SINOXX 4841 Steel

Designation by Standards

Brand Name	Ravne	Mat. No.	DIN	EN	AISI/SAE
SINOXX 4841	PK19	1.4841	X15CrNiSi25-20 †	X15CrNiSi25-21	314

Chemical Composition (in weight %)

C	Si	Mn	Cr	Mo	Ni	V	W	Others
max. 0.20	max. 2.00	max. 2.00	25.00	-	20.50	-	-	-

Description
PK19 is a heat resistant austenitic steel grade characterized by good high temperature strength at elevetaed temperatures. Steel is heat resistant up to to 1000^{o}C. It can thus primarily be used wherever high mechanical stress occour.

Applications
Application examples: grids, fittings, supporting/walking beams, blowers, superheater parts, pipe clips, component parts for furnaces, steam boilers, sheath tubes for thermocouples.

Physical properties (average values) at ambient temperature
Modulus of elasticity [10^3 x N/mm^2]: Approx. 210
Density [g/cm^3]: 7.9
Thermal conductivity [W/m.K]: 15, 19 (500^{o}C)
Electric resistivity [Ohm mm^2/m]: 0.90
Specific heat capacity[J/g.K]: 0.50
Magnetisable: No

Coefficient of Linear Thermal Expansion 10^{-6} ^{o}C^{-1}

20-200^{o}C	20-400^{o}C	20-600^{o}C	20-800^{o}C	20-1000^{o}C
15.5	17.0	17.5	18.0	19.0

Stress Relieving
Stress relieving to remove machining stresses should be carried out by heating to approx. 650^{o}C, holding for 1-2 hours at heat, followed by air cooling. This operation is performed to reduce distortion during heat treatment.

Quenching
Harden from a temperature of 1050-1150^{o}C followed by water or air (sufficienty fast) quenching. Structure after quenching is austenite.

Mechanical properties at room temperature in solution-annealed condition
For size range: <=160 mm and solution-annealed condition
Hardnees: Approx. 223 HB
0.2 % proof stress: 230 N/mm^2
1.0 % proof stress: 270 N/mm^2
Tensile strength: 550-750 N/mm^2
Elongation after fracture AT min: 30%

Approximate data on long-term high temperature resistance + AT condition

1% Creep Limit in N/mm^2 vs. Temperature in ^oC

Hours	600^oC	700^oC	800^oC	900^oC	1000^oC
1 000	105	50	23	10	3
10 000	95	35	10	4	-

Forging

Hot forming temperature: 1150-800^oC, cooling in air.

Machinability

This alloy machines similarly to type 304 stainless. Its chips are stringy and it will work harden rapidly. It is necessary to keep the tool cutting at all times and use chip breakers.

Application Temperature: Maximum application temperature in air is 1000^oC.

Corrosion Resistance

Steel is resistant to scaling in oxidizing atmospheres at up to 1050^oC. Steel is sensitive to SO_2, and particularly gases containing H_2S at temperatures in excess of 650^oC. It is also displays a certain sensitivity to carburising gases, especially at temperatures above 900^oC. PK15 displays a tendency towards embrittlement due to Sigma-phase formation during continuous operation in the temperature range between 600 and 850^oC.

Welding

Most of the austenitic stainless steels can be readily welded using fusion or resistance methods. Oxyacetylene welding is not recommended. Filler metal should be AWS E/ER 309 or 309L.

Cold working

Although this alloy has a high work hardening rate, it can be drawn, headed, upset, and stamped. Full annealing is required after cold work to remove internal stress.

Forms manufactured: Please see the Dimensional Sales Program.

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