



**Grade 440A** is a high-carbon martensitic stainless steel created to give stainless properties with maximum hardness. It is magnetic in both the annealed as well as hardened conditions. Maximum hardness and corrosion resistance are accessible only in the hardened or hardened and stress relieved conditions, so the alloy is not utilized in the annealed or annealed and tempered conditions.

**Grade 440B** stainless steel is a high carbon martensitic stainless steel consisting good strength, moderate corrosion resistance and capacity to get and keep up wear resistance and magnificent resistance.

**Grade 440C** Stainless Steels are high carbon steels, which achieve the most elevated hardness, wear resistance and strength of all stainless steel grades after heat treatment. These properties make this grade suitable for applications for example, valve components and ball bearings. Grade 440A and 440B stainless steels, on the other hand, have comparable properties - with the exception of slightly lower percentage of carbon in grade 440A. Each of the three types of grade 440 stainless steels is ordinarily utilized. So, grade 440C is more promptly available than the other standard grades.

## Applications

- Chisels
- Surgical equipment
- High quality knife blades
- Valve seats
- Rolling element bearings

## Characteristics

- High carbon martensitic stainless with
- Moderate corrosion resistance
- Good Strength
- Ability to obtain and keep excellent hardness and wear resistance

# S. S. 440A / 440B / 440C

## Machining

This utilized best machined in the annealed condition. By utilizing chip breakers tough, stringy chips can be easily handled. Ceramic or carbide tooling is recommended.

## Welding

These alloys are not generally welded because of tendency to air harden. If it must be welded, post weld treat at 1350-1400 F (732-760 C) for 6 hours and preheat to 500 F (260 C) followed by a slow furnace cooling to avoid cracking. Use comparable filler metal and high heat inputs during operations.

## Hot Working

For 440A grade:

Pre-heat to 1400 F (760 C), then brings slowly up to 1900-2200 F (1038-1204 C) before proceeding. Do not work this material below 1700 F (927 C). Cool material slowly after working and once at room temperature, anneal fully. \*\*\*\*Pre-heat to 1400 F (760 C), then bring slowly up to 1900-2200 F (1038-1204 C) before proceeding. Do not work this material below 1700 F (927 C). Cool material slowly after working and once at room temperature, anneal fully.

For 440B & 440C grade:

Pre-heat to 1400 F (760 C), then brings slowly up to 1900-2200 F (1038-1204 C) before proceeding. Do not work this material below 1700 F (927 C). Cool material slowly after working and once at room temperature, anneal fully.

## Cold Working

These alloys are treated just slightly cold workable by common practices.

## Annealing

Annealing to 1550-1600 F (843-871 C) pursued by very slow furnace cooling.

## Tempering

For maximum properties, soak at 300 F (148 C). Maximum obtainable hardness is (440A) RC 56, (440B) RC 58 and (440C) RC 60.

## Hardening

Bring the material slowly up to 1400 F (760 C), then on to a soak temperature of 1850 F (1010 C), air or oil cool.

## Chemical Properties

Grade	C	Mn	P	S	Si	Cr	Mo	Fe
<b>440A</b>	0.60 - 0.75	1.0 Max	0.4 Max	0.3 Max	1.0 Max	16.0- 18.0	0.75 Max	Reminder
<b>440B</b>	0.75 - 0.95	1.0 Max	0.4 Max	0.3 Max	1.0 Max	16.0- 18.0	0.75 Max	Reminder
<b>440C</b>	0.95 – 1.20	1.0 Max	0.4 Max	0.3 Max	1.0 Max	16.0- 18.0	0.75 Max	Reminder

# S. S. 440A / 440B / 440C

## Mechanical Properties

Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation% in 2 inches
110	65	14

## Physical Properties

Properties	Units	Temperature in °C
Density	7.6 g/cm <sup>3</sup>	Room
Specific Heat	0.11 Kcal/kg.C	22°
Melting Range	1482°C	-
Modulus of Elasticity	200 KN/mm <sup>2</sup>	20°
Electrical Resistivity	360 μΩ.cm	Room
Coefficient of Expansion	10.1 μm/m °C	20-100°
Thermal Conductivity	24.2 W/m-°K	20°

## ASTM Specifications

Grade	Pipe / Tube (SMLS)	Bar	Forging	Wire
440A	A 511	A 276, A 314	A 473	A 580
440B	-	A 276, A 314	A 473	A 580
440C	-	A 276, A 314	A 473	A 493

## Availability

### For 440A Grade:

MANUFACTURING
Fasteners
Custom Machining
Custom Fabrication
Piping / Spools
Stamped Parts
B/W Fittings
S/W Fittings
Flanges
Compression Fittings

### RAW MATERIALS

Pipes
Tubes
Bars
Wires

### For 440B & 440C Grade:

### MANUFACTURING

Fasteners
Custom Machining
Custom Fabrication
Stamped Parts

### RAW MATERIALS

Bars
Wires

## Disclaimer

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