



Process Specification for the Heat Treatment of Maraging Steels

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1. Introduction

Maraging Steel is commonly used in LIGO suspensions and seismic isolation systems due to its high ultimate strength and low creep under stress. The purpose of this document is to standardize the heat treating process to assure consistent spring properties of parts made of maraging steel.

Maraging Steels are generally purchased in the solution annealed condition from the material supplier for machining. To ensure consistent properties of the final heat treated part all maraging steel should be solution annealed AGAIN prior to machining. Fig. 1 shows the influence of solution annealing temperature on the age hardened tensile strength for both maraging 250 and 300.

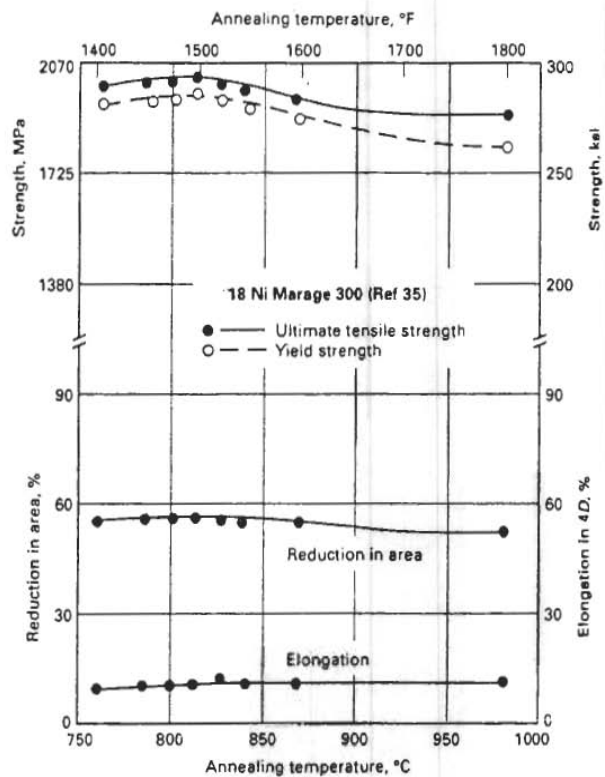
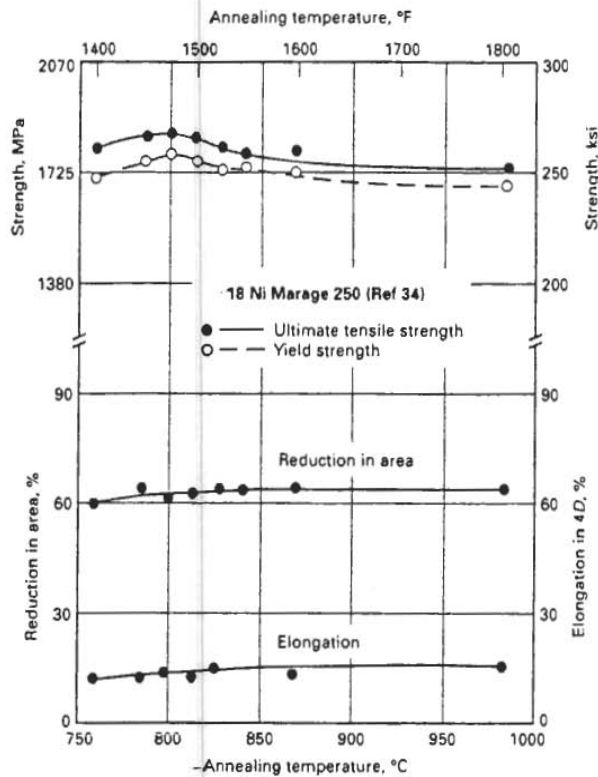


Fig.1



Process Specification for the Heat Treatment of Maraging Steels

2. Applicable Documents

“Heat Treating of Maraging Steels”, ASM Handbook, tenth Edition, Volume 4
“Maraging Steels”, ASM Handbook, tenth edition, Volume 1
The maraging-steel blades of the Virgo super attenuator, Meas.Sci. Technol. 11 (2000)

3. Applicable Materials

- 18Ni(200) Maraging 200
- 18Ni(250) Maraging 250
- 18Ni(300) Maraging 300
- 18Ni (350) Maraging 350

4. Heat treat Process for Maraging steels

1. Solution anneal maraging rough cut material in air at 1500°F (815°C) for 1 hour and air cool to room temperature.
2. Machine parts as specified in LIGO drawings and other applicable specifications.
3. Age harden in an argon atmosphere per table 1. Age harden maraging 200, 250, and 300 at 900°F (480°C) for 6 hours. Age harden maraging 350 at 900°F (480°C) for 12 hours.

Grade	Heat treatment(a)	Tensile strength		Yield strength		Elongation in 50 mm (2 in.), %	Reduction in area, %	Fracture toughness	
		MPa	ksi	MPa	ksi			MPa√m	ksi√in.
18Ni(200).....	A	1500	218	1400	203	10	60	155–240	140–220
18Ni(250).....	A	1800	260	1700	247	8	55	120	110
18Ni(300).....	A	2050	297	2000	290	7	40	80	73
18Ni(350).....	B	2450	355	2400	348	6	25	35–50	32–45
18Ni(Cast).....	C	1750	255	1650	240	8	35	105	95

(a) Treatment A: solution treat 1 h at 820 °C (1500 °F), then age 3 h at 480 °C (900 °F). Treatment B: solution treat 1 h at 820 °C (1500 °F), then age 12 h at 480 °C (900 °F). Treatment C: anneal 1 h at 1150 °C (2100 °F), age 1 h at 595 °C (1100 °F), solution treat 1 h at 820 °C (1500 °F) and age 3 h at 480 °C (900 °F)

Table 1