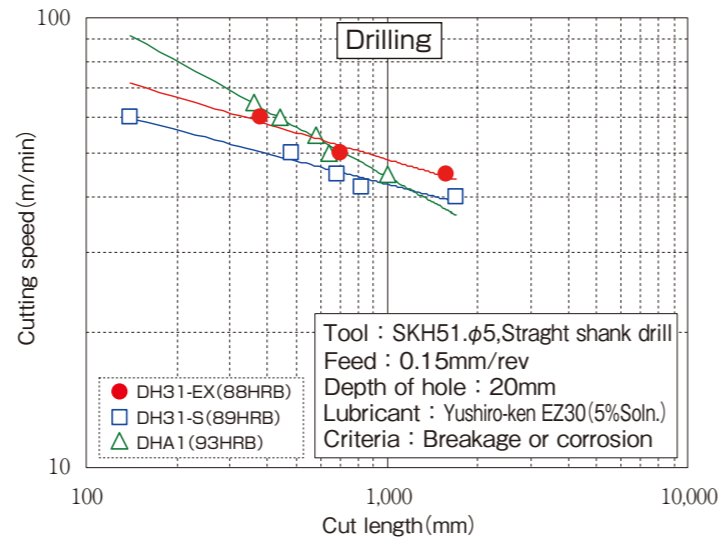
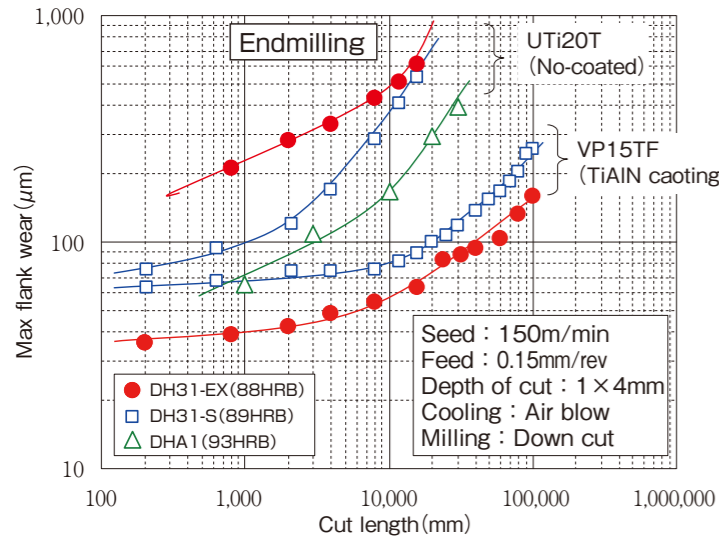


Machinability



Main applications

Applications	Hardness(HRC)
Al, Zn, Mg Diecasting molds	41~48
Hot extrusion dies	43~50
Hot shear blades	35~45
Hot forging dies	42~50

Physical properties

◆ Thermal expansion rate

Temp.	20~100°C	20~200°C	20~300°C	20~400°C	20~500°C	20~600°C	20~700°C
x10 ⁻⁶ /K	11.6	11.8	12.0	12.2	12.5	12.8	12.9

◆ Thermal conductivity

Temp.	100°C	200°C	300°C	400°C	500°C	600°C	700°C
W/m·K	26.7	27.9	29.0	29.4	29.7	30.0	29.5

◆ Specific heat

Temp.	100°C	200°C	300°C	400°C	500°C	600°C	700°C
J/kg·K	487	527	572	626	703	802	985
[cal/g·°C]	[0.116]	[0.126]	[0.137]	[0.150]	[0.168]	[0.192]	[0.235]

※Heat treatment of specimens

Quenching : 1030°C, AC, Tempering : 610°C, AC, Twice



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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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SC1302a 18.06.0,3 (DLS)

Daido's Hot Work Die Steel Series

DH31-EX

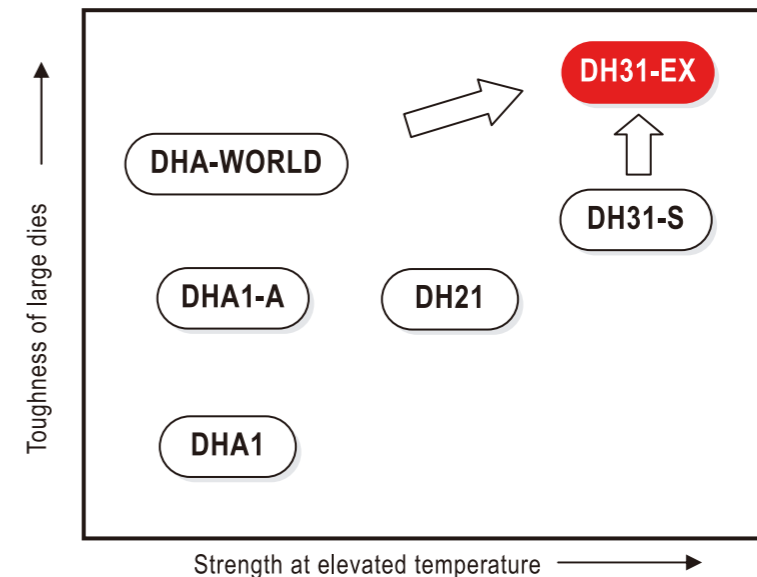


High Performance Hot Work Die Steel

Features

High toughness throughout large Die Casting Dies and Forging Dies contributes to prevent from the risk of gross cracking in service

- ◆ High hardenability ··· High toughness even in large sized Dies
- ◆ High hot strength ··· Great heat checking and wear resistance
- ◆ Double melted ··· Homogeneous and almost isotropic properties throughout Dies



Heat treating

Forging Temperature (°C)	Heat treatment(°C)			Hardness		Transformation Temp.(°C)	
	Annealing	Quenching	Tempering	Annealing	Quenching Tempering	Ac	Ms
900~1200	820~870 Slow cooling	1000~1050 Air cooling	550~650 Air cooling	≤ 235HBW	35~53HRC	805~885	300 (Austenitized at 1030°C)

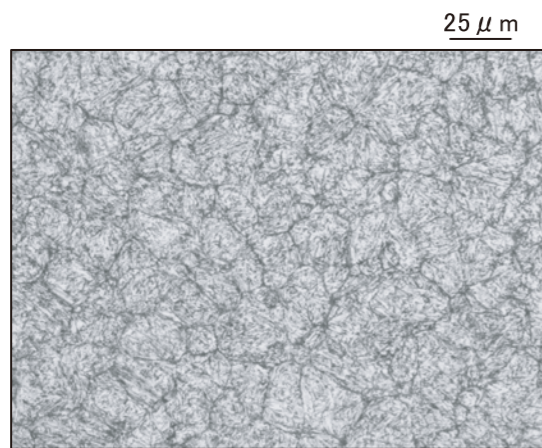


Properties

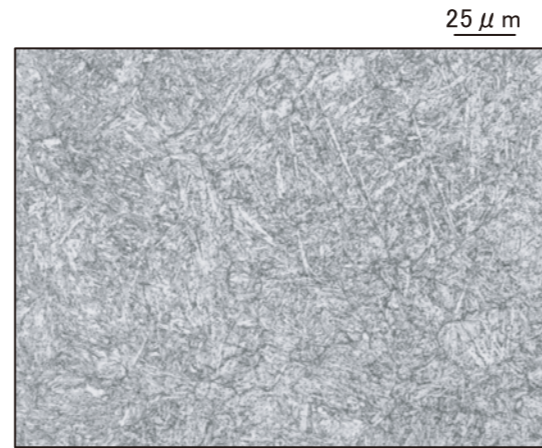
Material size : 200mm H × 800mm W

Microstructure (Quenched and Tempered)

Specimen : 200mmH × 600mmW × 300mmL (Center)
Quenching : 1030°C, Gas quenching with 6-9 bar in vacuum furnace



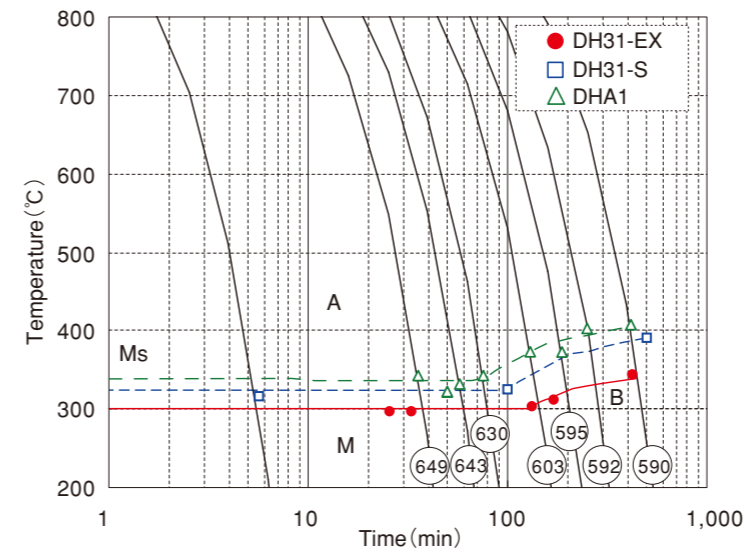
DH31-EX



DHA1

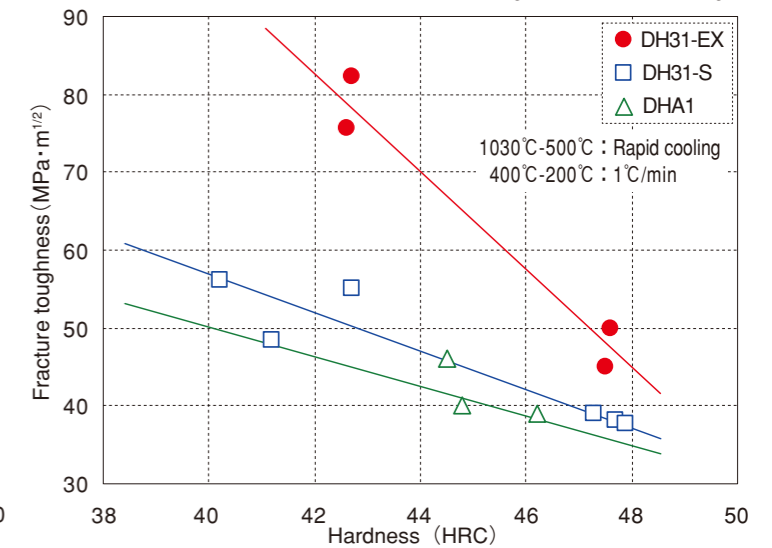
CCT curves

Austenitizing : 1030°C × 15min



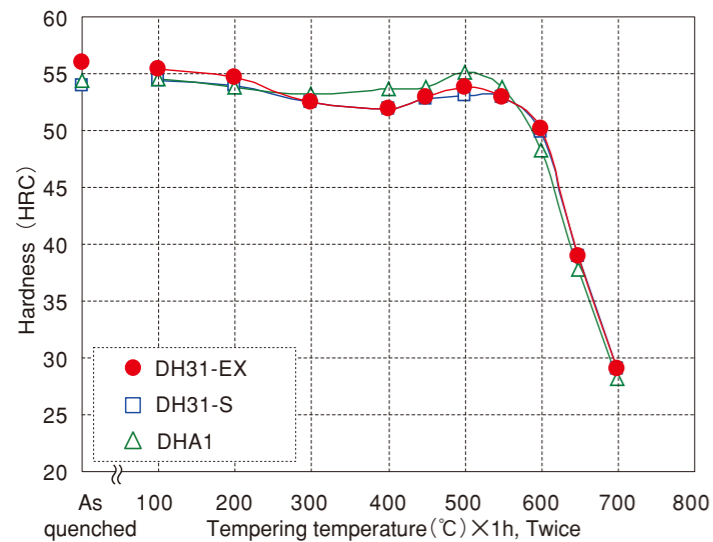
Fracture toughness

Specimen : 12.5mm × 61mm × 64mm
Quenching : 1030°C, Gas cooling



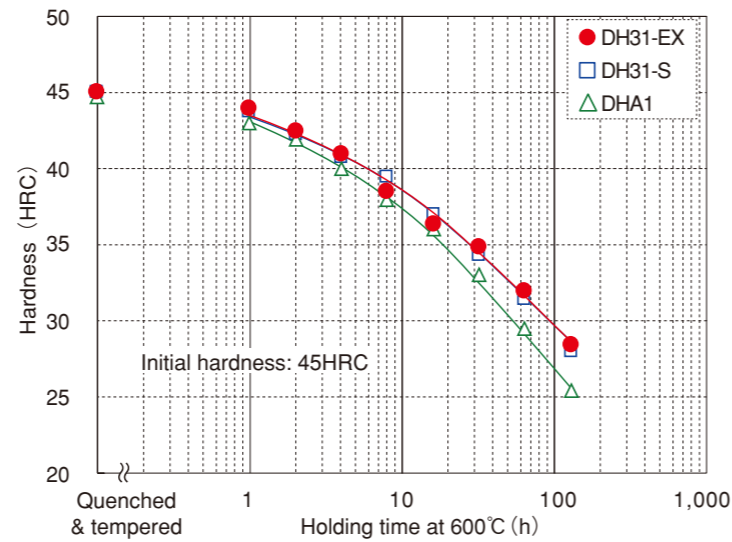
Tempering hardness

Specimen : 10mm × 15mm × 20mm
Quenching : 1030°C × 15min, AC



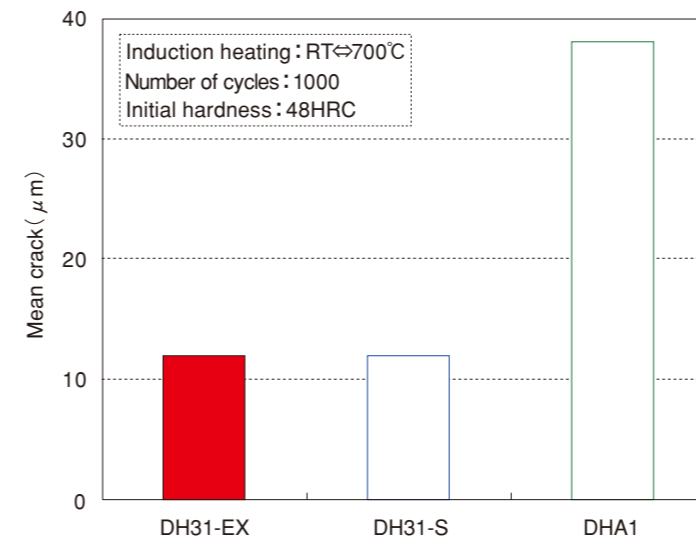
Softening resistance

Specimen : 200mmH × 600mmW × 300mmL (Center)
Quenching : 1030°C, Gas quenching with 6-9bar



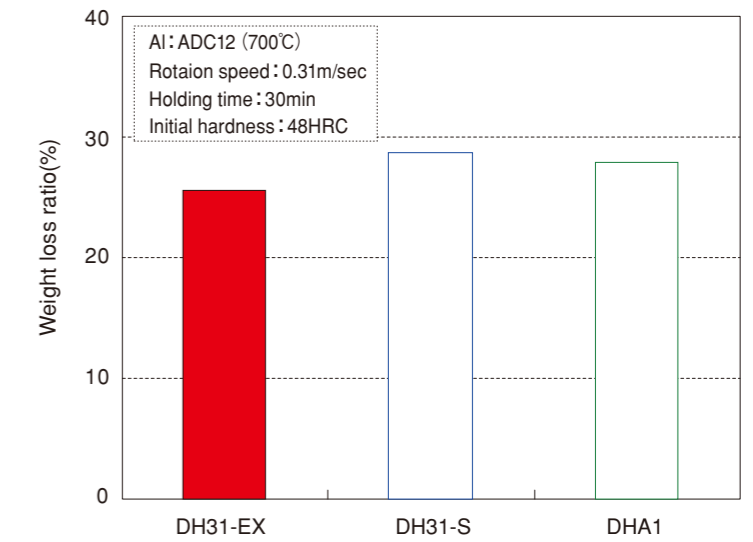
Heat checking resistance

Specimen : φ 15 × 5mm
Quenching : 1030°C, Gas cooling



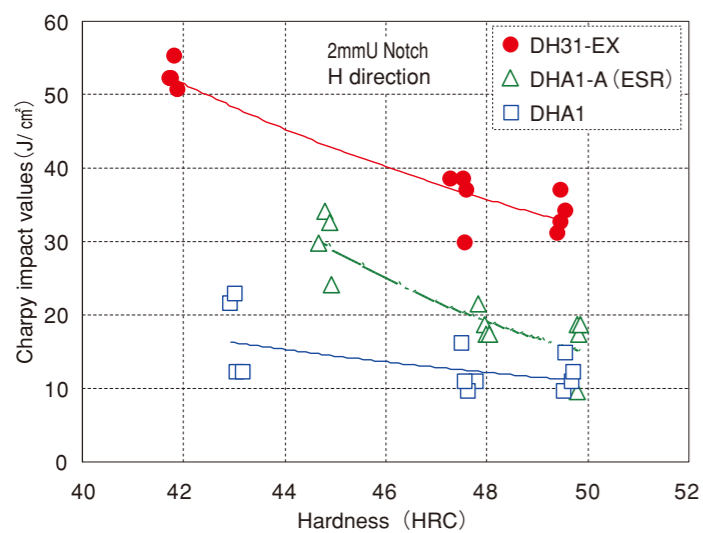
Al erosion resistance

Specimen : φ 10 × 30mm
Quenching : 1030°C, Gas cooling

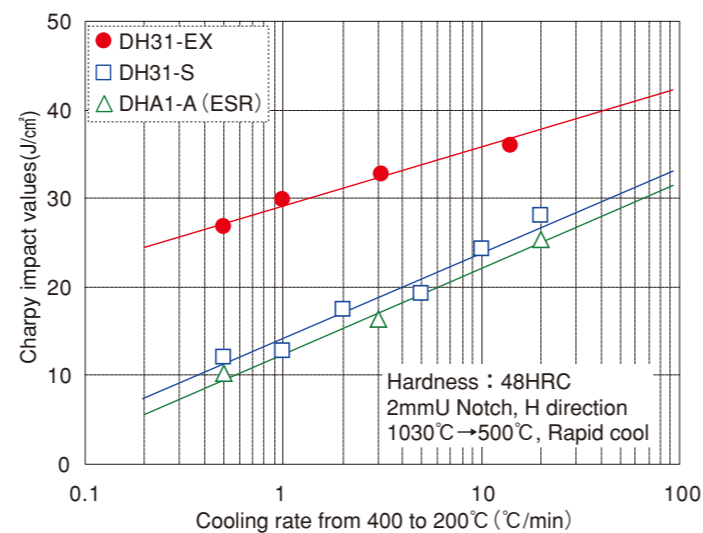


Toughness

Specimen : 200mmH × 600mmW × 300mmL (center)
Quenching : 1030°C, Gas quenching with 6-9bar

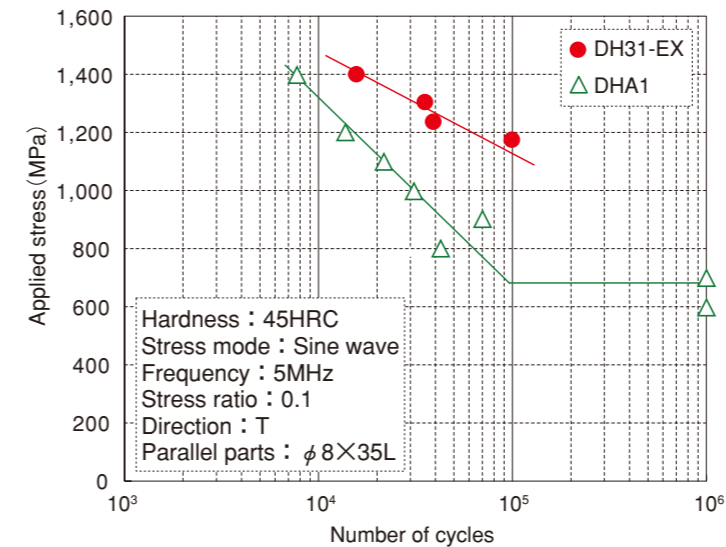


Specimen : 10 × 10 × 55mm
Quenching : 1030°C × 1h, Gas cooling



Fatigue properties

Specimen : φ 26 × 180mm
Quenching : 1030°C, Gas cooling



Nitriding characteristics

Nitriding : PS treatment
Initial hardness : 45HRC

