SITHERM 2365 Steel

Designation by Standards

Brand Name	Ravne	Mat. No.	DIN	EN	AISI/SAE
SITHERM 2365	UTOP33	1.2365	32CrMoV12-28	-	H10

Chemical Composition (in weight %)

C	Si	Mn	Cr	Mo	Ni	V	W	Others
0.32	0.25	0.30	2.95	2.75	-	0.55	-	-

Description
Hot work, chromium-molybdenum type tool steel that exhibits excellent resistance to softening at elevated tempertaure. This grade is very reistant to thermal fatique cracking (heat cracking), and can be water cooled in service.

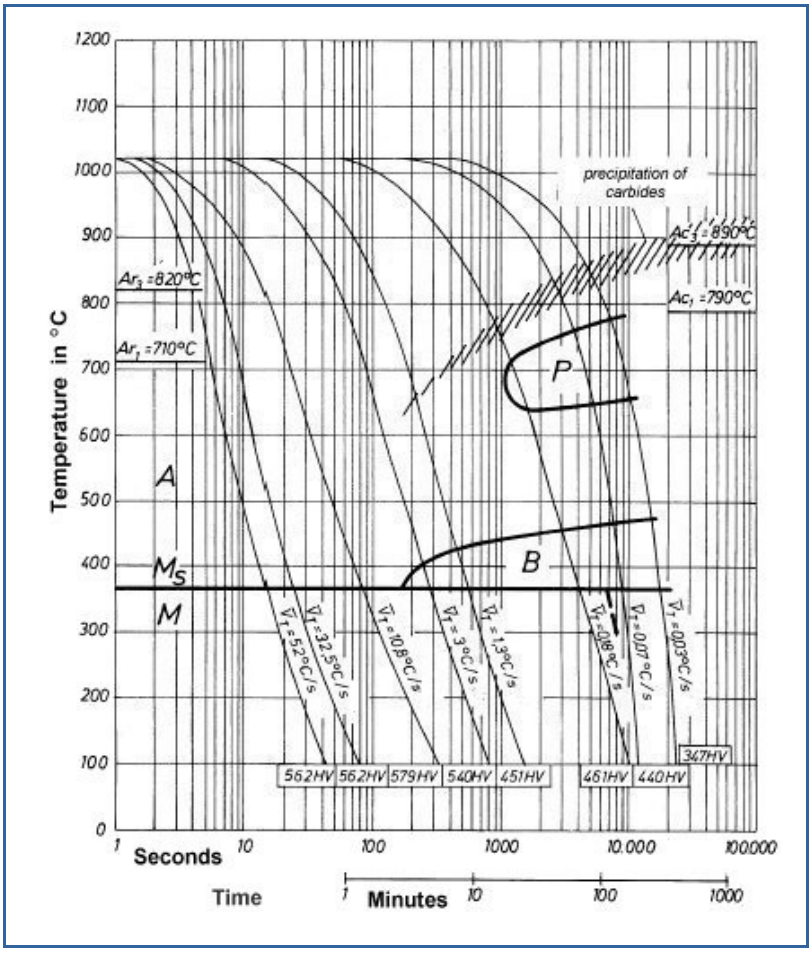
Applications
It is recommended for difficult hot work tooling applications such as hot punches, forging dies, hot shear blades, extrusion tooling.

Physical properties (average values) at ambient temperature
Modulus of elasticity [10^3 x N/mm^2]: 207, 176 (at 500^{o}C), 165 (at 600^{o}C)
Density [g/cm^3]: 7.88, 7.69 (at 500^{o}C), 7.65 (at 600^{o}C)
Thermal conductivity [W/m.K]: 30.0, 30.1 (at 500^{o}C), 29.7 (at 600^{o}C)
Electric resistivity [Ohm mm^2/m]: 0.37, 0.78 (at 500^{o}C), 0.89 (at 600^{o}C)
Specific heat capacity[J/g.K]: 0.46, 0.55 (at 500^{o}C), 0.59 (at 600^{o}C)

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

20-100^{o}C	20-200^{o}C	20-300^{o}C	20-400^{o}C	20-500^{o}C	20-600^{o}C	20-700^{o}C
12.6	13.3	13.8	14.2	14.6	15.1	15.4

Continuous Cooling Transformation (CCT) Diagram



Soft Annealing

Heat to 780-810^{O}C, cool slowly in furnace. This will produce a maximum Brinell hardness of 229.

Stress Relieving

Stress relieving to remove machining stresses should be carried out by heating to 600-650^{O}C, holding for one hour at heat, followed by air cooling. This operation is performed to reduce distortion during heat treatment. Hardness after quenching is 44-54 HRC.

Hardening

Harden from a temperature of 1010-1050^{O}C followed by air, oil quenching or warm bath quenching 450-450^{O}C.

Tempering

Tempering temperature: 538-621^{O}C, double tempering is required.

Tempering Temperature (^{O}C) vs. Hardness (HRC) vs. Tensile Strength (N/mm^{2})

100^{O}C	200^{O}C	300^{O}C	400^{O}C	500^{O}C	550^{O}C	600^{O}C	650^{O}C	700^{O}C
51	50	49	49	49	50	48	41	29
1730	1680	1620	1620	1620	1680	1570	1300	940

Tempering Diagram

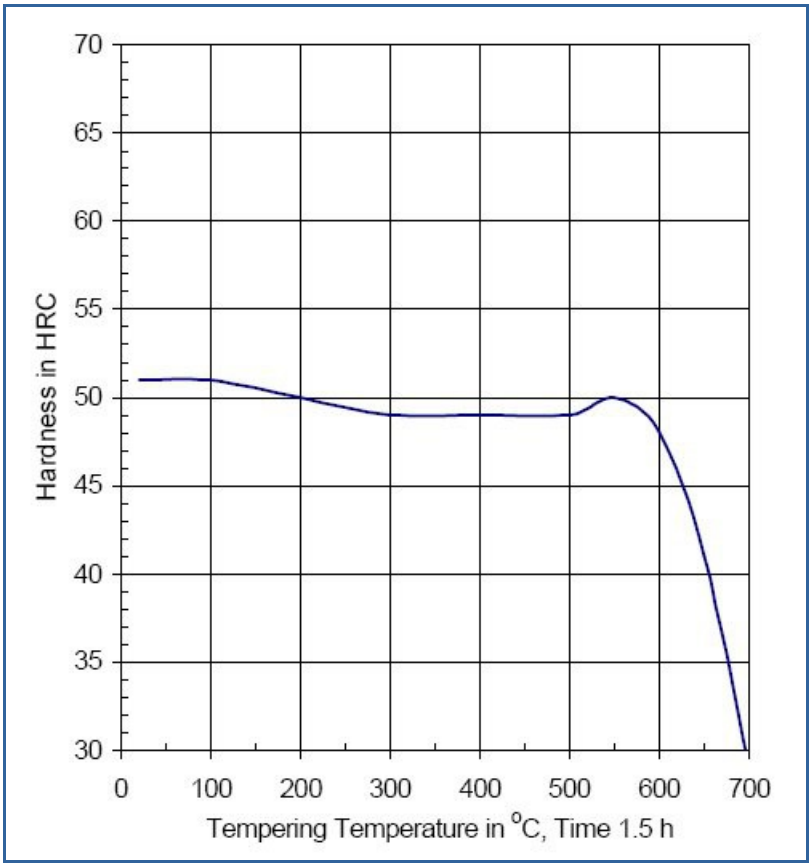


Diagram Tempering Temperature - Mechanical Properties

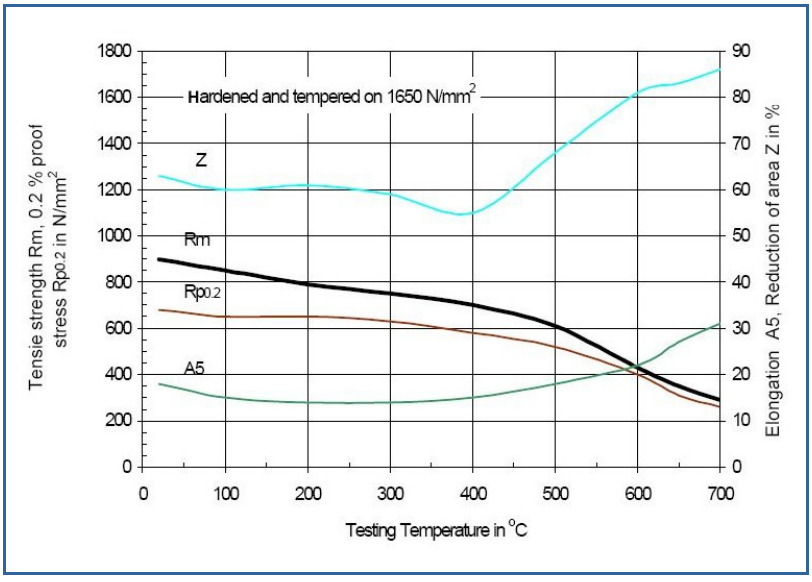
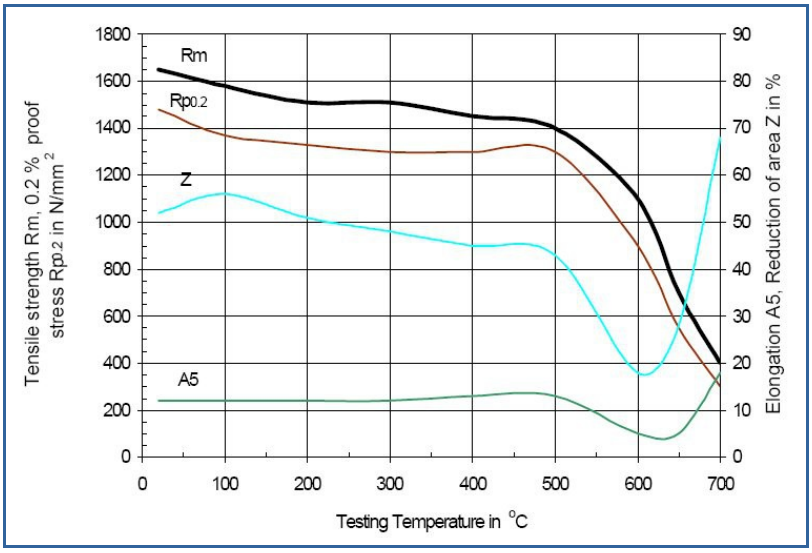


Diagram Tempering Temperature - Mechanical Properties



Forging
Hot forming temperature: 1100-900°C.

Machinability
90-95% of a 1% carbon steel.

Corrosion Resistance
Corrosion resistance of this alloy is better than that of plain carbon steels. However it will rust unless given protective treatment.

Forms manufactured: Please see the Dimensional Sales Program.

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