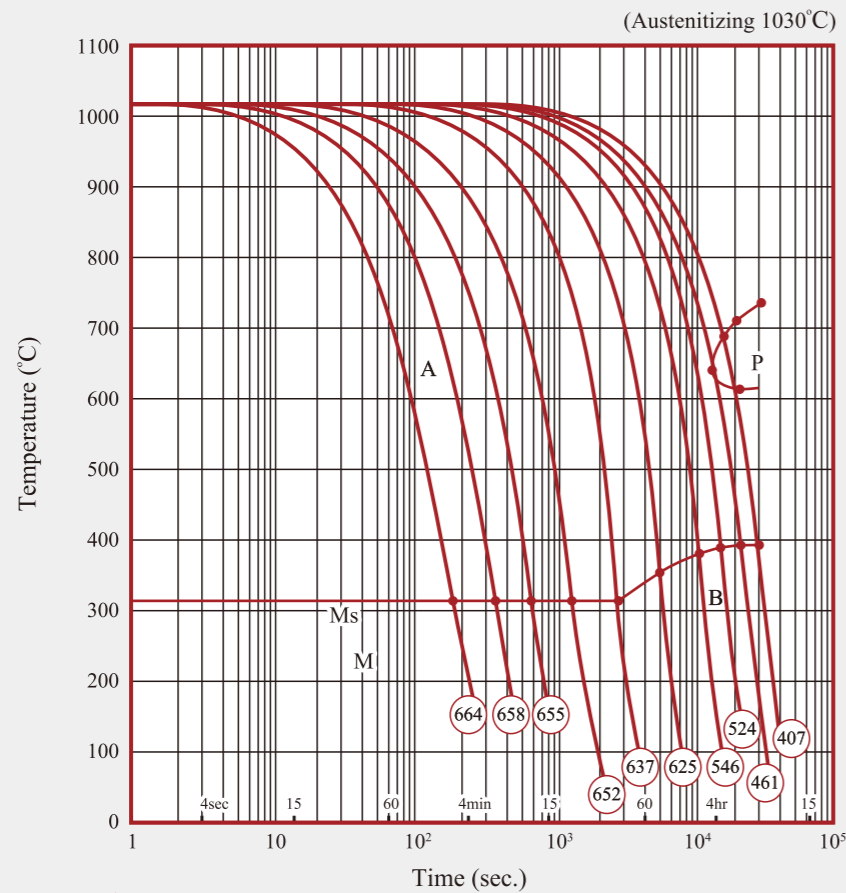


● Continuous cooling transformation curve



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### Document Disclaimer

The product characteristics included in this brochure are the representative values based on the result of our measurements, and do not guarantee the performance in use of the products. Please inquire the latest information to our department in charge as the information of this brochure is updated without previous notice as needed.

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# DHA1

Excellent Wear and Heat Check Resistance  
Hot Work Die Steel

### Features

- 1 Finely distributed spherical carbides
- 2 Excellent quenching nature
- 3 Excellent softening resistance under high temperature
- 4 Excellent heat impact and fatigue resistance
- 5 Excellent erosion resistance to molten metal

### Applications

Application	Hardness	Application	Hardness
Al, Zn, die caster mold	41~48HRC	Hot work shear blade	35~45HRC
Mold's accessories (Plunger sleeve, chip, etc.)	45~50HRC	Hot work press mold	42~50HRC
Hot work pressing die	43~48HRC	Same as other Hot work equipment	----



DAIDO STEEL

# Chemical composition



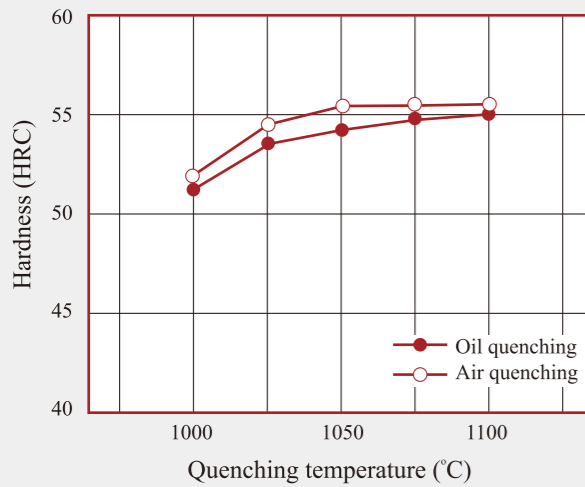
DAIDO Brand	JIS Equivalent	Chemical composition (%)					
		C	Si	Mn	Cr	Mo	V
DHA1	SKD61	0.35 ~0.42	0.80 ~1.20	0.25 ~0.50	4.80 ~5.50	1.00 ~1.50	0.80 ~1.15

# Heat treatment

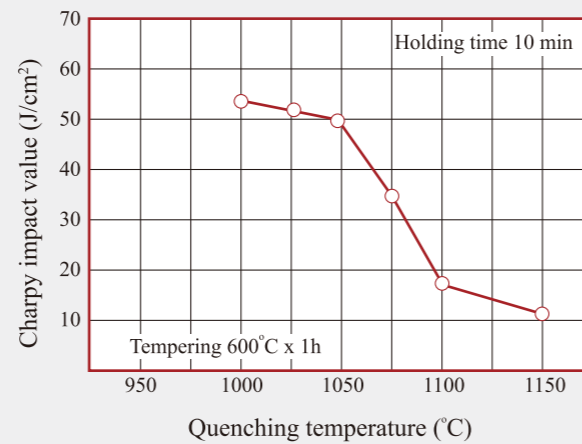


Re-forging temperature (°C)	Heat treatment temperature (°C)			Hardness		Transformation temperature (°C)		
	Annealing	Quenching	Tempering	Annealing (HBW)	Quenching tempering (HRC)	Ac	Ar	Ms
1200~900	820~870 slow cooling	1000~1050 air quenching (oil quenching)	550~650 air cooling	≧ 229	≧ 53	847~918	769~725	320 (Austenitized at 1030)

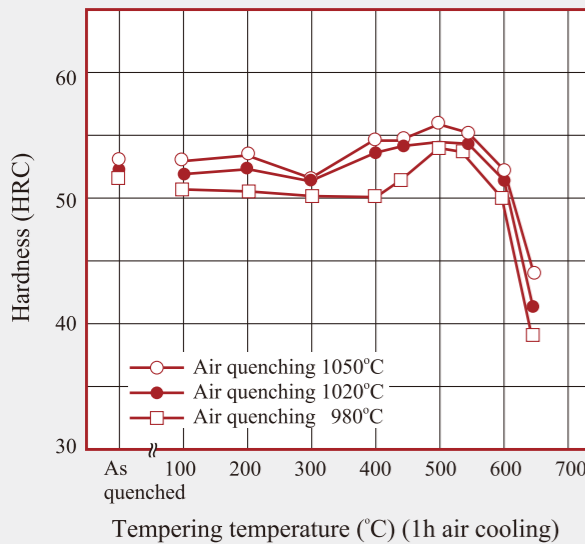
## Quenching hardness



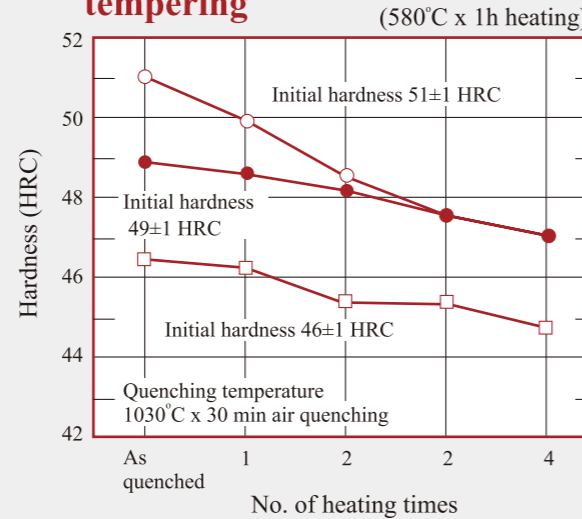
## Relationship between quenching temperature and toughness



## Tempering curve



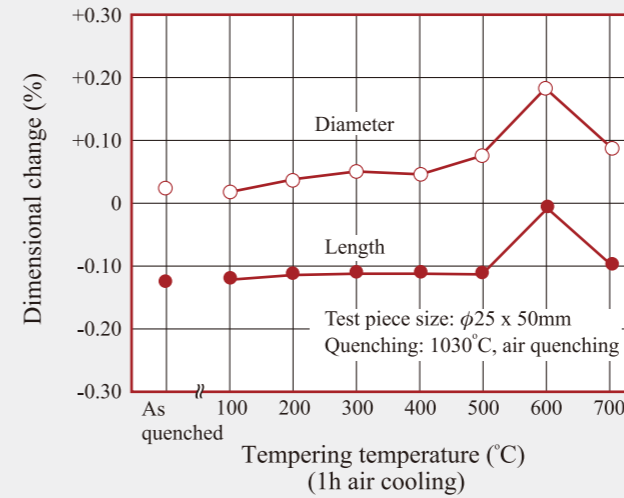
## Resistance against softening by tempering



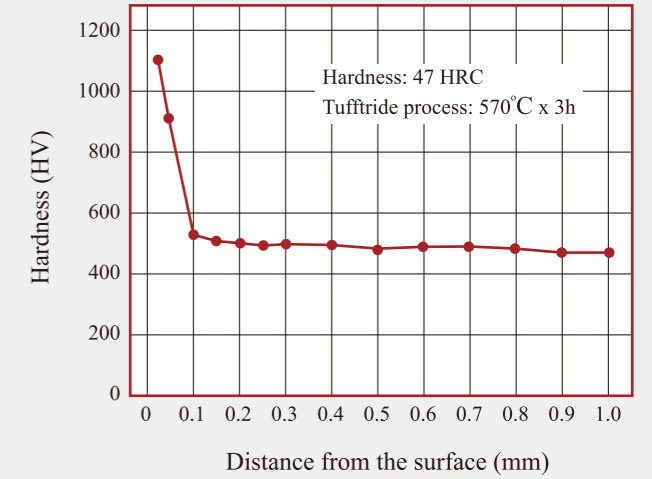
# Quality characteristics



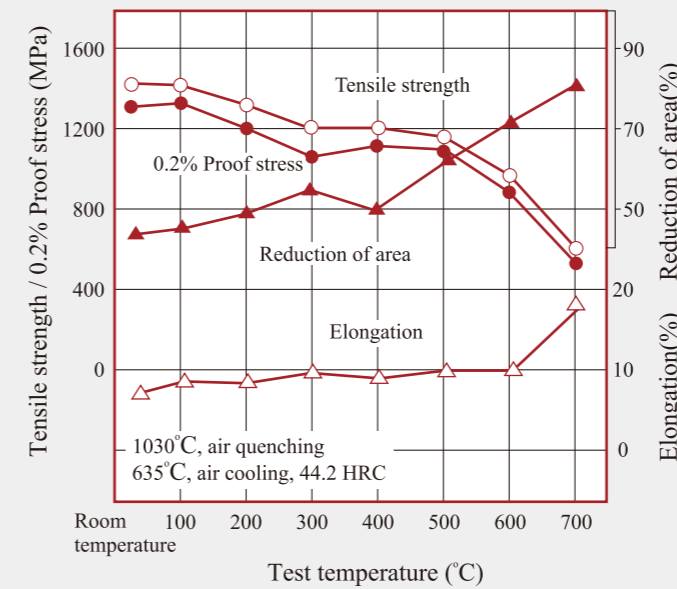
## Dimensional change



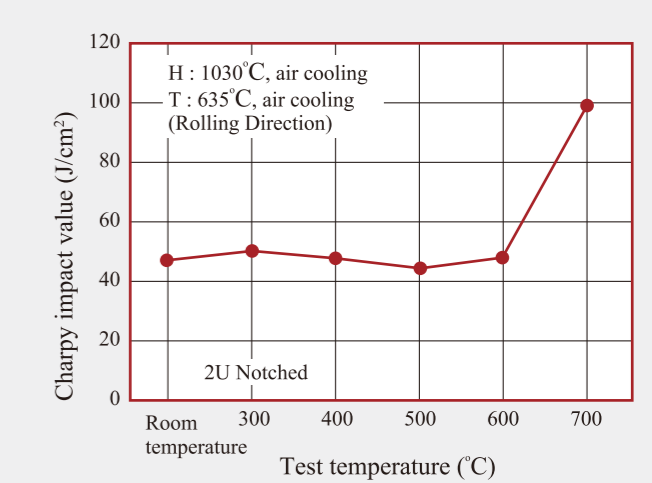
## Nitriding property



## Mechanical properties



## Toughness



## Thermal conductivity (W/m · k)

Daido Brand	25°C	100°C	200°C	300°C	400°C	500°C	600°C	700°C
DHA1	23.8	25.3	29.4	29.6	28.7	26.1	29.8	30.2

## Coefficient of thermal expansion (x 10<sup>-6</sup>/K)

Daido Brand	20~100°C	20~200°C	20~300°C	20~400°C	20~500°C	20~600°C	20~700°C
DHA1	10.5	11.4	12.1	12.8	13.3	13.7	13.6