

DH21

For Aluminum Die Cast Dies

HOT WORK DIE STEEL

- Excellent heat check resistance
- Excellent mechanical properties at high temperatures
- Excellent temper resistance
- Excellent oxidation resistance
- Excellent nitriding properties

PRIMARY USE

DH21 was developed to extend the life of aluminum diecast molds

CHEMICAL COMPOSITION

Daido Brand	C	Si	Mn	Cr	Mo	V
DH21	0.39	≤1.5	≤1.5	5.0	2.0	1.0

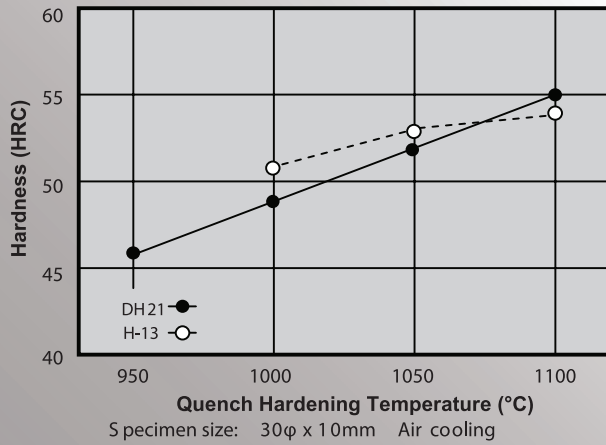
HEAT TREATMENT

Forging Temperature (°C)	Heat Treat Conditions (°C)			Hardness		Transformation Temperature (°C)		
	Annealing	Quenching	Tempering	Annealed	Quenched & Tempered	Ac	Ar	Ms
1200 ~ 950	820 ~ 870 Slow Cool by Air	1010 ~ 1070 Air Cool	550 ~ 650 Air Cool	≤229	≤53	815 ~ 868		300 (Austenitized at 1030)

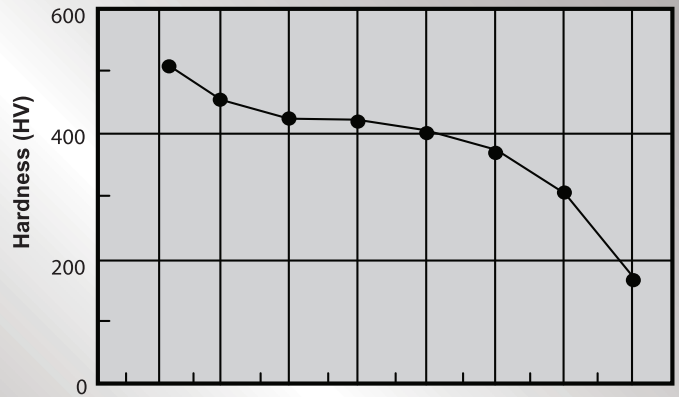


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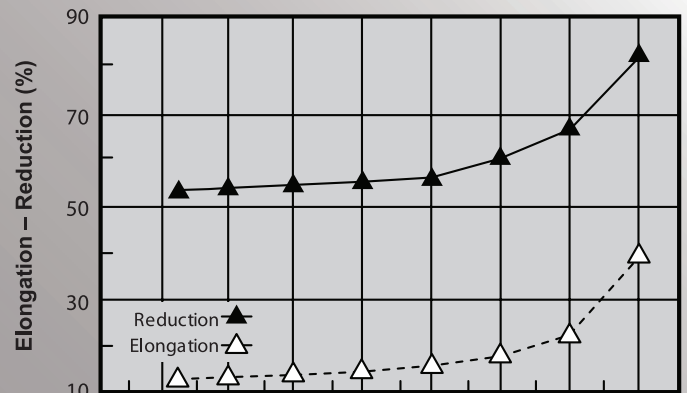
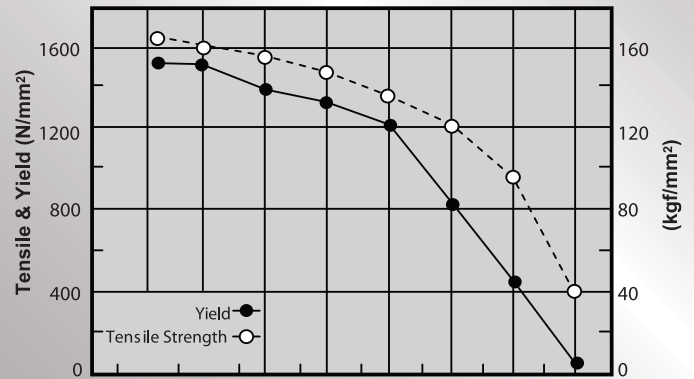
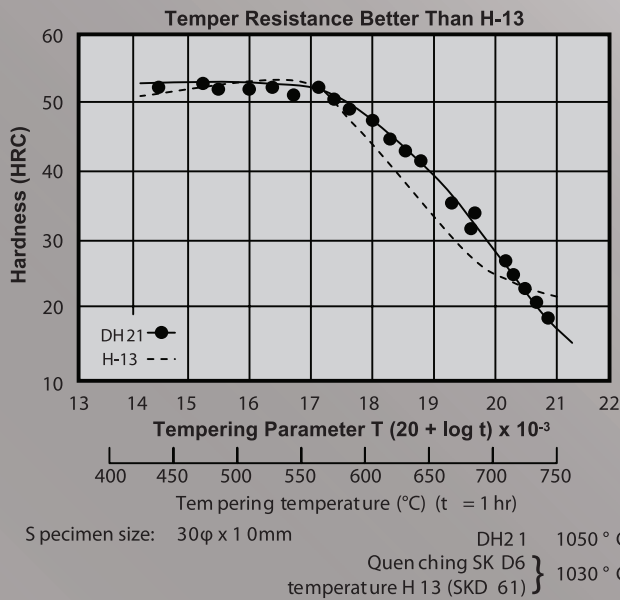
QUENCH HARDNESS



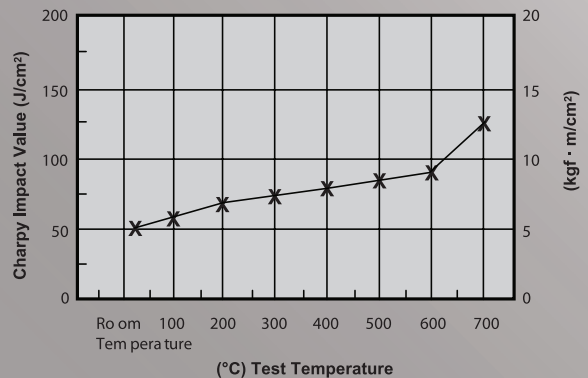
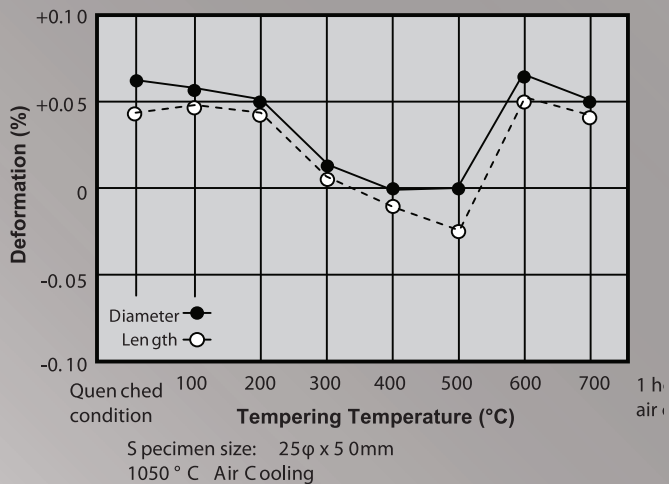
MECHANICAL PROPERTIES AT ROOM AND HIGH TEMPERATURE



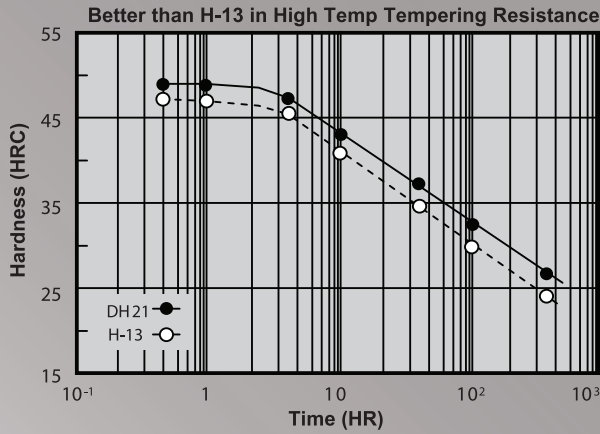
TEMPERING HARDNESS



DEFORMATION IN HEAT TREAT



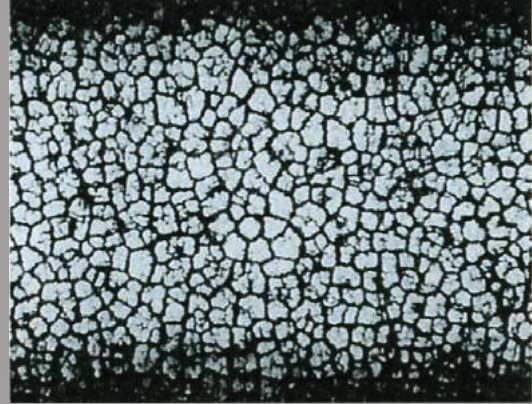
TEMPER RESISTANCE



Specimen size: 30φ x 10mm
 Holding DH21, H-13 at 600 ° C to observe change from room temperature hardness.

HEAT CHECKING RESISTANCE

Better Resistance to Thermal Fatigue than H-13



DH21 (47.2HRC)

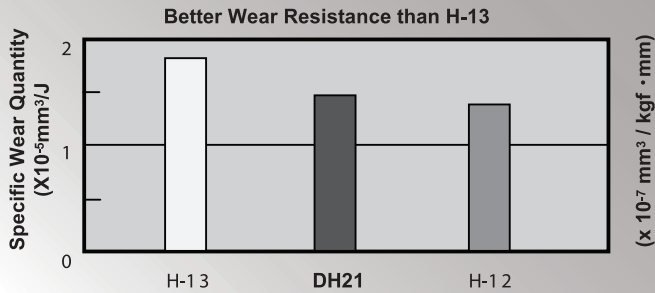


H-13 (47.5HRC)

Test condition : Heating - Cooling 600 ° C ↔ 20 ° C
 Repeat 600 times

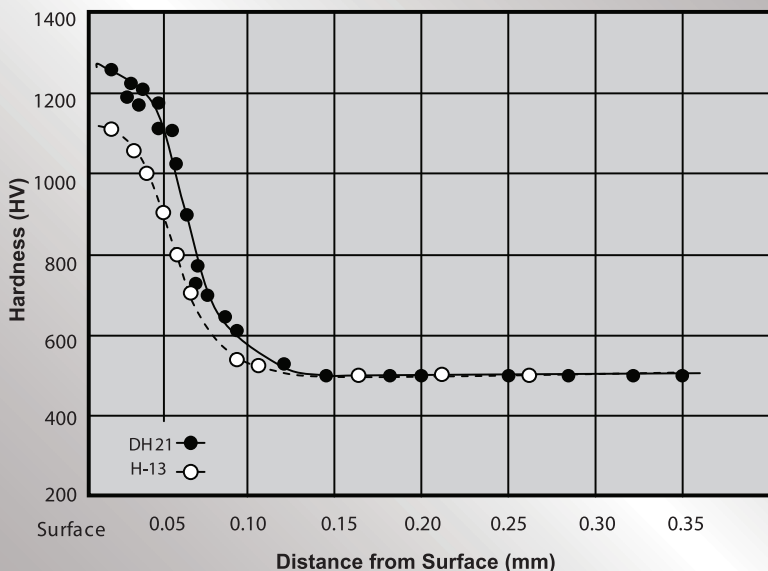
Magnification: X40

WEAR RESISTANCE



Wear Resistance of Major Hot-Work Die Steels (Specimens' Hardness: 47.0 HRC)
 [Ohkos hi-Method Wear Test Machine: Abrasion speed:0.94m / min,
 Abrasion distance 200m, Final weight 6.9kg, Abrasion disk: SKH 4A (HRC 63.0)]

NITRIDING (TUFRIDING ON TEMPERED MATERIAL)



Hardness: 47 HRC
 Tufride at 570 ° C for 3 hours

CONTINUOUS COOLING TRANSFORMATION CURVE

C	Si	Mn	Cr	Mo	V	Austenitized
0.39	≤1.5	≤1.5	5.0	2.0	1.0	1050 °C x 10min

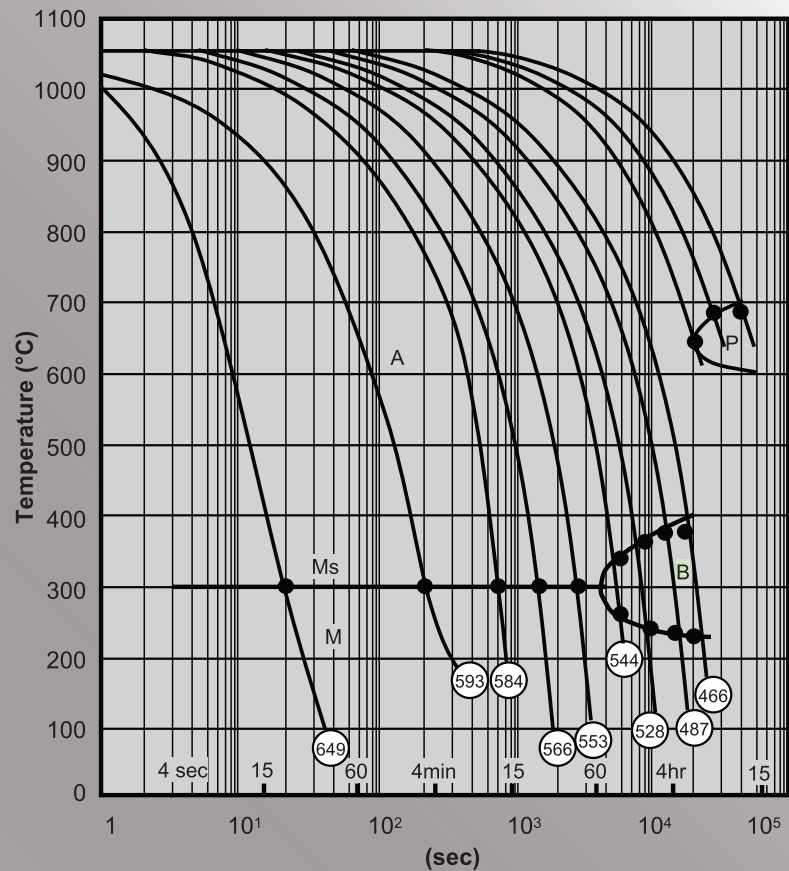
COEFFICIENT OF THERMAL EXPANSION

Temp.	~100°C	~200°C	~300°C	~400°C	~500°C	~600°C	~700°C
X10 ⁶ /K	11.0	11.4	11.8	12.2	12.4	12.8	13.1

THERMAL CONDUCTIVITY

Temp	Room Temp.	100°C	200°C	300°C	400°C	500°C	600°C	700°C
W/M·K	27.6 (0.066)	29.3 (0.070)	31.0 (0.074)	30.1 (0.072)	29.3 (0.070)	29.3 (0.070)	29.3 (0.070)	29.3 (0.070)

(cal/cm · sec · °C)



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