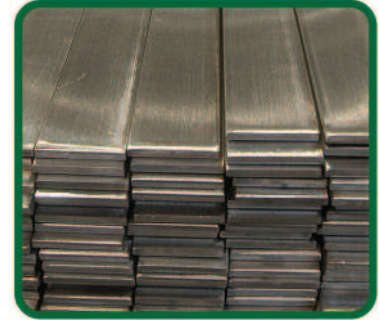
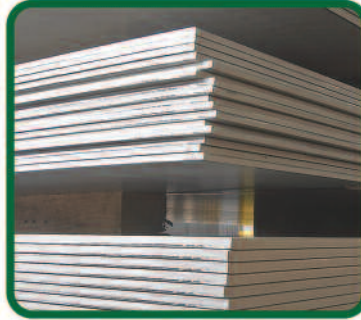
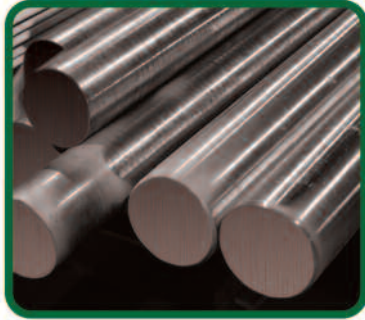




# ALLOY 410 SPECIFICATIONS: UNS S41000



## ALLOY 410 (UNS S41000)

Penn Stainless inventory now includes Alloy 410 (UNS S41000) in sheet, sheet coil, plate, round bar, processed flat bar and tubular products.

## GENERAL PROPERTIES

Alloy 410 is the basic, general purpose martensitic stainless steel that is used for highly stressed parts and provides good corrosion resistance plus high strength and hardness. Alloy 410 contains a minimum of 11.5% chromium which is just sufficient enough to demonstrate corrosion resistance properties in mild atmospheres, steam, and many mild chemical environments. It is a general purpose grade that is often supplied in the hardened but still machineable condition for applications where high strength and moderate heat and corrosion resistance are required. Alloy 410 displays maximum corrosion resistance when it's been hardened, tempered, and then polished.

## APPLICATIONS

Applications requiring moderate corrosion resistance and high mechanical properties are ideal for Alloy 410. Examples of applications that frequently used Alloy 410 include:

- Cutlery
- Steam and gas turbine blades
- Kitchen utensils
- Bolts, nuts, screws
- Pump and valve parts and shafts
- Mine ladder rugs
- Dental and surgical instruments
- Nozzles
- Hardened steel balls and seats for oil well pumps

## STANDARDS ALLOY 410

ASTM/ASME .....UNS S41000  
 EURONORM .....FeMn35Cr20Cu4Mo2  
 DIN .....2.4660

ALLOY 410 (UNS S41000) CAN BE PROCESSED BY PENN STAINLESS UTILIZING THE FOLLOWING METHODS:

- SHEAR CUTTING
- PLASMA CUTTING
- HQ PLASMA CUTTING
- DYNAMIC WATER JET CUTTING
- LASER CUTTING
- SAW CUTTING
- GAUER PROCESSING
- MACHINE CUTTING



## PRODUCT OFFERING:

- SHEET
- PLATE
- PERFORATED
- FLATE & EXPANDED
- ROUND BAR
- SQUARE BAR
- HEX BAR
- ROLLED FLAT BAR
- S/E PROCESSED BAR
- TUBULAR PRODUCTS
- STRUCTURALS

## CORROSION RESISTANCE

- Good corrosion resistance to atmospheric corrosion, potable water, and to mildly corrosive environments
- Its exposure to everyday activities (sports, food preparation) is generally satisfactory when proper cleaning is performed after exposure to use
- Good corrosion resistance to low concentrations of mild organic and mineral acids

## WELDING CHARACTERISTICS

- Readily welded by all standard methods
- To reduce the risk of cracking, it is suggested to pre-heat the work piece to 350 to 400°F (177 to 204°C)
- Post weld annealing is recommended to retain maximum ductility

## HEAT TREATMENT

- The proper hot work range is 2000 to 2200°F (1093 to 1204°C)
- Do not work this material below 1650°F (899°C)

## CHEMICAL PROPERTIES

Type	C	Mn	Si	P	S	Cr	Ni
410	0.15 max	1.00 max	1.00 max	0.04 max	0.03 max	min: 11.50 max: 13.50	0.50 max

## MECHANICAL PROPERTIES

Grade	Tensile Strength ksi (MPa) min	Yield Strength 0.2% offset ksi (MPa) min	Elongation (% in 50mm) min	Hardness (Brinell) MAX	Hardness (Rockwell B) MAX
410	65 (450)	30 (205)	20	217	96

## MECHANICAL PROPERTIES OF HEAT TREATED 410

Heat Treatment	T410 (0.14%C) Hardened 1800°F (982°C)		
	Rockwell Hardness	0.2% YS, Ksi (MPa)	UTS, Ksi (MPa)
Annealed*	81 HRB	45.4 (313)	80.4 (554)
Hardened & Tempered 400°F (204°C)	43 HRC	156.1 (1076)	202.9 (1399)
Hardened & Tempered 550°F (288°C)	40 HRC	148.3 (1022)	187.0 (1289)
Hardened & Tempered 600°F (316°C)	40 HRC	148.8 (1026)	186.1 (1283)
Hardened & Tempered 800°F (427°C)	41 HRC	132.9 (916)	188.5 (1300)
Hardened & Tempered 900°F (482°C)	41 HRC	122.6 (845)	188.3 (1298)
Hardened & Tempered 1000°F (538°C)	35 HRC	127.9 (882)	154.3 (1063)
Hardened & Tempered 1200°F (649°C)	98 HRB	85.5 (589)	111.2 (767)

## PHYSICAL PROPERTIES

	Alloy 410	
Density	0.276 lbs/in <sup>3</sup>	
Modulus of Elasticity	Psi	Gpa
	29 x 10 <sup>6</sup>	200
Specific Gravity	7.65	
Specific Heat	.11 Btu/lb. Σ °F	
Thermal Conductivity	Btu/(hr Σ ft Σ °F)	W/m Σ K
at 212°F (100°C)	14.4	24.9
Electrical Resistivity at 68°F (20°C)	56 Microhm-cm	
Coefficient of Thermal Expansion	in/in°F	cm/cm/°C
68 - 392°F (20 - 200°C)	5.9 x 10 <sup>-6</sup>	10.5 x 10 <sup>-6</sup>
68 - 1112°F (20 - 600°C)	6.5 x 10 <sup>-6</sup>	11.6 x 10 <sup>-6</sup>
Melting Range	°F	°C
	2700 - 2790	1482 - 1532

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