



410

### Description

This is the basic grade in the group of 400 Series alloys that can be hardened by heat treatment. It, and its companion grade, Type 403, contain a minimum of 11.5% chromium, just sufficient to give them corrosion resistance properties. Both achieve maximum corrosion resistance when they have been hardened and then polished. While Type 410 is a general purpose grade often supplied in the hardened, but still machinable condition for applications where high strength and moderate heat and corrosion resistance are required.

### Typical Applications

- Bolts, Nuts, Screws
- Bushings
- Pump parts and shafts
- Steam and gas turbine parts
- Petroleum fractionating towers
- Mine ladder rungs
- Valves

### Corrosion Resistance

Resists dry atmosphere, fresh water, mild alkalies and acids, steam and hot gasses. Must be hardened for maximum heat and corrosion resistance. Less corrosion resistance than 300 Series grades and ferritic 400 Series alloys such as Type 430.

### Heat Resistance

Good resistance to scaling in intermittent service to 1500°F and in continuous service to 1300°F.

### Heat Treatment

Hardened by heating to 1700-1850°F, quenching in oil or air and tempering to obtain a wide variety of hardness values and mechanical properties. The tempering range 750-1075°F should be avoided.

### Welding

Readily welded by all standard methods. But a pre-heat of 300-500°F and post-weld annealing treatment is required to reduce the possibility of cracking. Use Type 410 welding rod if post hardening and tempering is involved. If parts are to be used in the "as welded" condition, a ductile joint can be achieved by using Type 308 or 309 filler rod.

Chemical Analysis		C	Mn	P	S	Si	Cr
Max values	410	.15	1.0	.040	.030	1.0	11.5-13.5

Typical Mechanical Properties- Annealed	Yield Strength	Tensile Strength	Elongation % in 2"	Hardness		Impact Charpy Ft. - lbs	Modulus of Elasticity in Tension - ksi
	ksi	ksi		R b	BHN		
	45	70	25	80	150	110	29000

Other Properties	Creep Strength 1% flow 10,000 hours at 1000°F -ksi	Electrical Resistivity - Microhm -Cm At 68°F	Coefficient of Thermal expansion: (ln/ln°F x 10 <sup>-6</sup> ) 32°- 212°F	Thermal Conductivity BTU/ft. <sup>2</sup> /Hr./°F/ft.	
				At 212°F	At 932°F
	12.0	57	5.5	8.0	10.8

