

# Dynamic Metals International

95 Valley Street Bristol, CT 06110 Toll Free 800-641-4140

[www.maraging.com](http://www.maraging.com)

## MARAGING (C) 350

**General:** Maraging is a 18% nickel, cobalt strengthened steel (C-type), with excellent mechanical properties, workability and heat treatment characteristics.

**Applications:** Typical applications for maraging include missile and rocket motor cases, landing and takeoff gear, munitions, aerospace, extrusion tooling, die casting, high performance shafting, gears and fasteners.

### Composition:

C	Mn	Si	P	S	NI	
0.03 max	0.10 max	0.10 max	0.010 max	0.010 max	18.00-19.00	
Co	Mo	Ti	Al	Cr	Cu	
11.50-12.50	4.60-5.20	1.30 -1.60	0.05-0.15	0.50 max	0.50 max	Fe Bal

**Material Melt Method:** Maraging melt method is a VIM (Vacuum Induction Melt) + VAR (Vacuum Arc Remelt)

**As Shipped Condition:** Maraging is supplied in the annealed and descaled condition. The alloy is very tough, relatively soft (38 Rc Max.), therefore, readily machined and formed.

**\*Bar Tolerances:**     .250" - .499"     .500" - .999"     1.000" - 3.625"     3.626" - 6.000"     6.001" - 8.000"     8.001" - 10.000"  
                                  -.000/+0.005     -.000/+0.010     -.000/+0.031     -.000/+0.047     -.000/+0.063     -.000/+0.078

### Minimum Properties after Aging:

Hardness .....	56 Rc	Charpy V-notch .....	6 ft/lbs. min	Reduction of Area .....	25%
Elongation .....	2.8%	Yield Strength .....	330 ksi	Fracture Toughness .....	25

### Physical Properties:

Density..... .289 lbs./cu. In  
Average Coefficient of Thermal Expansion (70 – 900 F) ..... 5.6 x 10<sup>-6</sup> in/in. F

### Heat Treatment Aging Process: (Non Die Casting Applications)

Material is to be heat treated to 900 F +/- 10 holding at temperature for 6 hours then cooling at room air temperature. During the aging treatment maraging shrinks uniformly and predictably on all dimensions .001 in/in

### Heat Treatment Aging Process: (Die Casting Applications)

Following the rough machining of the die, anneal at 1500-1525 F for 1 hour per inch of thickness is recommended. After finish machining, an aging heat treatment of 980-1000 F for 6 hours is recommended.

### Machining:

Maraging steel in the annealed condition is comparable to 4340. However, when maraging is aged, the type of cutting tool and speeds change. Rigid equipment, firm tool supports, sharp tools and abundant coolant are essential.

### Welding:

Maraging is weld able without preheat, in both the annealed and aged condition. Only an aging heat treatment is needed to restore in the weld.

### Standards:

\*Mil-S-46850D

\*DMI product is not supplied to the dimensional tolerances of MIL-S-46850D.

\*The information, data and specifications presented here are representative only, and are not guaranteed values. Material or products applications described are solely for illustrative purposes and should not be construed as express or implied warranties for fitness for these or other applications.