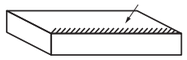
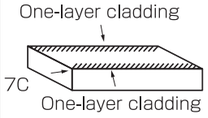
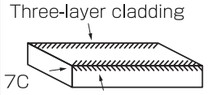
Weldability

◆ Weldability test results

	Specimen condition	Welding conditions	Presence or absence of cracks	HV hardness of overlay (HRC hardness conversion)
1	Flame-hardened steel	One-layer cladding on the flame hard part 	None	669HV (58.7HRC)
2	Quenched and tempered steel	One-layer cladding  7C One-layer cladding	None	700HV (60.1HRC)
3	Quenched and tempered steel	Three-layer cladding  7C Three-layer cladding	None	697HV (60.0HRC)

Specimen : 50W×30t×150L
Weld rod : Equivalent to JIS DF3B-B
Weld rod diameter : φ3.2

Welding current : 105A
Pre-heating : 300℃
After-heating : 400℃

If the number of overlay layers exceeds 3-4, an under-layer of austenitic stainless steel must be deposited.

Physical properties

Quenching : 950℃×1h, Gas cooling
Tempering : 180℃×1h, Twice
Hardness : 60HRC

◆ Thermal expansion rate

Temp.	20～100℃	20～200℃	20～300℃	20～400℃	20～500℃	20～600℃
×10^{-6}/K	12.4	13.4	14.3	14.7	12.1	13.1

◆ Thermal conductivity

Temp.	25℃	100℃	200℃	300℃	400℃	500℃	600℃
W/m·K	16.0	17.1	18.0	19.8	21.7	22.4	24.5

＊Accuracy of repeated measurements is about ±10%.

◆ Specific heat

Temp.	25℃	100℃	200℃	300℃	400℃	500℃	600℃
J/kg·K	450	456	474	524	587	636	740

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

Young's modulus	Rigidity modulus	Poisson's ratio
201GPa	76GPa	0.32

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No.SC1802a 24.12.0,3 (DDD)

Daido's Cold Work Die Steel Series

GO5™

Reducing Mold-Making Processes and Costs with Cold Work Tool Steel Featuring Outstanding Flame Hardenability

Features

◆ Simplified Flame Hardening

This steel achieves sufficient surface hardness and depth of hardening through air cooling after flame heating.
Thanks to a broad suitable quenching temperature range, the risk of overheating and grain coarsening is minimized.

◆ Superior Machinability

Proper spheroidizing annealing ensures excellent machinability.

◆ Enhanced Wear Resistance

Achieving higher uniform hardness, it offers wear resistance on par with SKS type die steel.

◆ Reduced Risk of Cracking and Chipping under Use

Its toughness surpasses that of molds made from SKS and SKD steel.

◆ Facilitated Die Repair Through Overlay Welding

Designed with weldability in mind, the alloy composition greatly reduces the risk of cracking during overlay welding, making repairs easier and more reliable.

Main applications

Punching dies, drawing dies, bending dies
Other cold forming dies

Chemical composition

Cr-Mo-V series steel

DAIDO STEEL

Heat treatment

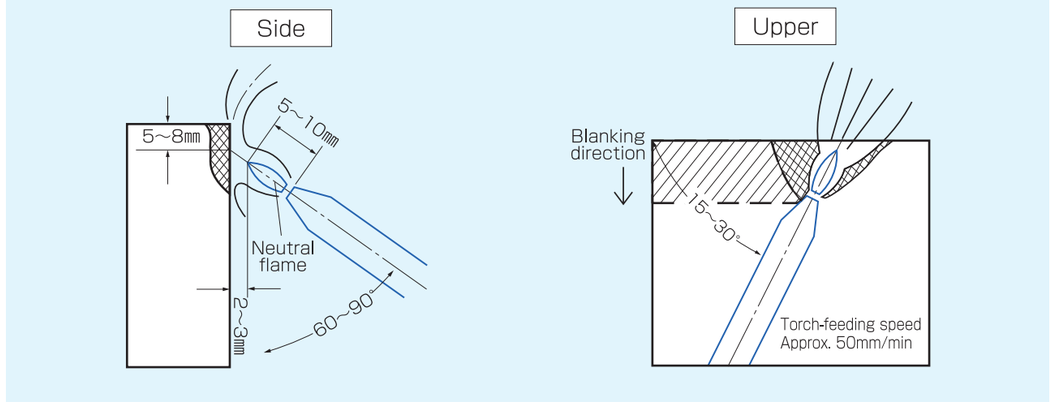
In case of flame hardening (mainly applied to the case of cutting edges)

1	Work environment	The room must be at a constant brightness level.
2	Pre-heating	200-300℃ (Hardening hardness may decrease if the temperature is too high)
3	Austenitizing	Heat until it becomes bright red (950℃ target) and move the heating area sequentially (see the figure below).
4	Cooling method	Air cooling
5	Tempering	Tempering at 150-200℃ improves toughness

◆ The standard of burner and gas pressure

Burner type	Nozzle number	Oxygen gas pressure (O_2)	Acetylene gas pressure (C_2H_4)
Welding burner	#100～300	0.098MPa	0.017MPa
Thermal cutting burner	#1 ～ 2	0.490MPa	0.049MPa

◆ The method of flame hardening



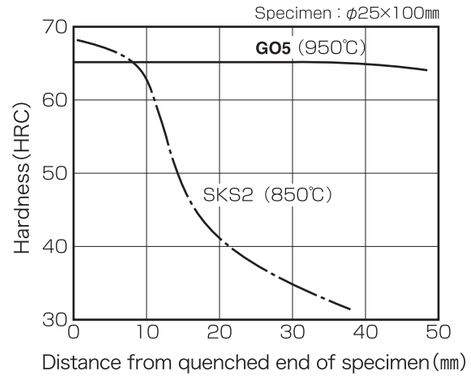
In case of total quenching (mainly applicable to bending dies and drawing dies)

Heat treatment		Hardness	Transformation temp.		
Quenching	Tempering		Ac_1	Ac_3	Ms
900～950℃ Oil quenching	150～200℃ Air cooling	≧60HRC	752℃	808℃	188℃

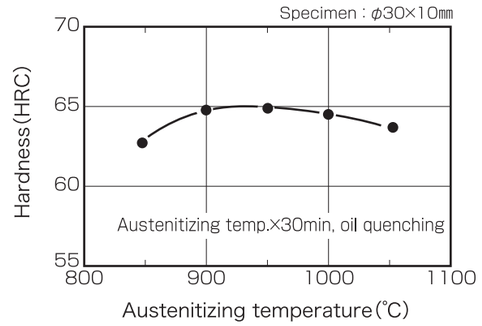
Properties

Material size : φ36

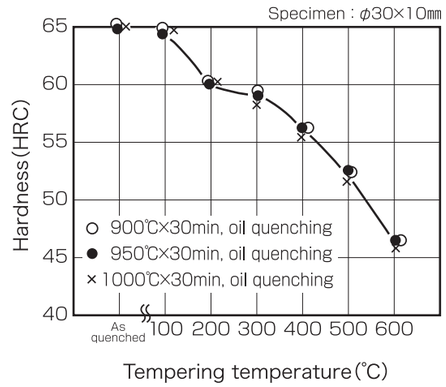
Hardenability (End-quench test)



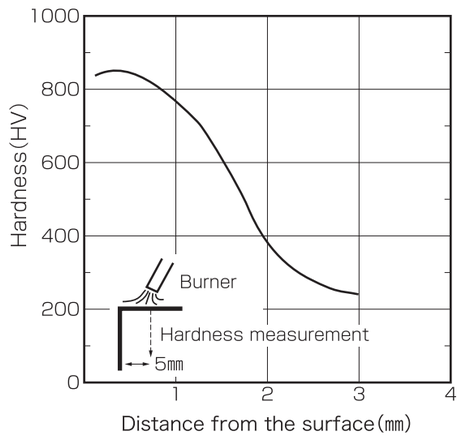
Quenched hardness



Tempering chart



Hardness distribution (After flame hardening)



Toughness