



SINOXX 4000 Steel

Designation by Standards

Brand Name	Ravne	Mat. No.	DIN	EN	AISI/SAE
SINOXX 4000	PK1	1.4000	X6Cr13	X6Cr13	410S

Chemical Composition (in weight %)

C	Si	Mn	Cr	Mo	Ni	V	W	Others
max. 0.08	max. 1.00	max. 1.00	13.00	-	-	-	-	-

Description

Creep resisting steel, hardened and tempered. Usual upper temperature limit for continuous operating 550°C.

Applications

Construction of turbines, water and steam resistant ferritic steel components, parts for water turbines, valves, diff. machine parts, comp. for petrochemical and shipbuilding industry. machines and ships engines (sweet water), paper-, textile and dairy machines, vapor- and water armatures.

Physical properties (average values) at ambient temperature

Modulus of elasticity [$10^3 \times \text{N/mm}^2$]: 216

Density [g/cm^3]: 7.72

Thermal conductivity [W/m.K]: 30.0

Electric resistivity [$\text{Ohm mm}^2/\text{m}$]: 0.60

Specific heat capacity [J/g.K]: 0.46

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
10.5	11.0	11.5	12.0	12.0

Soft Annealing

Heat to 800-840°C, cool slowly in furnace.

Hardening

Harden from a temperature of 950-1000°C followed by oil or air quenching.

Tempering

Tempering temperature: 650-750°C, air.

Mechanical properties at ambient temperature

Condition: Annealed+hardened+tempered

Average hardness: 130-185 HB

0.2 % proof stress: 250-400 N/mm^2

Tensile strength: 400-600, 550-700 N/mm^2

Elongation: 18-20 %

Impact strength: 85 J

0.2 % Proof Stress in N/mm² vs. Temperature in °C
Annealed Condition

50°C	100°C	150°C	200°C	250°C	300°C	350°C	400°C
240	235	230	225	225	220	210	195

Forging

Hot forming temperature: 1100-800°C, slow cooling in furnace or in thermo-insulating material.

Machinability

Tough, draggy chips with heavy build-up. While this alloy can be machined in the annealed condition, it tends to perform better in the cold drawn or heat treated condition.

Welding

Most common methods of welding can be successfully employed with this alloy. To reduce the chance of cracking, it is advisable to preheat the workpiece to 177-204°C. Post-weld annealing is recommended to reattain maximum ductility. Filler material is KW10-IG.

Corrosion Resistance

Not known for its exceptional corrosion resistance, this alloy will stand up well to mild atmospheric conditions and fresh waters.

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

Disclaimer

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