SINOXX 4021 Steel

Designation by Standards

Brand Name	Ravne	Mat. No.	DIN	EN	AISI/SAE
SINOXX 4021	PK3	1.4021	X20Cr13	X20Cr13	420

Chemical Composition (in weight %)

C	Si	Mn	Cr	Mo	Ni	V	W	Others
0.20	max. 1.0	max. 1.50	13.0	-	-	-	-	-

Description
This alloy is a general purpose heat treatable chromium steel which is a popular cutlery grade. Martensitic stainless steel.

Applications
Dental and surgical instruments, cutlery, pump shafts, plastic molds and dies, steel balls, and various hand tools, pump components, shafts, turbine blades, pressing dies for tablets, glass and plastics processing tools.

Physical properties (average values) at ambient temperature
Modulus of elasticity [10^3 x N/mm^2]: 216
Density [g/cm^3]: 7.73
Thermal conductivity [W/m.K]: 30.0
Electric resistivity [Ohm mm^2/m]: 0.60
Specific heat capacity[J/g.K]: 0.46

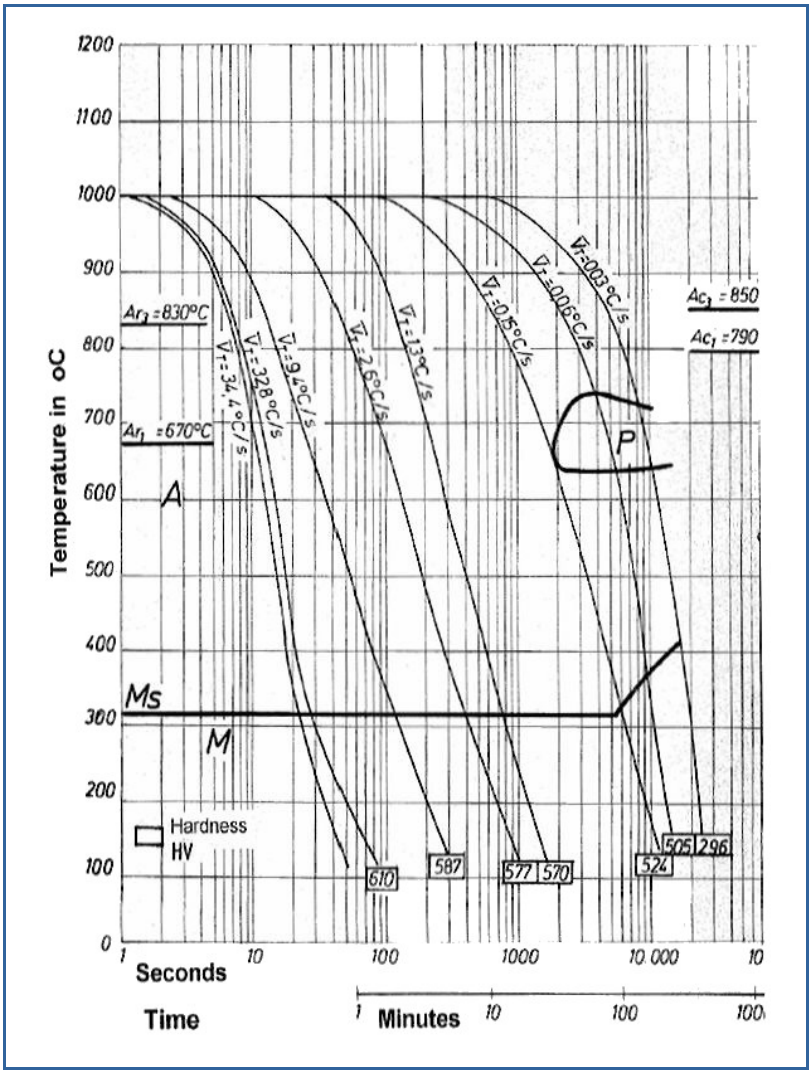
Coefficient of Linear Thermal Expansion 10^{-6} $^oC^{-1}$

20-100^{o}C	20-200^{o}C	20-300^{o}C	20-400^{o}C	20-500^{o}C
10.5	11.0	11.5	12.0	12.0

Modulus of Elasticity [10^3 N/mm^2]

20^{o}C	200^{o}C	400^{o}C
216	205	190

Continuous Cooling Transformation (CCT) Diagram



Soft Annealing

Heat to 730-810^{O}C, air cooling. Structure is ferrite with spherical carbides.

Hardening

Harden from a temperature of 950-1050^{O}C followed by oil, air quenching.

Tempering

Tempering temperature: 650-750^{O}C. Transformation structure with ferrite.

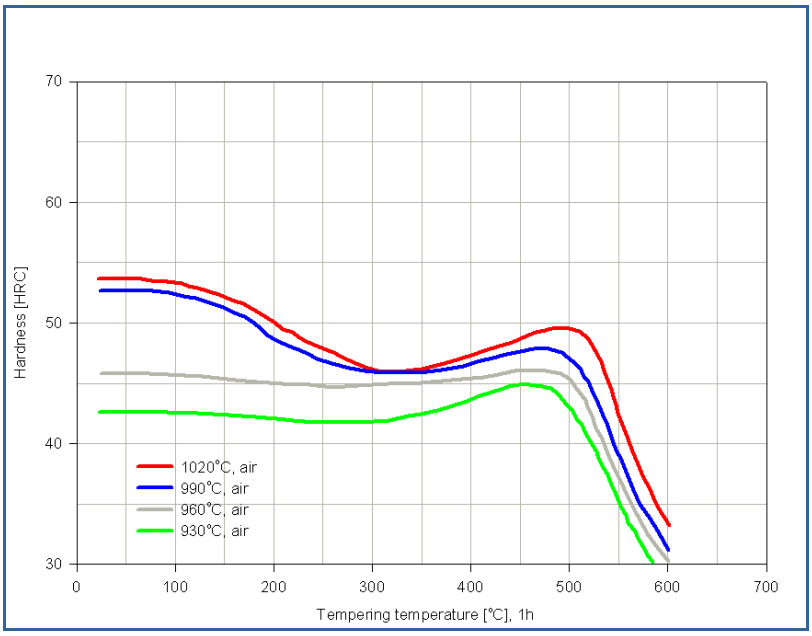
Mechanical Properties at Room Temperature

Size range mm	Heat treatment condition	0.2 % proof stress (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Notch impact energy (ISO-V) (J)	Hardness HB max.
d<=160	Q+T 700	500	700-850	13	25	230
d<=160	Q+T 800	600	800-950	12	20	230

0.2 % Proof Stress (N/mm^2) at Elevated Temperatures

Condition	100°C	150°C	200°C	250°C	300°C	350°C	400°C
Q+T 700	460	445	430	415	395	365	330
Q+T 800	515	495	475	460	440	405	355

Diagram Tempering Temperature - Mechanical Properties



Forging
Hot forming temperature: 1100-850°C.

Machinability
Similar to machining some of the high carbon tool steel, this alloy has tough, stringy chip build-up.

Embittlemnt: It must be in mind that the temperature range between 425 and 525°C must be avoided owing to embritllement at 475°C.

Corrosion Resistance
420 is resistant to the atmosphere, fresh water, dilute acids and alkalis and fruit and vegetable juices.

Welding
Not commonly welded due to its air hardening characteristics. Welding may be performed after preheating to 149-204°C with post weld tempering at temperature for 2 hours. Filler metal should be AWS E/ER420.

Forms manufactured: Please see the Dimensional Sales Program.

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