



SIQUAL 1191 Steel

Designation by Standards

Brand Name	Ravne	Mat. No.	DIN	EN	AISI/SAE
SIQUAL 1191	CK45	1.1191	Ck45 †	C45E	1045

Chemical Composition (in weight %)

C	Si	Mn	Cr	Mo	Ni	V	W	Others
0.46	max. 0.40	0.65	max. 0.40	max. 0.10	max. 0.40	-	-	(Cr+Mo+Ni)=max. 0.63

Description

SIQUAL 1191 is a medium carbon steel is used when greater strength and hardness is desired than in the "as rolled" condition. Extreme size accuracy, straightness and concentricity combine to minimize wear in high speed applications. Turned, ground and polished.

Applications

Component parts for shafts, bushings, crankshafts, connecting rods and parts for the machine building industry and steel for axes, knives, hammers, etc.

Physical properties (average values) at ambient temperature

Modulus of elasticity [$10^3 \times \text{N/mm}^2$]: 190-210

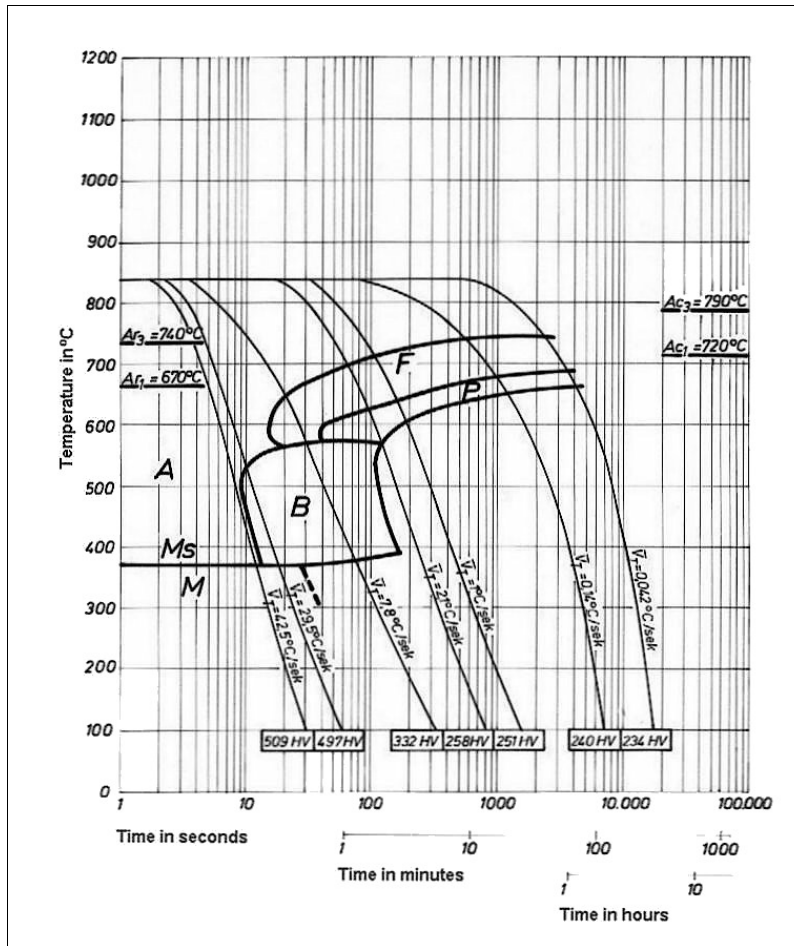
Density [g/cm^3]: 7.84

Thermal conductivity [W/m.K]: 15.1

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	20-600°C	20-700°C
11.6	12.3	13.1	13.7	14.2	14.7	15.1

Continuous Cooling Transformation (CCT) Diagram



Soft Annealing

Heat to $650\text{--}700^{\circ}\text{C}$, cool slowly. This will produce a maximum Brinell hardness of 207.

Hardening

Harden from a temperature of $820\text{--}850^{\circ}\text{C}$, $830\text{--}860^{\circ}\text{C}$ followed by water or oil quenching.

Normalizing

Normalizing temperature ($^{\circ}\text{C}$): $840\text{--}870^{\circ}\text{C}$.

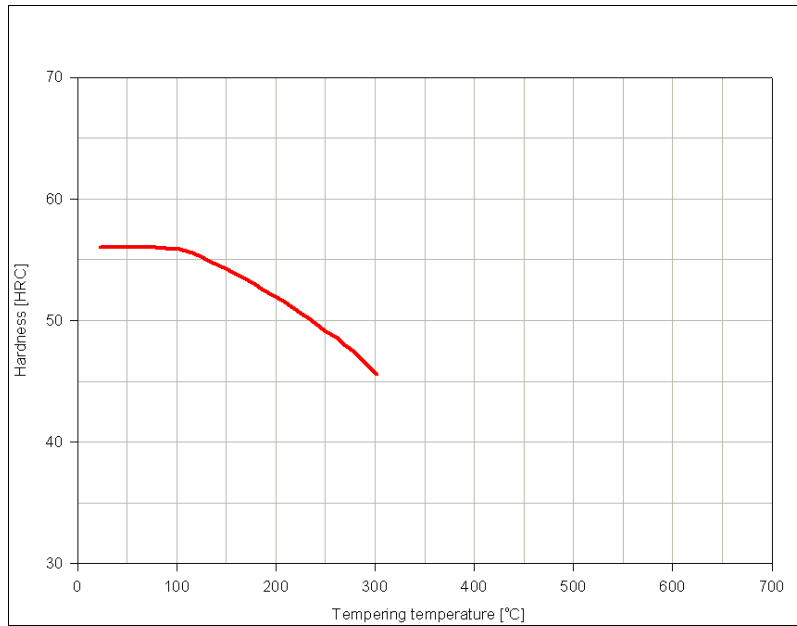
Tempering

Tempering temperature: See the data below.

Tempering Temperature ($^{\circ}\text{C}$) vs. Hardness (HRC)

20°C	50°C	100°C	150°C	200°C	250°C	300°C
56	56	56	54	52	49	45.5

Tempering Diagram



Mechanical Properties vs. Diameter

Diameter	Tensile Strength (MPa)	Yield Strength (MPa)	Elongation (%)	Reduction in Area (%)
cold drawn, round bar (16-22 mm)	655	585	12	35
cold drawn, round bar (32-50 mm)	585	515	10	30
cold drawn, round bar (50-75 mm)	515	485	10	30
cold drawn, round bar (22-32 mm)	620	550	11	30
cold drawn, round bar (19-32 mm)	625	530	12	30
cold drawn, annealed, round bar (19-32 mm)	585	505	12	45
cold drawn, high temperature, stress relieved, round bar (16-22 mm)	655	515	15	45
cold drawn, high temperature, stress relieved, round bar (50-75 mm)	550	450	12	35
cold drawn, high temperature, stress relieved, round bar (32-50 mm)	585	485	15	40
cold drawn, high temperature, stress relieved, round bar (22-32 mm)	620	515	15	40
cold drawn, low temperature, stress relieved, round bar (22-32 mm)	655	585	11	30
cold drawn, low temperature, stress relieved, round bar (16-22 mm)	690	620	12	35
cold drawn, low temperature, stress relieved, round bar (50-75 mm)	585	515	10	25

cold drawn, low temperature, stress relieved, round bar (32-50 mm)	620	550	10	30
hot rolled, round bar (19-32 mm)	565	310	16	40
turned, ground and polished, round bar (19-32 mm)	675	405	24	45

Forging

Hot forming temperature: 1050-850°C.

Machinability

Machinability is good, rated at 80% that of the AISI 1112 alloy used as a 100% machining rated steel.

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

Disclaimer

The information and data presented herein are typical or average values and are not a guarantee of maximum or minimum values. Applications specifically suggested for material described herein are made solely for the purpose of illustration to enable the reader to make his own evaluation and are not intended as warranties, either express or implied, of fitness for these or other purposes. There is no representation that the recipient of this literature will receive updated editions as they become available.

Unless otherwise specified, registered trademarks are property of SIJ Metal Ravne company. Copyright 2016 by SIJ Metal Ravne d.o.o. All rights reserved. Contact our [Sales Office](#) for more information.