two Heat Resistant Stainless Steels

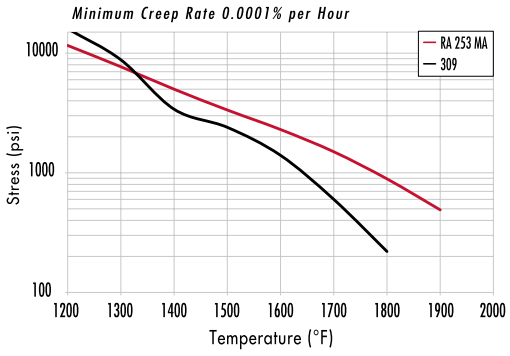
RA 253 MA® Advantages

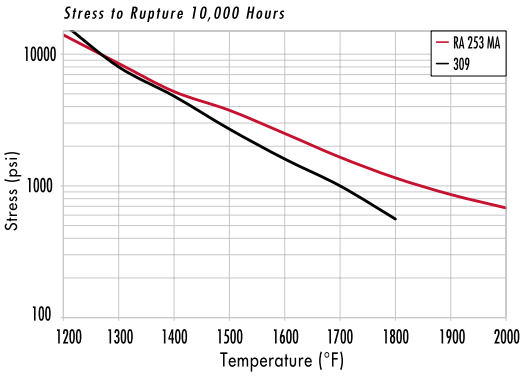
- The main difference between RA 253 MA and 309 stainless steel are the additions of cerium, silicon and nitrogen to RA 253 MA. RA 253 MA also has a lower content of nickel and chromium making it less susceptible to fluctuating commodity prices.
- The micro-alloyed addition of cerium in addition to silicon gives RA 253 MA excellent oxidation resistance up to 2000°F, which is superior to 309 stainless at 1900°F.
- Due to the additions of carbon and nitrogen, the creep strength of RA 253 MA is over twice that of 309 stainless at temperatures above 1600°F.
- RA 253 MA is ASME section VIII, Div 1 approved for pressure vessels up to 1650°F, while 309 is only approved up to 1500°F.
- RA 253 MA and 309 are assigned to the same P group in ASME Section IX. This is P Number 8 Group 2.
- RA 253 MA is welded with RA 253 MA matching composition weld filler, available from Rolled Alloys in FCAW, GTAW, GMAW, and SMAW.
- RA 253 MA can also be welded to other 300 series stainless steels using the RA 253 MA weld filler or to higher nickel alloys using the RA333 weld filler to maintain similar strength in the weld compared to the RA 253 MA base metal.
- Rolled Alloys stocks a complete range of RA 253 MA products including plate, sheet, round bar, pipe, and welding consumables.

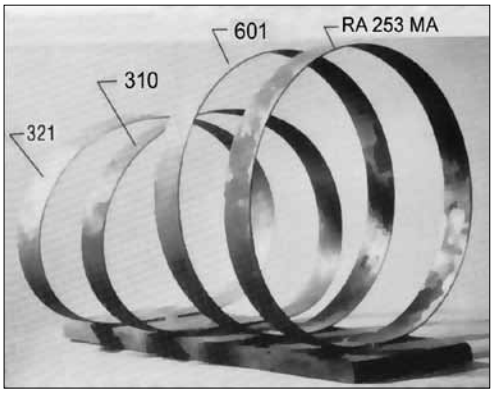
Chemical Composition, %

	Cr	Ni	Si	Mn	N	C	Ce	Fe
RA 253 MA® UNS S30815	21.0	11.0	1.7	0.6	0.17	0.08	0..04	balance
309 UNS S30908	23.0	13.0	0.8	1.6	–	0.05	–	balance

Creep-Rupture Properties







Creep Test: Ring specimens subjected to a temperature of 1800°F under the stress of their own weight for total of 32 hours.

Typical Tensile Properties, Plate

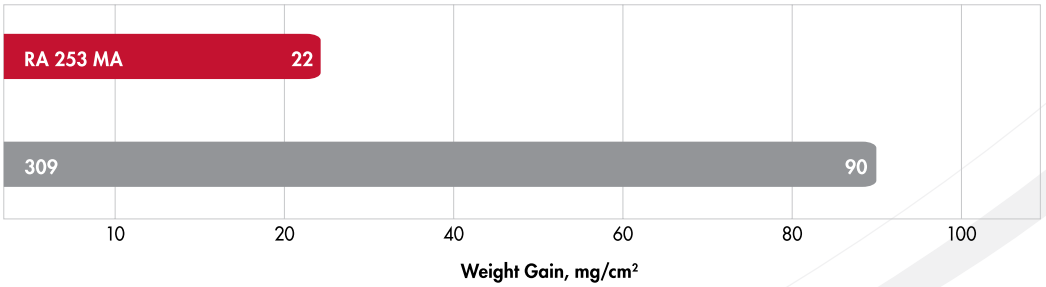
	Temperature		70 °F	1200 °F
RA 253 MA	Ultimate Tensile Strength,	ksi	87	56.4
	0.2% Offset Yield Strength,	ksi	45	23.0
309	Ultimate Tensile Strength,	ksi	75	52.0
	0.2% Offset Yield Strength,	ksi	30	22.0

ASME Section VIII Div. 1 Maximum Design Allowable Stresses

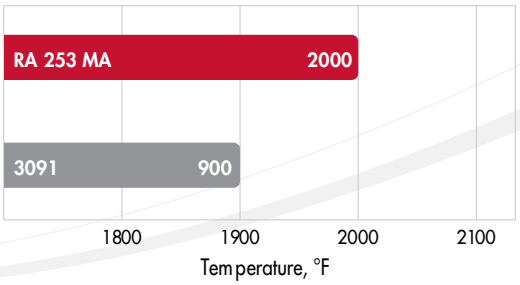
Temperature	°F	1100	1200	1350	1500	1650
RA 253 MA	ksi	9.0	5.2	2.4	1.3	0.71
309H*	ksi	7.6	4.0	1.7	0.75	–

**309H is only approved to 1500°F. Values for 309H are used in this comparison as they have higher values than 309 straight grade.*

2000°F Cyclic Oxidation Testing in Air



Maximum Suggested Temperature Limit in Air



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