E STEEL SDN BHD (891338-A)

NO 3, Lorong Sungai Puloh 7/KU 6,
Kawasan Perindustrian Sungai Puloh,42100 Selangor D.E
Tel : 03-3292 8686 / 32928666 / 32928777
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Stainless Steel - Grade 410, UNS S41000, SUS410

Chemical Formula

Fe, <0.15% C, 11.5-13.5% Cr, >0.75% Ni, <1.0% Mn, <1.0% Si, <0.04% P, <0.03% S

Applications

SS410 is the basic martensitic stainless steel; like most non-stainless steels it can be hardened by a "quench-and-temper" heat treatment. It contains a minimum of 11.5 per cent chromium, just sufficient to give corrosion resistance properties. It achieves maximum corrosion resistance when it has been hardened and tempered and then polished. SUS410 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.

Martensitic stainless steels are optimised for high hardness, and other properties are to some degree compromised. Fabrication must be by methods that allow for poor weldability and usually the need for a final heat treatment. Corrosion resistance of the martensitic grades is lower than that of the common austenitic grades, and their useful operating temperature range is limited by their loss of ductility at sub-zero temperatures and loss of strength by over-tempering at elevated temperatures.

Composition

Grade		C	Mn	Si	P	S	Cr	Mo	Ni	N
SS 410	min.	-	-	-	-	-	11.5	-	0.75	-
	max.	0.15	1.00	1.00	0.040	0.030	13.5			

Mechanical Properties

Tempering Temperature (°C)	Tensile Strength (MPa)	Yield Strength 0.2% Proof (MPa)	Elongation (% in 50mm)	Hardness Brinell (HB)	Impact Charpy V (J)
Annealed *	480 min	275 min	16 min	-	-
204	1310	1000	16	388	30
316	1240	960	14	325	36
427	1405	950	16	401	#
538	985	730	16	321	#
593	870	675	20	255	39
650	755	575	23	225	80

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* Annealed properties are specified for Condition A of ASTM A276, for cold finished bar.

Due to associated low impact resistance this steel should not be tempered in the range 425-600°C

Specification Comparison

Grade	UNS No	Old British		Euronorm		Swedish SS	Japanese JIS
SS410	S41000	410S21	56A	1.4006	X12Cr13	2302	SUS 410

These comparisons are approximate only. The list is intended as a comparison of functionally similar materials **not** as a schedule of contractual equivalents. If exact equivalents are needed original specifications must be consulted.

Corrosion Resistance

410 resists dry atmosphere, fresh water, mild alkalies and acids, food, steam and hot gases. Must be hardened for maximum heat and corrosion resistance. Performance is best with a smooth surface finish. Less corrosion resistant than the austenitic grades and also less than 17% chromium ferritic alloys such as Grade 430.

Heat Resistance

Good resistance to scaling up to approximately 650°C, but generally not recommended for use in temperatures between 400 and 580°C, because of the reduction in mechanical properties.

Heat Treatment

Annealing - Grade 410 steels can be fully annealed at temperatures from 815 to 900 °C, followed by slow furnace cooling and air-cooling. Process annealing of grade 410 steels can be carried out at temperatures ranging from 650 to 760 °C and air-cooled.

Hardening – Hardening of grade 410 steels can be performed at 925 to 1010 °C, followed by air and oil quenching. Heavy sections of grade 410 need to be oil quenched. Tempering, to enhance the mechanical properties and hardness of grade 410 steels, follows this process. It is not recommended to perform tempering at temperatures from 400 to 580 °C.

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Applications

Typical applications include:

- Bolts & Nults
- Screws
- Bushings
- Pump and valve parts and shafts
- Steam and gas turbine parts
- Petroleum fractionating towers
- Mine ladder rungs