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IMPORTANT NOTE

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S-STAR

32HRC Pre-Hardened or 53HRC Quench-Hardened Type
Ultra-Hard, Mirror-Finish, Corrosion-Resistance
Plastic Mold Steel

Features

- 1 Excellent corrosion resistance
- 2 High hardness, maximum 53HRC, is obtained
- 3 Super mirror-finished surface
- 4 Minimal distortion, less than $\pm 0.03\%$, after heat treatment
- 5 Excellent internal soundness by special melting
- 6 Uniform texture surface by process etching and excellent electric discharge-machining
- 7 It is available to provide pre-hardened materials with the hardness 32 HRC

Applications

- 1 Ultra mirror finish plastic molds
 - Lens
- 2 Ultra -hard, Corrosion-resistance plastic molds
 - Medical instruments, Cosmetic container, Food container
- 3 Resin
 - PMMA, PC, PP, PS, PVC, PE, PF, Flame resisting compound added resin



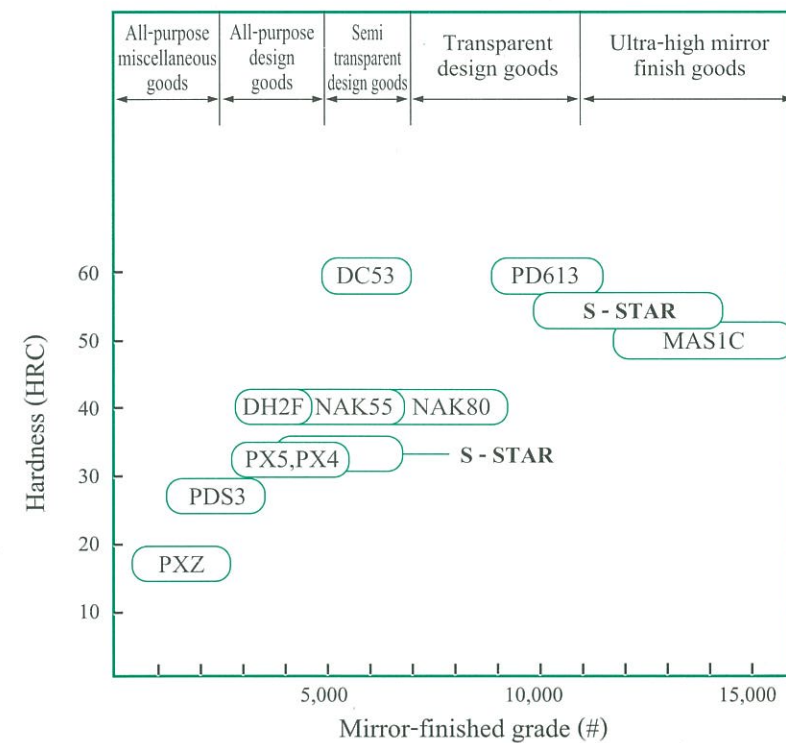
DAIDO STEEL

Chemical Composition

Daido Brand (JIS)	Supply Condition (hardness)	Chemical Composition (%)				
		C	Si	Cr	Mo	V
S-STAR (SUS420J2 mod.)	Annealing (HB ≤ 229)	0.38	0.9	13.5	0.1	0.3
	Pre-hardened (31~34HRC)					

Mirror Finish Properties

- Excellent corrosion resistance and mirror-finish surface are obtained with the high hardness: 53HRC



《Normal polishing procedures》

Turning }
 Milling } → Grinding (~#220 → #320 → #400)
 - Emery paper polishing (#320 → #400 → #600 → #800 → #1000 → #1200 → #1500) →
 Diamond paste finishing (#1200 → #1800 → #3000 → #8000 → #14000)

With NAK55, surface might be roughed to aventurine finish surface when the method of polishing of #5000 or finer polishing is attempted.

Mechanical and Physical Properties

● Mechanical Properties

	Hardness (HRC)	
	32	53
Tensile strength (N/mm ²)	1100	1940
0.2% Proof stress (N/mm ²)	890	1540
Elongation (%)	15	9
Reduction in area (%)	55	28
Charpy impact value 2uE20°C (J/cm ²)	60	25

● Thermal Expansion Coefficient

Thermal expansion (x 10 ⁻⁶ / °C)			
20~100°C	20~200°C	20~300°C	20~400°C
10.8	11.1	11.3	11.5

● Thermal Conductivity

Thermal conductivity (W/m · K)				
20°C	100°C	200°C	300°C	400°C
23.0	23.4	23.9	24.7	25.1

● Longitudinal Elastic Modulus

Longitudinal elastic modulus (N/mm ²)				
20°C	100°C	200°C	300°C	400°C
214,500	212,500	209,500	200,000	190,000

● Density

Density (kg/m ³)				
20°C	100°C	200°C	300°C	400°C
7.80	7.78	7.75	7.73	7.70

● Specific Heat

Specific heat (J/kg · K)	
20°C	460

Welding Properties

● Build-up Welding Procedures

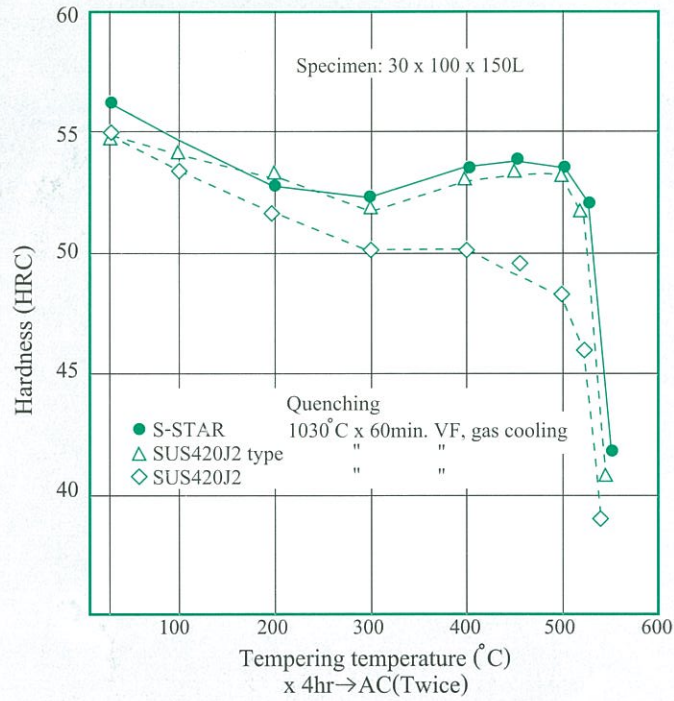
Heat treatment	Welding rod	Pre and post-heating	
		Pre-heating	Post-heating
Pre-hardened (32HRC)	AWS : ER420 (JIS SUS420J2)	200~250°C	650°C
Quench-tempered (52HRC)		200~250°C	250°C Twice or 510°C Twice (Below tempering temperature)

Heat Treatment

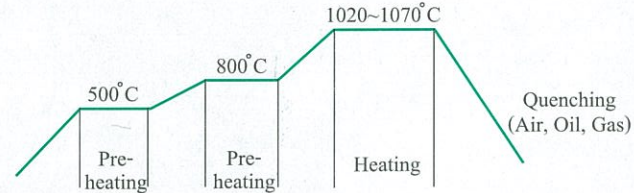


● Hardened-Tempered Hardness

Maximum hardness of 53HRC is obtained.

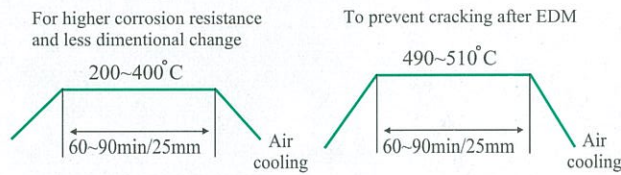


● Quenching



● Tempering

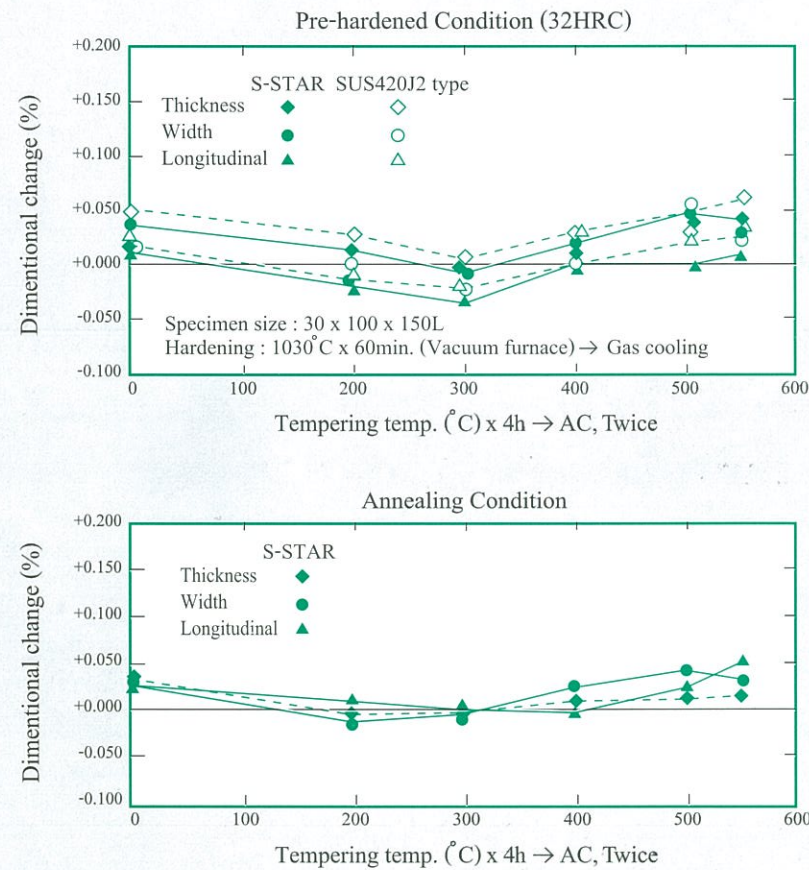
Double tempering is recommended for both low and high temperature tempering.



- Note ● For higher corrosion resistance, tempering should be carried out at temperatures of 400°C or lower.
 ● To prevent from cracking in EDM tempering is recommended at 490 to 510°C.
 ● When aging dimensional stability is deemed important, carry out low temperature tempering at 200 to 400°C or sub-zero processing.

● Dimensional Change

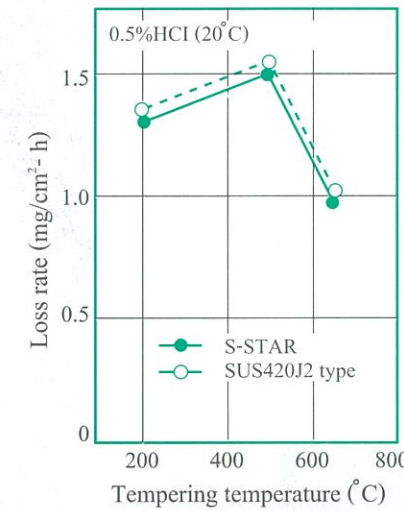
Dimensional change is the smallest by tempering about 300°C.



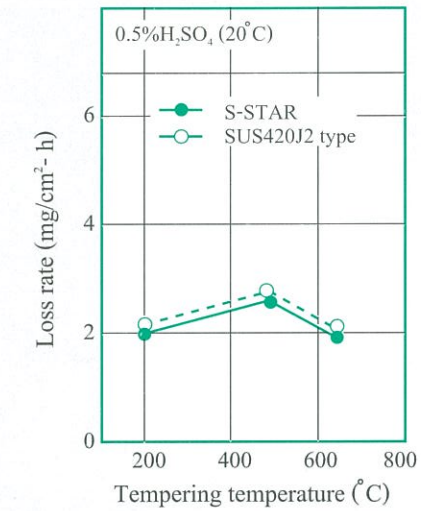
Corrosion Resistance



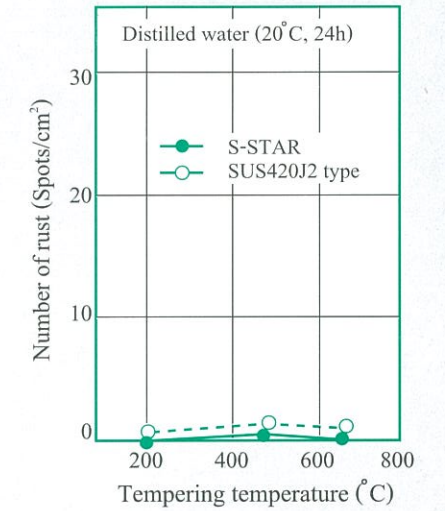
● Hydrochloric Acid



● Sulphuric Acid



● Distilled Water

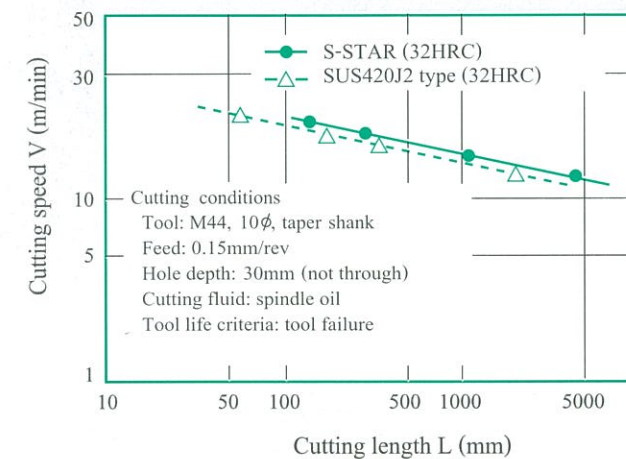


Machinability



Good machinability under supply conditions (P.H).

● Drill Tool Life (Pre-hardened)



● Endmill Tool Life (Pre-hardened)

