



## SINOXX 4028 Steel

### Designation by Standards

Brand Name	Ravne	Mat. No.	DIN	EN	AISI/SAE
SINOXX 4028	PK4	1.4028	-	X30Cr13	420F

### Chemical Composition (in weight %)

C	Si	Mn	Cr	Mo	Ni	V	W	Others
0.31	max. 1.00	max. 1.50	13.00	-	-	-	-	-

### Description

This steel is a general purpose free machining version of 420 stainless, a heat treatable chromium steel. PK4 displays the best corrosion resistance in hardened and slightly tempered (around 150°C) condition. A smoothed (industrially polished) and residue-free surface is necessary in order to achieve optimum resistance of this chromium steel grade.

### Applications

Dental and surgical instruments, cutlery, pump shafts, gears pinions and cams, steel balls, and various hand tools. Not recommended for vessels containing high pressure gases or liquids or for plastic moulds where high surface finishes are required.

### Physical properties (average values) at ambient temperature

Modulus of elasticity [ $10^3 \times \text{N/mm}^2$ ]: 215, 205 (200°C), 190 (400°C)

Density [ $\text{g/cm}^3$ ]: 7.73

Thermal conductivity [ $\text{W/m.K}$ ]: 30.0

Electric resistivity [ $\text{Ohm mm}^2/\text{m}$ ]: 0.65

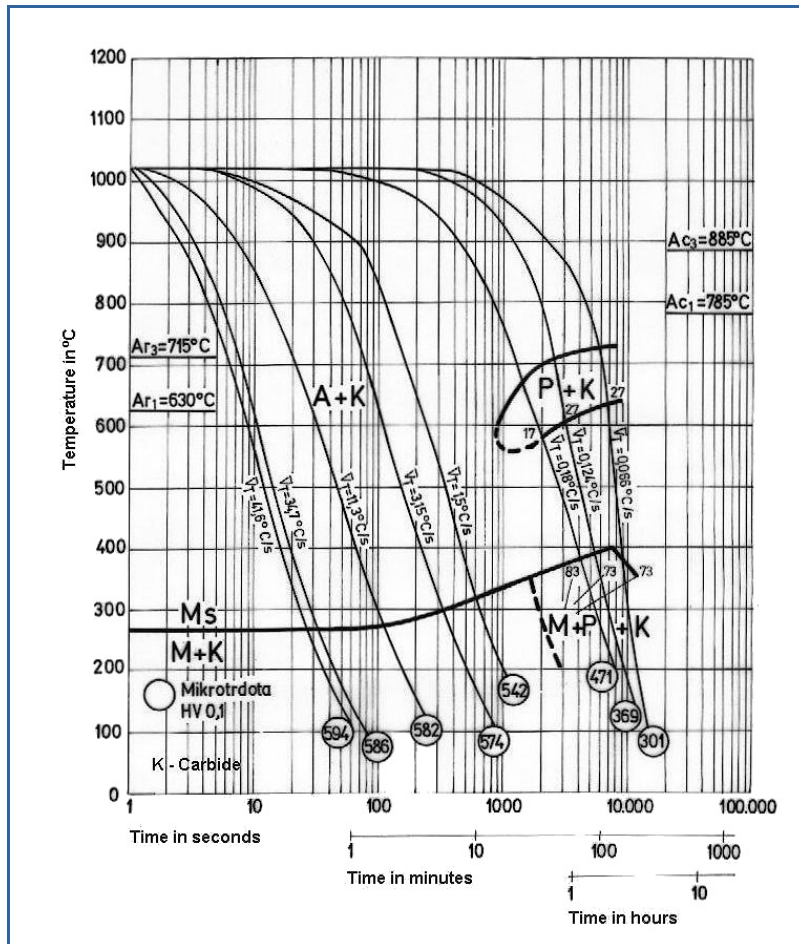
Specific heat capacity [ $\text{J/g.K}$ ]: 0.46

Magnetisable: Yes

### Coefficient of Linear Thermal Expansion $10^{-6} \text{ }^\circ\text{C}^{-1}$

20-100°C	20-200°C	20-300°C	20-400°C	20-500°C	20-600°C	20-700°C
11.7	11.9	11.9	12.1	12.1	12.6	12.6

## Continuous Cooling Transformation (CCT) Diagram



### Soft Annealing

Heat to  $745\text{--}820^{\circ}\text{C}$ , cool slowly in air. This will produce a maximum Brinell hardness of 225. Structure is ferrite with spherical carbides.

### Hardening

Harden from a temperature of  $950\text{--}1050^{\circ}\text{C}$  followed by oil or air quenching. Hardness after quenching is 52-58 HRC.

### Tempering

Tempering temperature:  $625\text{--}724^{\circ}\text{C}$ , Structure is transformation structure with ferrite.

### Mechanical properties at at ambient temperature

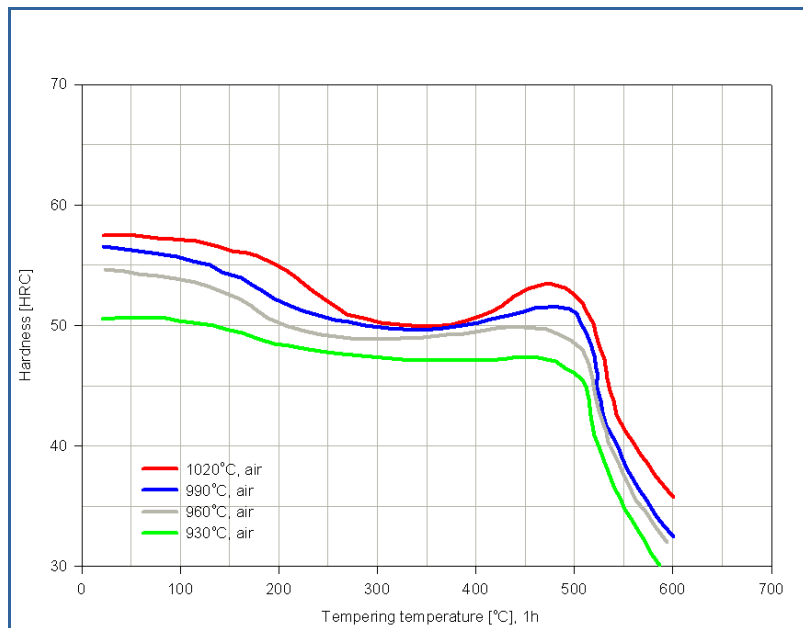
Condition: Annealed, quenched and tempered at  $850^{\circ}\text{C}$ , diameter  $d \leq 160\text{ mm}$

0.2% Proof Stress:  $650\text{ N/mm}^2$

Tensile strength:  $850\text{--}100\text{ N/mm}^2$

Elongation (A5): 10% (Longit.)

## Tempering Diagram



### Forging

Hot forming temperature: 1100-800°C, slow cooling.

### Machinability

Good machining characteristics due to the addition of sulfur. High speeds and feeds combined with short brittle chips.

### Corrosion Resistance

PK4 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.

### Cold working

PK4 will withstand only minor cold work. Radical forming operations will result in cracking.

Forms manufactured: Please see the [Dimensional Sales Program](#).

### Disclaimer

The information and data presented herein are typical or average values and are not a guarantee of maximum or minimum values. Applications specifically suggested for material described herein are made solely for the purpose of illustration to enable the reader to make his own evaluation and are not intended as warranties, either express or implied, of fitness for these or other purposes. There is no representation that the recipient of this literature will receive updated editions as the become available.

Unless otherwise specified, registered trademarks are property of SIJ Metal Ravne company. Copyright 2016 by SIJ Metal Ravne d.o.o. All rights reserved. Contact our [Sales Office](#) for more information.