

Daido DRM1 is a high-toughness matrix hot-work high-speed steel. This material significantly outperforms the known hot-work steels, combining excellent resistance to thermal cracking, high toughness, and high hardness. Its good tempering resistance ensures high wear hardness even after numerous cycles. A fine microstructure contributes to better toughness compared to conventional high-speed steels.

DRM1 is ideal for dies, metal die-casting molds, and hot cutting tools. It is a trademark product of the Japanese manufacturer Daido Steel. Gebr. Recknagel distributes DRM1 as the sole stocking distributor for Central Europe.

Color code:

Red/Mint (DRM1)



Daido DRM™1

VarioRond®
Rohmaterial
Stahllexikon

199
200
201
202



WebShop:  www.stahlnetz.de

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GEBRÜDER RECKNAGEL  Präzision in Stahl 199

Daido DRM™1

VarioRond®

Round material sections with selectable length at a unit price.

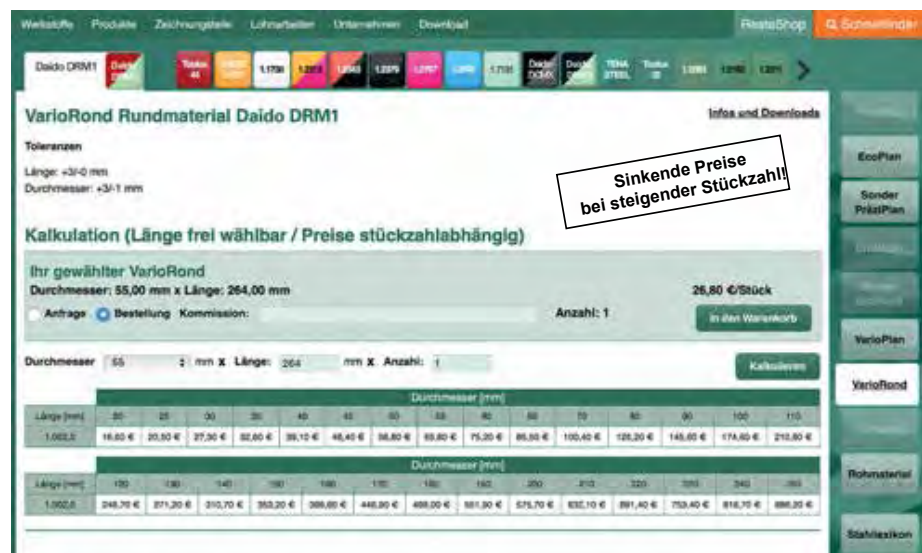
Execution and tolerances:

- length, sawn: +3.0 / -0 mm
- diameter:
- rolled surface: +1.0 / -0mm
- 61–165mm +2 / -1% of diameter
- peeled/ turned Surface:
- 80–105 mm +1.0 / -0mm
- 106–242 mm +2.0 / -0mm
- diameter range: 16–242 mm

Flexible online calculation:

www.variorond.de

- Desired length is freely selectable
- Unit prices for your desired length
- Sawing costs included
- No additional surcharges



VarioRond Rundmaterial Daido DRM1

Toleranzen
Länge: +3/-0 mm
Durchmesser: +3/-1 mm

Kalkulation (Länge frei wählbar / Preise stückzahlabhängig)

Ihr gewählter VarioRond
Durchmesser: 55,00 mm x Länge: 264,00 mm
Anzahl: 1
26,80 €/Stück

Buttons: Anträge, Bestellung, Kommission, In den Warenkorb, Kalkulieren

Länge [mm]	Durchmesser [mm]														
	20	25	30	35	40	45	50	55	60	65	70				
1.002,0	16,80 €	20,90 €	27,30 €	32,60 €	39,10 €	46,40 €	55,80 €	65,80 €	75,20 €	85,90 €	100,40 €	128,20 €	148,60 €	174,80 €	212,80 €

Länge [mm]	Durchmesser [mm]													
	130	135	140	150	160	170	180	190	200	210	220	230	240	250
1.002,0	248,70 €	271,20 €	210,70 €	353,20 €	388,60 €	448,80 €	498,00 €	581,90 €	678,70 €	832,10 €	891,40 €	750,40 €	918,70 €	886,20 €



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Rohmaterial

Rolled or forged bars as well as cut pieces thereof.

	width [mm]	thickness [mm]	diameter [mm]
flat, rolled	50–270 mm	10–105 mm	
flat, forged	135–370 mm	55–128 mm	
round, rolled/ forged			Ø 16–Ø 242 mm



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201

Daido DRM™1

chemical composition [%]

	C	Si	Mn	Cr	Mo	W	V	Co
quantity dir. analysis	0.5	0.2	0.5	4.2	1.0	3.0	1.3	2.0

warm forming	Treatment temperatures			Hardness	
	annealing	hardening	tempering	annealed	hardened
please ask	800–880 °C Slow cooling	1,100–1,140 °C cooling in oil, gas or salt bath	550–620 °C minimum 2x tempering, air-cooling	≤ 235 HB	56–58 HRC

Physical properties								
thermal expansion coefficient [10 ⁻⁶ /K]	20–100 °C	20–200 °C	20–300 °C	20–400 °C	20–500 °C	20–600 °C	20–700 °C	20–800 °C
	11.2	11.4	11.7	11.9	12.2	12.4	12.7	12.3
thermal conductivity [W/mK]	25 °C	200 °C	300 °C	400 °C	500 °C	600 °C	700 °C	
	22.4	26.3	27.3	28.6	28.4	29.1	28.8	
specific heat [J/kgK]	25 °C	200 °C	300 °C	400 °C	500 °C	600 °C	700 °C	
	413	487	519	562	616	705	840	

Young's Modulus = 210 GPa, sample hardened at 1,140 °C, double-tempered at 560 °C.

Microstructure

DRM1
(center of a round bar with Ø 100 mm)



50µm

Conventional hot work steel
(Daido)



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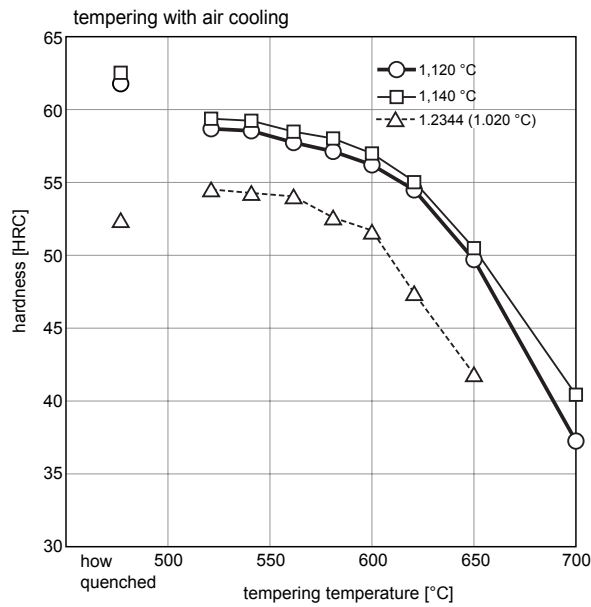
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	C	Si	Mn	Cr	Mo	W	V	Co
quantity dir. analysis	0.5	0.2	0.5	4.2	1.0	3.0	1.3	2.0

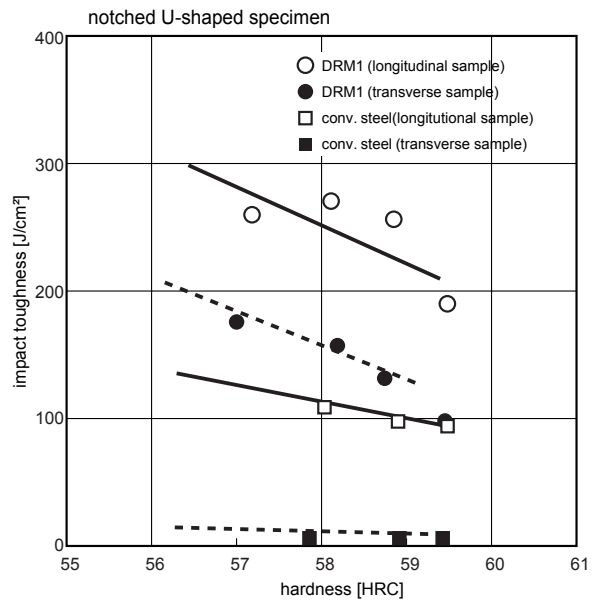
Tempering treatment

sample: square 15 mm, oil quenching



Impact toughness

Samples: taken from round bar, at the center of Ø 100mm

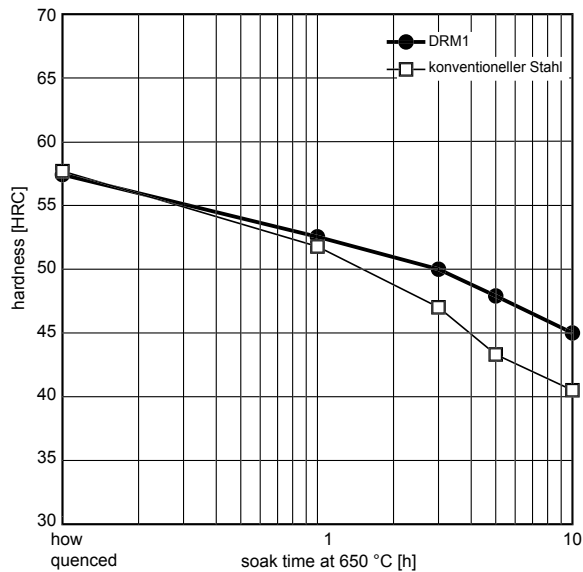


	Heat treatment	
	hardening	tempering
DRM1	1,140 °C, oil quenched	540 - 600 °C, double-tempered
conventional steel	1,120 °C, oil-quenched	540 - 600 °C, double-tempered

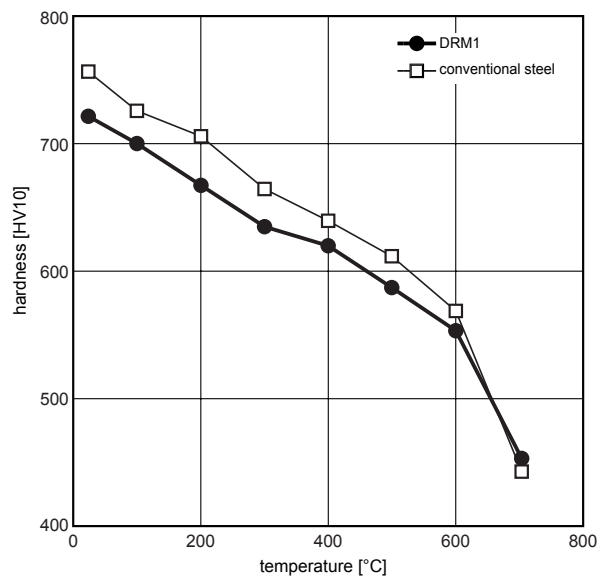


	C	Si	Mn	Cr	Mo	W	V	Co
quantity dir. analysis	0.5	0.2	0.5	4.2	1.0	3.0	1.3	2.0

Tempering resistance over time



Hardness at elevated temperatures



	heat treatment	
	hardening	tempering
DRM1	1,140 °C, oil quenched	600 °C, double-tempered
conventional steel	1,120 °C, oil quenched	610 °C, double-tempered

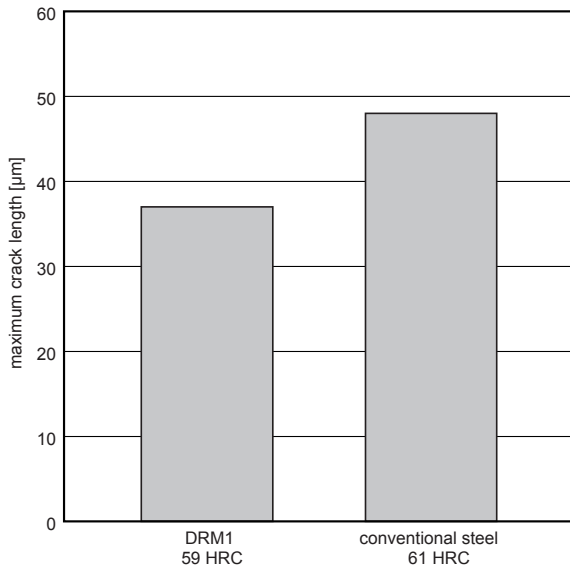
	heat treatment	
	hardening	tempering
DRM1	1,140 °C, oil quenched	560 °C, double-tempered
conventional steel	1,140 °C, oil quenched	560 °C, double-tempered



	C	Si	Mn	Cr	Mo	W	V	Co
quantity dir. analysis	0.5	0.2	0.5	4.2	1.0	3.0	1.3	2.0

Resistance to hot cracking

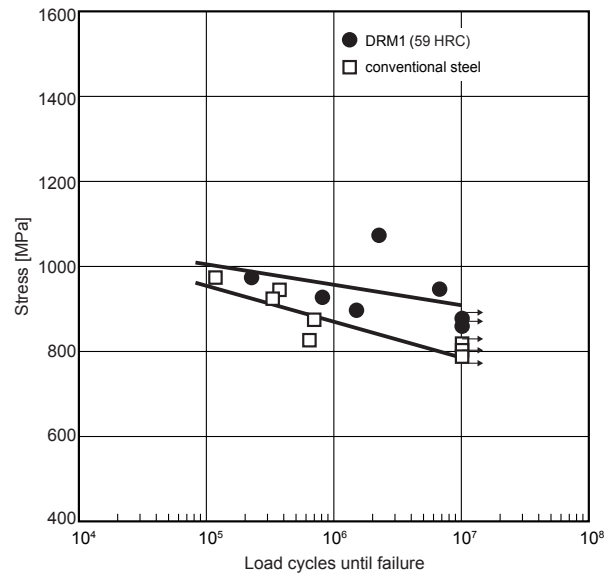
sample: Ø 15mm, 10mm thick



	heat treatment	
	hardening	tempering
DRM1	1,140°C, oil quenched	560°C, zdouble-tempered
conventional steel	1,140°C, oil quenched	560°C, double-tempered
test method	Heating inductively to 700°C and cooling to 20°C 1,000 times	

Endurance strength/material fatigue

samples: taken from the center of a round bar, Ø 100mm



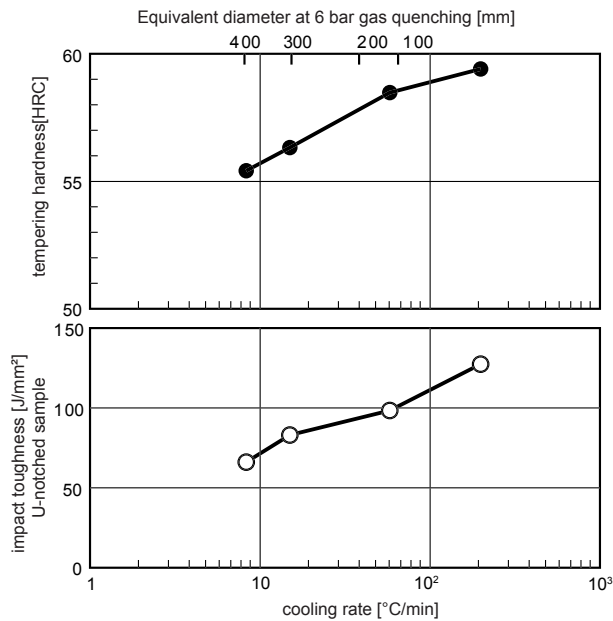
	heat treatment	
	hardening	tempering
DRM1	1,140°C, oil quenched	560°C, double-tempered
conventional steel	1,140°C, oil quenched	560°C, double-tempered
test method	Wöhler test at room temperature	



	C	Si	Mn	Cr	Mo	W	V	Co
quantity dir. analysis	0.5	0.2	0.5	4.2	1.0	3.0	1.3	2.0

Hardenability

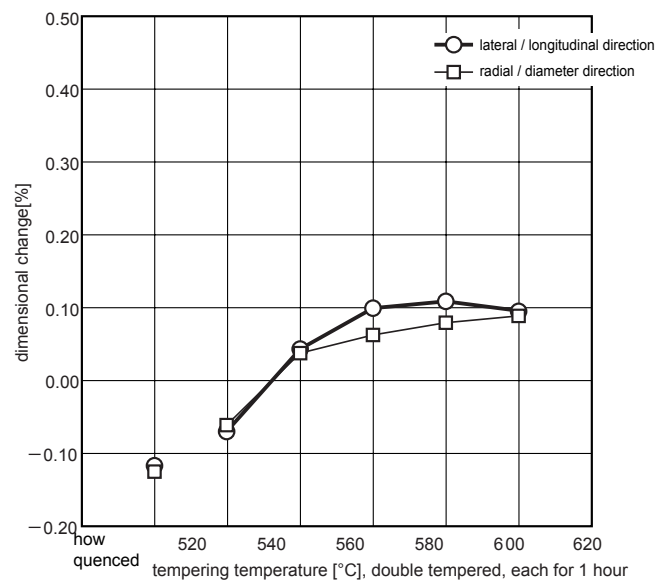
sample: Round steel Ø 100 mm



	heat treatment	
	hardening	tempering
DRM1	1,140°C, 200°C/min equiv. to oil quenching	560°C, double-tempered

Dimensional change during hardening

samples: Round bar Ø 100 mm x 60 mm length



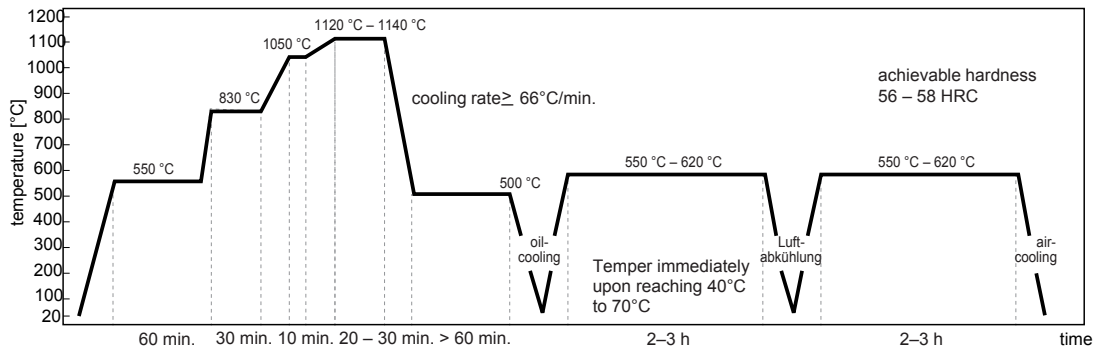
	heat treatment
	hardening
DRM1	1,140°C, oil quenched



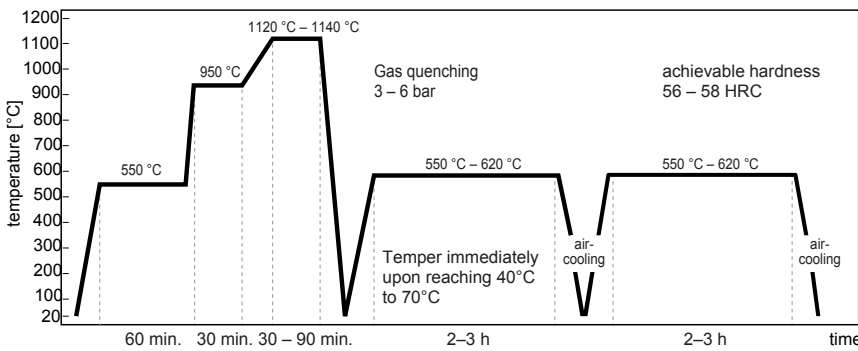
	C	Si	Mn	Cr	Mo	W	V	Co
quantity dir. analysis	0.5	0.2	0.5	4.2	1.0	3.0	1.3	2.0

Hardness testing method

Salt bath



Vacuum



thickness [mm]	Salt bath Soaking times [min]	Vacuum Soaking times [min]
to 12	8 - 10	20 - 30 per 25 mm thickness
to 25	10 - 15	
to 37,5	15 - 20	
to 50	20 - 25	10 - 20 per 25 mm thickness
to 100	30 - 40	
over 100	30 - 40	

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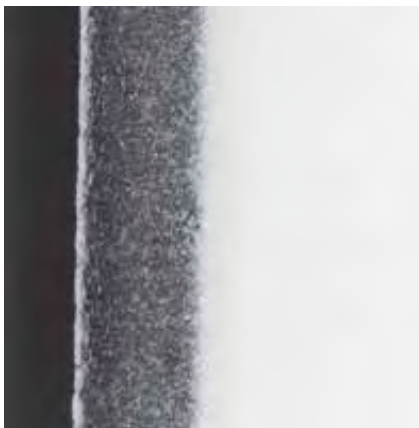
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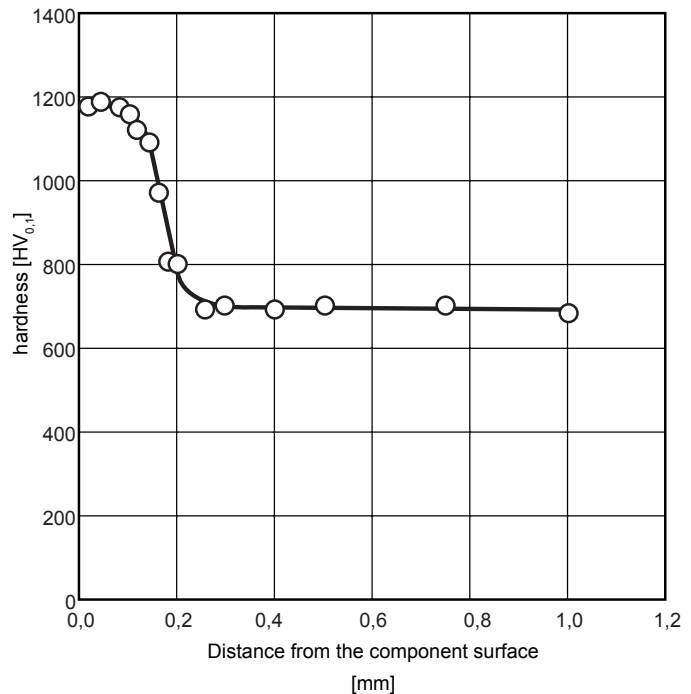
	C	Si	Mn	Cr	Mo	W	V	Co
quantity dir. analysis	0.5	0.2	0.5	4.2	1.0	3.0	1.3	2.0

Nitriding



Example of the microstructure of a nitrided surface using the PS process by Daido Amistar.

Hardness progression after nitriding



The surface hardness reaches 1,200 HV with NHD = 0.2mm.

The technical values provided are always based on our investigations. Unless otherwise stated, they do not represent guarantees. Please seek individual advice in specific cases.

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