Physical properties

Quenching : 1030℃ × 1 h, Air cooling
Tempering : 620℃ × 1 h, Twice
Hardness : 45 HRC

◆Thermal expansion rate

Temp.	20～100℃	20～200℃	20～300℃	20～400℃	20～500℃	20～600℃
×10⁻⁶/K	11.5	11.7	11.9	12.2	12.6	13.0

◆Thermal conductivity

Temp.	25℃	100℃	200℃	300℃	400℃	500℃	600℃
W/m·K	23.8	25.7	27.0	28.4	28.9	29.1	29.0

＊Accuracy of repeated measurements is about ±10%.

◆Specific heat

Temp.	25℃	100℃	200℃	300℃	400℃	500℃	600℃
J/kg·K	476	521	571	594	670	732	849

◆Young's modulus / Rigidity modulus / Poisson's ratio (25℃)

Young's modulus	Rigidity modulus	Poisson's ratio
212 GPa	82 GPa	0.29

DAIDO STEEL

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No.SC1813a 26.01.0,1 (DDD)

Daido's Hot Work Die Steel Series

DHA1™

Excellent Wear and Heat Check Resistance Hot Work Die Steel

Features

- ◆Finely distributed spherical carbides
- ◆Excellent hardenability
- ◆Excellent softening resistance under high temperature
- ◆Excellent heat impact and fatigue resistance
- ◆Excellent erosion resistance to molten metal

Main applications

Application	Hardness	Application	Hardness
Al, Zn Die-casting dies	41～48 HRC	Hot work shear blades	35～45 HRC
Die-casting die accessories (Plunger sleeves, chips, etc.)	45～50 HRC	Hot work pressing dies	42～50 HRC
Hot extrusion dies	43～48 HRC	Other hot work tools	-

Chemical composition

DAIDO Brand	Equivalent standard			Chemical composition (%)					
	JIS	AISI	WNr.	C	Si	Mn	Cr	Mo	V
DHA1	SKD61	H13 eq.	1.2344 eq.	0.35 ～ 0.42	0.80 ～ 1.20	0.25 ～ 0.50	4.80 ～ 5.50	1.00 ～ 1.50	0.80 ～ 1.15

Heat treatment

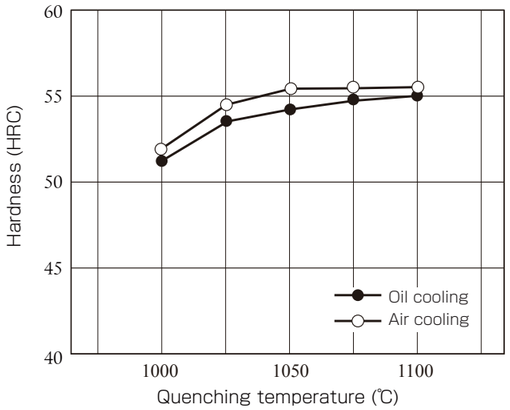
Re-forging Temp. (℃)	Heat treatment (℃)			Hardness		Transformation Temp.(℃)		
	Annealing	Quenching	Tempering	Annealed	Quenched & Tempered	Ac	Ar	Ms
900～1200	820～870 Slow cooling	1000～1050 Air cooling	550～650 Air cooling	≦ 229 HBW	≦ 53 HRC	847～918	769～725	320 (Austenitized at 1030)

DAIDO STEEL

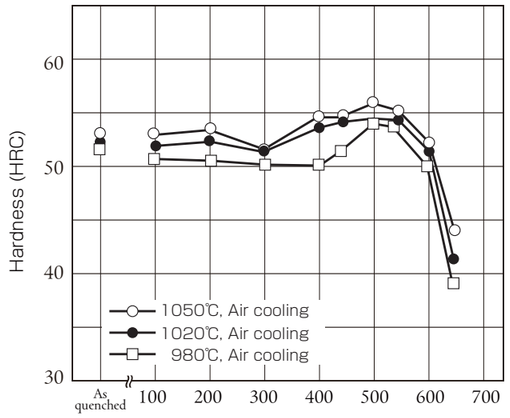
Properties

Material size : Φ35 mm

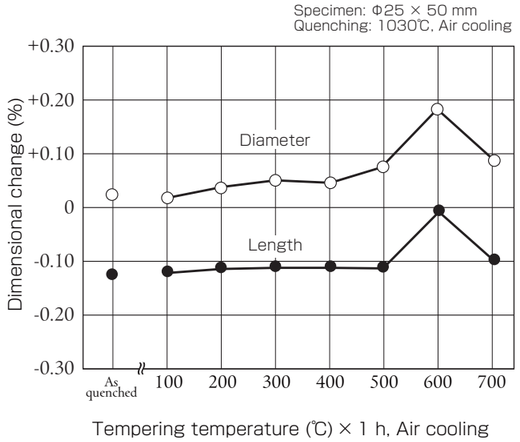
Quenched hardness



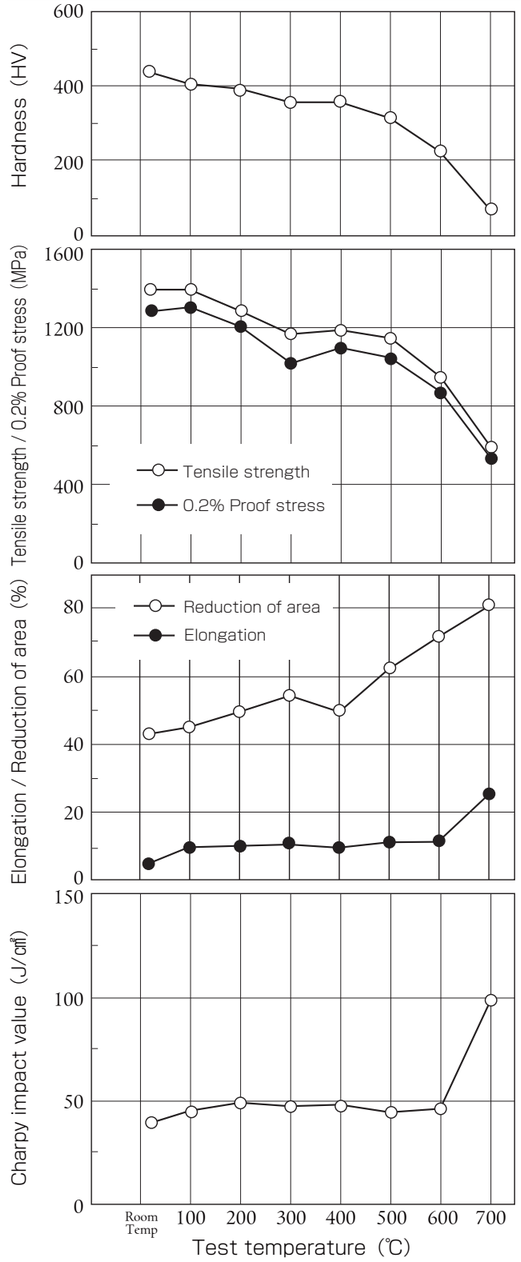
Tempered hardness



Dimensional change

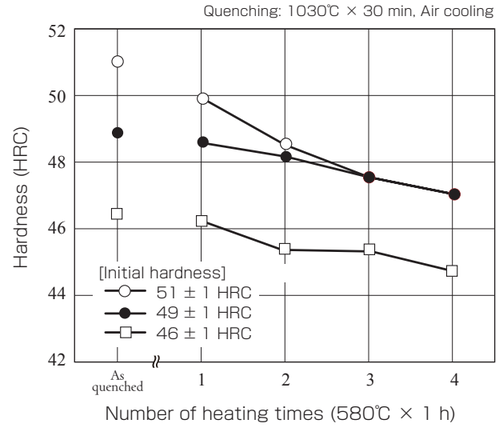


Mechanical properties

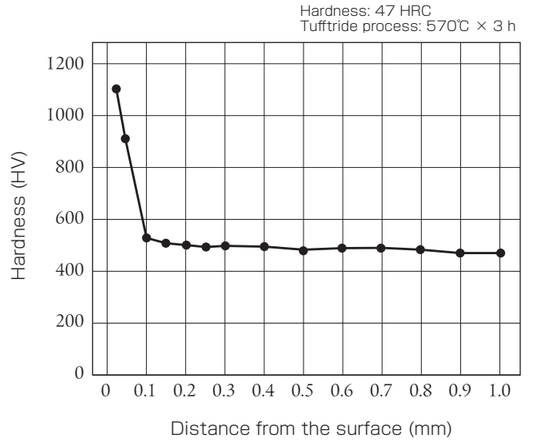


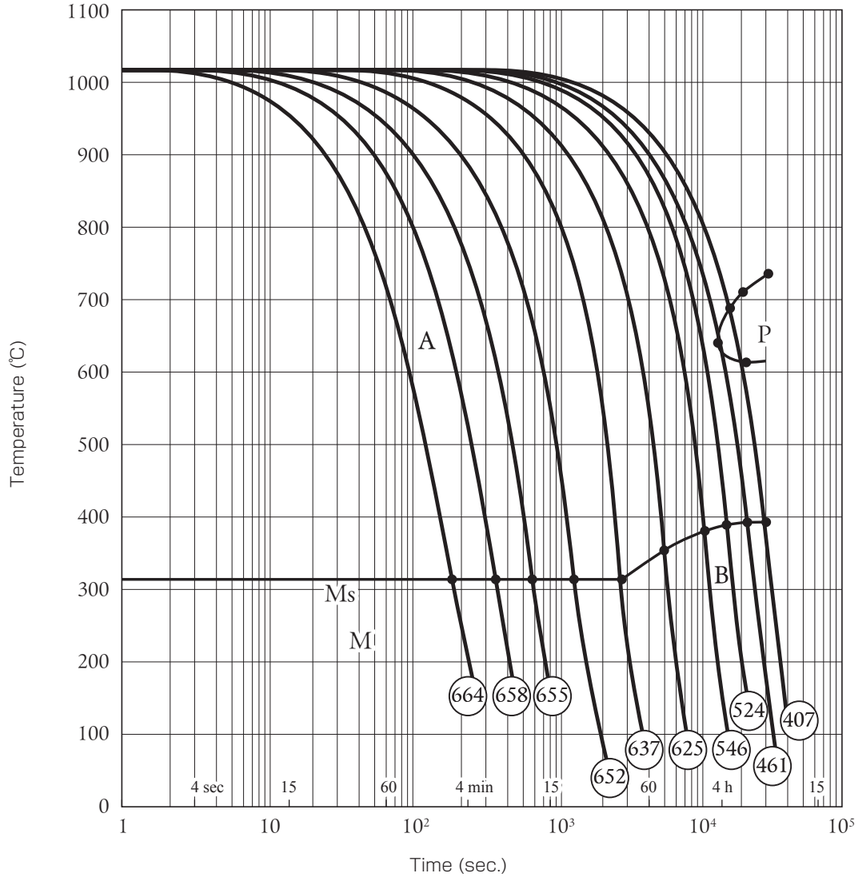
[Test conditions]
Quenching: 1030℃, Air cooling
Tempering: (Hardness) 630℃, Air cooling, 45 HRC
(Tensile) 635℃, Air cooling, 44 HRC
(Impact) 635℃, Air cooling, 44 HRC
Specimen: (Tensile) Φ8 × 90 mm
(Impact) 2 mm U-notched, L direction

Resistance to temper softening



Nitriding characteristics



CCT diagram

C	Si	Mn	Cr	Mo	V		Austenitizing
0.37	1.01	0.42	5.20	1.12	0.85		1030℃ × 10 min