SIQUAL 7228 Steel

Designation by Standards

Brand Name	Ravne	Mat. No.	DIN	EN	AISI/SAE
SIQUAL 7228	VCMO150	1.7228	50CrMo4	50CrMo4	4150

Chemical Composition (in weight %)

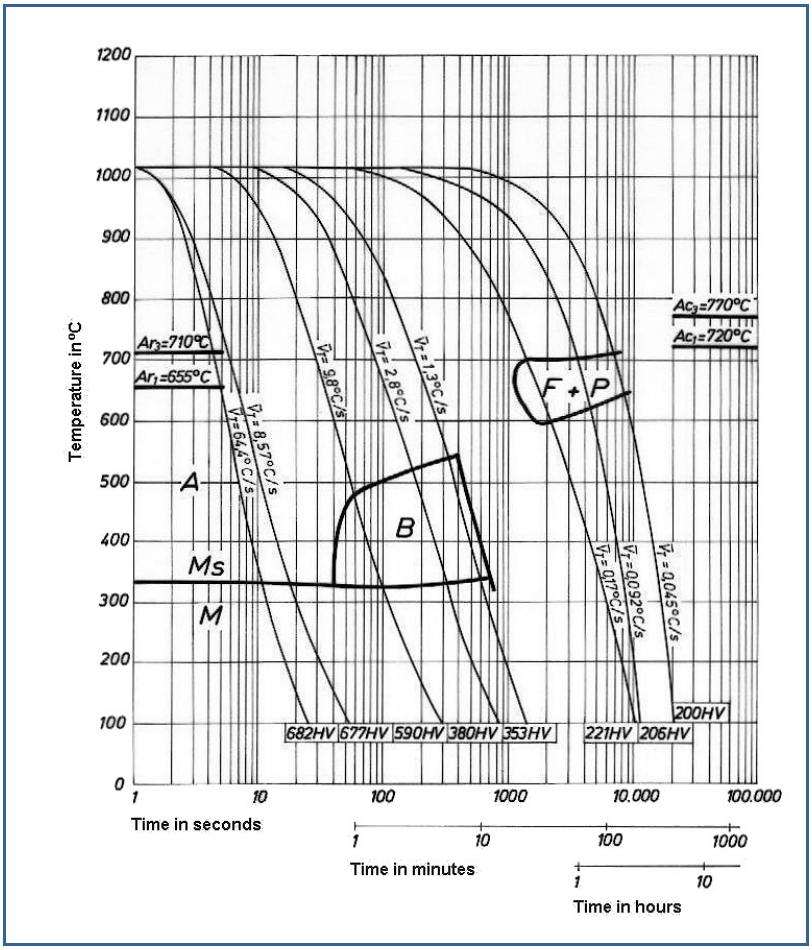
C	Si	Mn	Cr	Mo	Ni	V	W	Others
0.50	max. 0.40	0.65	1.05	0.23	-	-	-	-

Description
This is a higher carbon variation of the chromium, manganese, molybdenum 4100 series of low alloy steels.

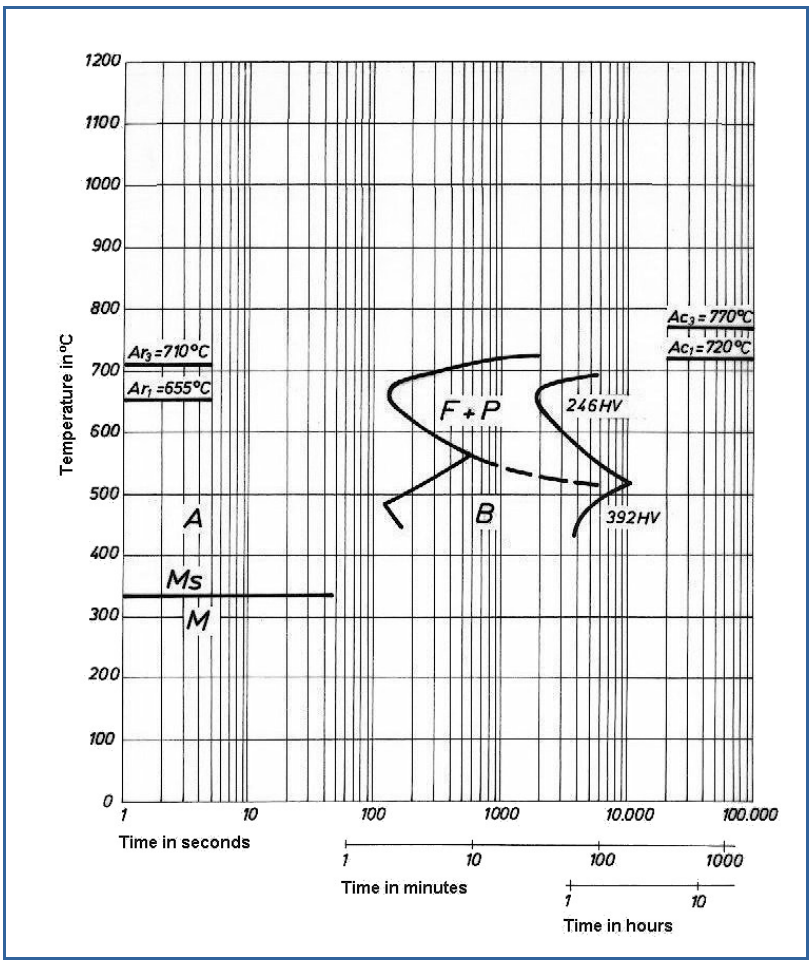
Applications
Statically and dynamically stressed components for vehicles, engines and machines, for parts of larger cross-sections. Components for driving gears, axles, rolls, rings.

Physical properties (average values) at ambient temperature
Modulus of elasticity [10^3 x N/mm^2]: 190-210
Density [g/cm^3]: 7.84

Continuous Cooling Transformation (CCT) Diagram



Time-Temperature Transformation (TTT) Diagram



Soft Annealing
Heat to 680-720°C, cool slowly in furnace. This will produce a maximum Brinell hardness of 248.

Hardening
Hardening: 820-850, 830-860°C, water, oil.

Normalizing
Normalizing: 840-860°C

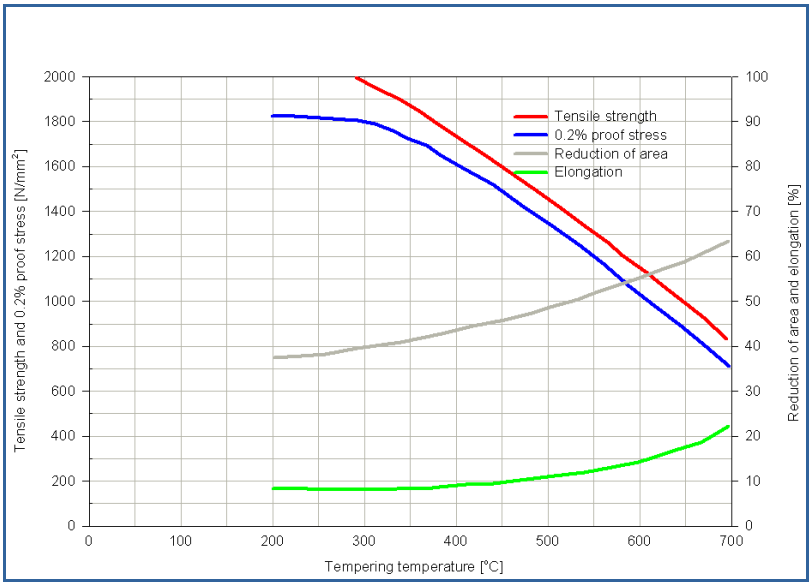
Tempering
Tempering temperature: 540-680°C

Hardness after heat treatment
Annealed at 815°C: 197 HB
Normalized at 870°C: 321 HB
Oil quenched, fine grained, tempered at 205°C: 530 HB
Oil quenched, fine grained, tempered at 315°C: 495 HB
Oil quenched, fine grained, tempered at 425°C: 440 HB
Oil quenched, fine grained, tempered at 540°C: 370 HB
Oil quenched, fine grained, tempered at 650°C: 290 HB

Mechanical Properties in Hardening and Tempering Condition

Diameter (mm)	0.2 % proof stress (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Reduction of area (%)	Notch impact energy (ISO-V) (J)
up to 16	900	1100-1300	9	40	35
17-40	780	1000-1200	10	45	35
41-100	700	900-1100	12	50	35
101-160	650	850-1000	13	50	35
161-250	550	800-950	13	50	35

Diagram Tempering Temperature - Mechanical Properties



Forging
Hot forming temperature: 1050-850°C.

Machinability
Machinability of 4150 is good in the annealed condition, or in the normalized condition. After heat treatment the alloy can be very hard and it is best to limit machining at that point to grinding.

Corrosion Resistance
This is not a corrosion resistant alloy. Use protective coating.

Welding
The alloy may be welded by conventional methods. Welding the alloy in the hardened (heat treated) condition may affect the mechanical properties due to welding heat input. A post-weld heat treatment may be needed. Follow an approved weld procedure.

Forms manufactured: Please see the Dimensional Sales Program.

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