SPECIFICATIONS

Commercial	440C
EN	1.4125

Grade 440C is capable of attaining, after heat treatment, the highest strength, hardness and wear resistance of all the stainless alloys. Its very high carbon content is responsible for these characteristics, which make 440C particularly suited to such applications as ball bearings and valve parts.

Grades 440A and 440B are identical except for slightly lower carbon contents (0.60 - 0.75% and 0.75 - 0.95% respectively); these have lower attainable hardnesses but slightly higher corrosion resistances. Although all three versions of this grade are standard grades, in practice 440C is more available than the A or B variants.

A free-machining variant 440F (UNS S44020) also exists, with the same high carbon content as 440C. Again this grade is not readily available in Australia.

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 also allow for a final harden and temper heat treatment. Corrosion resistance is lower than 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.

CHEMICAL COMPOSITION

EN 10088-3:2005
1.4125 Steel

Element	% Present
Chromium (Cr)	16.00 - 18.00
Carbon (C)	0.95 - 1.20
Molybdenum (Mo)	0.40 - 0.80
Silicon (Si)	0.0 - 1.00
Manganese (Mn)	0.0 - 1.00
Phosphorous (P)	0.0 - 0.04
Sulphur (S)	0.0 - 0.03
Iron (Fe)	Balance

ALLOY DESIGNATIONS

440C
UNS44004
1.4125

SUPPLIED FORMS

- Bar

GENERIC PHYSICAL PROPERTIES

Property	Value
Density	7.65 g/cm³
Thermal Expansion	10.1 x10^{-6} /K
Modulus of Elasticity	200 GPa
Thermal Conductivity	24.2 W/m.K
Electrical Resistivity	0.6 x10^{-6} Ω .m

MECHANICAL PROPERTIES

EN 10088-3:2005
Bar
Up To 100mm Dia or Thickness

Property	Value
Proof Stress	448-1900 MPa
Tensile Strength	758-2030 MPa
Elongation A50 mm	4-14 %

Mechanical properties vary greatly according the heat treatment that the material has undergone

APPLICATIONS

Typical applications include:
Rolling element bearings
Valve seats
High quality knife blades
Surgical instruments
Chisels

CORROSION RESISTANCE

Good resistance to the atmosphere, fresh water, foods, alkalies and mild acids. Best resistance in the hardened and tempered and passivated condition. A smooth polished surface also assists.

The corrosion resistance of grade 440C approximates that of grade 304 in many environments.

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HEAT RESISTANCE

Not recommended for use in temperatures above the relevant tempering temperature, because of reduction in mechanical properties by over-tempering.

MACHINABILITY

In the annealed condition this grade is relatively easily machined; approximately the same as for high speed steel. Chips are tough and stringy so chip breakers are important. If these grades are hardened machining becomes more difficult and probably impossible.

HEAT TREATMENT

Annealing - Full anneal - 850-900°C, slow furnace cool to about 600°C and then air cool. Sub-critical Annealing - 735-785°C and slow furnace cool. Hardening - Heat to 1010-1065°C, followed by quenching in warm oil or air. Oil quenching is necessary for heavy sections. Immediately temper at 150-370°C to obtain a wide variety of hardness values and mechanical properties as indicated in the accompanying table.
Tempering in the range 425-565°C is to be avoided because of reduced impact resistance and corrosion resistance. Tempering in the range 590-675°C results in lower hardness (the product become machinable) and high impact resistance.

WELDABILITY

If welding is necessary pre-heat at 250°C and follow welding with a full anneal. Grade 420 filler will give a high hardness weld (although not as high as the 440C), but 309 or 310 will produce soft welds with higher ductility.

CONTACT

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REVISION HISTORY

Datasheet Updated	13 March 2020

DISCLAIMER

This Data is indicative only and as such is not to be relied upon in place of the full specification. In particular, mechanical property requirements vary widely with temper, product and product dimensions. All information is based on our present knowledge and is given in good faith. No liability will be accepted by the Company in respect of any action taken by any third party in reliance thereon.

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