

SPECIFICATIONS

Commercial	420
EN	1.4021

A martensitic machining bar with machinability enhanced through the addition of Sulphur.

As for most other free-machining stainless steels the improvement in machinability is achieved by addition of sulphur which forms manganese sulphide inclusions; this sulphur addition also lowers the corrosion resistance, weldability and formability to below that of its non-free machining equivalent Grade 410.

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 1.4021 Steel	
Element	% Present
Chromium (Cr)	12 - 14
Manganese (Mn)	1.5 max
Silicon (Si)	1 max
Carbon (C)	0.16 - 0.25
Phosphorous (P)	0.04 max
Sulphur (S)	0.03 max
Iron (Fe)	Balance

ALLOY DESIGNATIONS

1.4021 is similar, **but may not be a direct equivalent to:**

420
UNS42000
1.4021, 1.4024, 1.4028, 1.4029, 1.4030, 1.4034

SUPPLIED FORMS

- Bar

GENERIC PHYSICAL PROPERTIES

Property	Value
Density	7.75 g/cm ³
Modulus of Elasticity	200 GPa
Thermal Conductivity	24.9 W/m.K
Thermal Expansion	10.3 x10 ⁻⁶ /K
Electrical Resistivity	0.55 x10 ⁻⁶ Ω .m

MECHANICAL PROPERTIES

EN 10088-3:2005 Bar Up to 160mm Dia / Thickness	
Property	Value
Proof Stress	500 - 600 MPa
Tensile Strength	700 - 950 MPa
Elongation A	12 - 13 %

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

APPLICATIONS

Typical applications include:
Valve Parts
Pump Shafts
Automatic Screw Machined Parts
Motor Shafts
Washing Machine Components
Bolts and Nuts
Studs
Gears
Shear Blades
Cutlery (Blades)
Surgical Instruments

CORROSION RESISTANCE

Corrosion resistance is lower than the common austenitic grades.

Useful resistance to dry atmospheres, fresh water and mild alkalies and acids, but less resistant than the equivalent non-free-machining grades. Less corrosion resistant than the austenitic grades and also less than 17% chromium ferritic alloys such as Grade 430. High sulphur content free machining grades such as 416 are totally unsuitable for marine or other chloride exposure.

Maximum corrosion resistance is achieved in the hardened condition, with a smooth surface finish.

HEAT RESISTANCE

Fair resistance to scaling in intermittent service up to 760°C and up to 675°C in continuous service. Not recommended for use in temperatures above the relevant tempering temperature, if maintenance of mechanical properties is important.

FABRICATION

Fabrication must be by methods that allow for poor weldability and usually also allow for a final harden and temper heat treatment.

COLD WORKING

Not recommended - Suitable only for minor deformation. Severe deformation will result in cracking.

HOT WORKING

All hot work procedures should commence following uniform heating to 2100-2250 F (1149-1232 C). Hot work below 1700 F (927 C) may result in cracking.

MACHINABILITY

Grade 420 offers exceptionally good machinability, the highest of any of the commonly available stainless steels. Best machinability is in the sub-critical annealed condition.

HEAT TREATMENT

WELDABILITY

Grade 420 has poor weldability.

Pre-heat to 150-320°C and post-heat at 610-760°C. Grade 420 coated welding rods are recommended for high strength joints, where a post-weld hardening and tempering heat treatment is to be carried out.

If parts are to be used in the "as welded" condition, a ductile joint can be achieved by using Grade 309 filler rod. AS 1554.6 pre-qualifies welding of 420 with Grade 309 rods or electrodes.

CONTACT

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REVISION HISTORY

Datasheet Updated	13 March 2020
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