SINOXX 4542

PRECIPITATION HARDENED STAINLESS STEEL

SPECIFICATION SHEET

SINOXX 4542 is a martensitic precipitation/age-hardening stainless steel offering high strength and hardness along with excellent corrosion resistance. It has good fabricating characteristics and can be age hardened by a single or double step. It has high strength combined with good corrosion resistance in fresh and salt water, industrial and marine atmosphere, and in oxidizing chemicals.

CHEMICAL COMPOSITION (in weight %)

Element	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb
min	-	-	-	-	-	15.00	-	3.00	3.00	5xC
max	0.07	1.0	1.0	0.040	0.030	17.50	0.50	5.00	5.00	0.4500

APPLICATIONS

It can be used for a variety of applications including oil field valve parts, chemical process equipment, aircraft fittings, fasteners, pump shafts, nuclear reactor components, gears, paper mill equipment, missile fittings and jet engine parts.

- **High temperature application –** it is suited up to 350°C, just for short time it can be used maximum 50°C bellow the precipitation hardening temperature
- **Application with condition H900 (PH at 482°C) –** this heat treatment provides high tensile strength and high hardness for application where wear resistance is needed with good corrosion properties. It is not suited for sub-zero application.
- **Application with condition H1150 (PH at 621°C) –** this heat treatment provides very high impact strength so the steel can be used up to -80°C
- **Application with condition H1150D (double PH at 621°C) –** steel can be used up to -196°C, with good corrosion resistance.

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MICROSTRUCTURE

Fig. 1: Microstructure of solution annealed condition

PHYSICAL PROPERTIES (average values) at ambient temperature

Modulus of elasticity

Modulus of elasticity [10^3 x N/mm²]:
196

Density

DENSITY [g/cm³] T: 20 °C
7.79

Electric resistivity

ELECTRIC RESISTIVITY (Ohm.mm²/m)
0.80

Specific heat capacity

SPECIFIC HEAT CAPACITY (J/(g. K))
20 °C
0.46, 0.65 at 500°C

Thermal conductivity

THERMAL CONDUCTIVITY (W/(m.K))
20 °C
15.3, 23.0 at 500 °C

Transformation points

Ac (begin): 590 °C, Ac (finish): 770 °C, Ms: 130 °C, Mf: 30 °C

TEMPERATURE RANGE (°C)

- Hot forming – 1150 °C to 900 °C, than air cooling
- Solution annealing – 1030 °C to 1050 °C, than cooling in oil or air
- Precipitation hardening H900 (482 °C) – 482 °C / 1h / air
- Precipitation hardening H925 (496 °C) – 496 °C / 4h / air
- Precipitation hardening H1025 (552 °C) – 552 °C / 4h / air
- Precipitation hardening H1075 (579 °C) – 579 °C / 4h / air
- Precipitation hardening H1100 (593 °C) – 593 °C / 4h / air
- Precipitation hardening H1150 (621 °C) – 621 °C / 4h / air
- Precipitation hardening H1150D (2 × 621°C) – 621 °C / 4h / air
- Precipitation hardening H1150M (760 °C/2h + 620 °C/4h)

Microstructure after solution annealing: Martensite + ferrite + austenite

Microstructure after precipitation hardening: Martensite + ferrite + austenite + intermetallic phases

MACHINABILITY

Long, gummy chips characterize this alloys machinability. It can be machined in the annealed condition, however condition H1150M will yield best results. Post machining solution treatment of parts will be required prior to final hardening.

WELDABILITY

SINOXX 4542 can be satisfactorily welded by the shielded fusion and resistance welding processes. Oxyacetylene welding is not recommended, since carbon pickup in the weld may occur. When a filler metal is required, AWS E/ER630 welding consumables should be considered to provide welds with properties matching those of the base metal. When designing the weld joint, care should be exercised to avoid stress concentrators, such as sharp corners, threads, and partial-penetration welds. When high weld strength is not needed, a standard austenitic stainless filler, such as E/ER308L, should be considered.

CONTINUOUS COOLING CURVES-CCT diagram

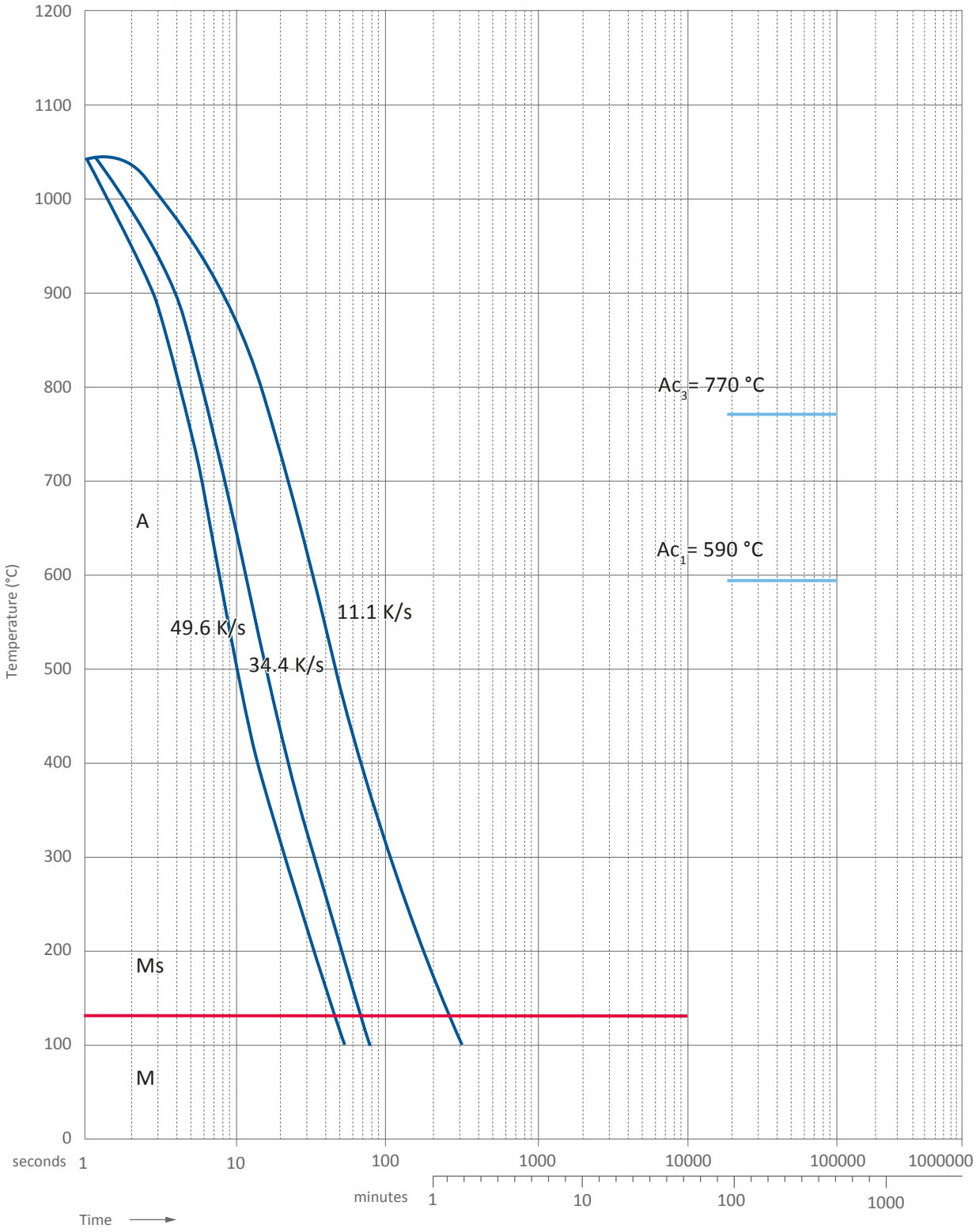

Fig. 2: Continuous Cooling Transformation (CCT) diagram
(dr.Sommer Werkstofftechnik GmbH – Copyright 2015).)

Precipitation hardening diagram

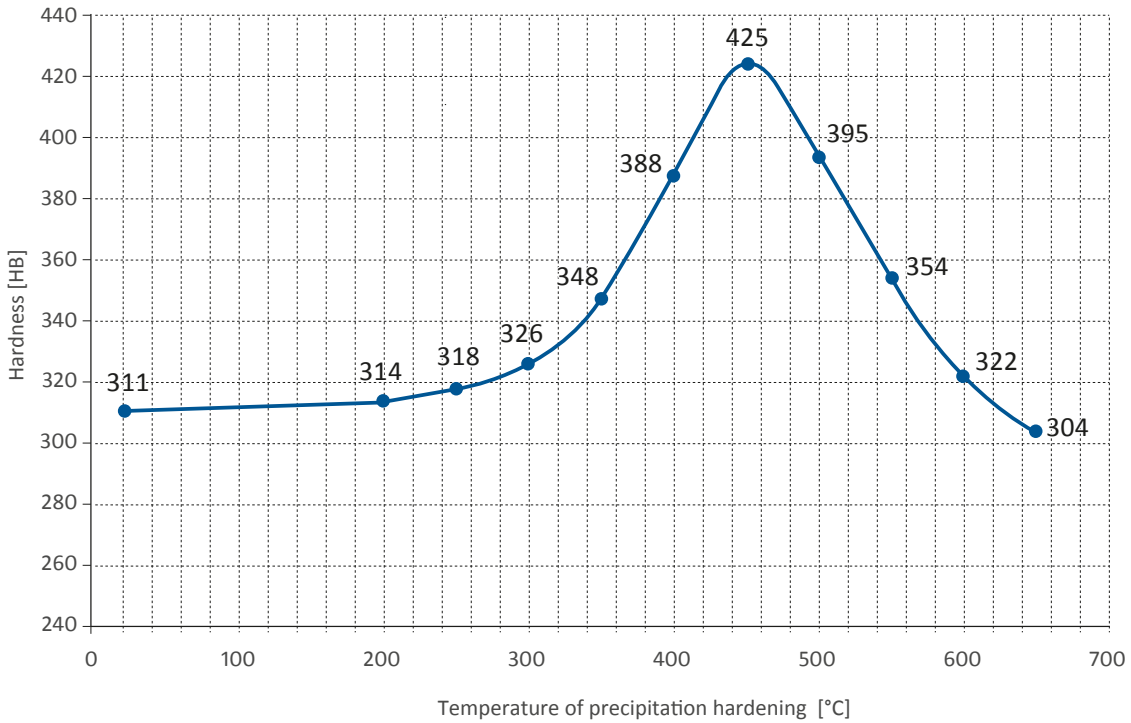

Fig.3: Precipitation hardening diagram – effect of PH temperature on hardness

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Disclaimer

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