S-STAR

420 ESR STAINLESS STEEL

Diameters: Stocked in the pre-hardened condition (30-34 HRC) can be heat treated to 50-53 HRC.

Plates: Stocked in the annealed condition. Can be heat treated to 50-53 HRC.

FEATURES

- **Excellent corrosion resistance**
- **High hardness: maximum 53 HRC is obtained**
- **Superb mirror-finish surface**
- **Minimal distortion, less than 0.03% after heat treatment**
- **Excellent internal matrix by ESR**
- **Uniform texture surface by photo etching and electrical discharge machining**

APPLICATIONS

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

THE CHAPIN & BANGS COMPANY

STEEL

Lindquist Steels - Tool Steel Division

AN ISO 9001:2015 CERTIFIED COMPANY

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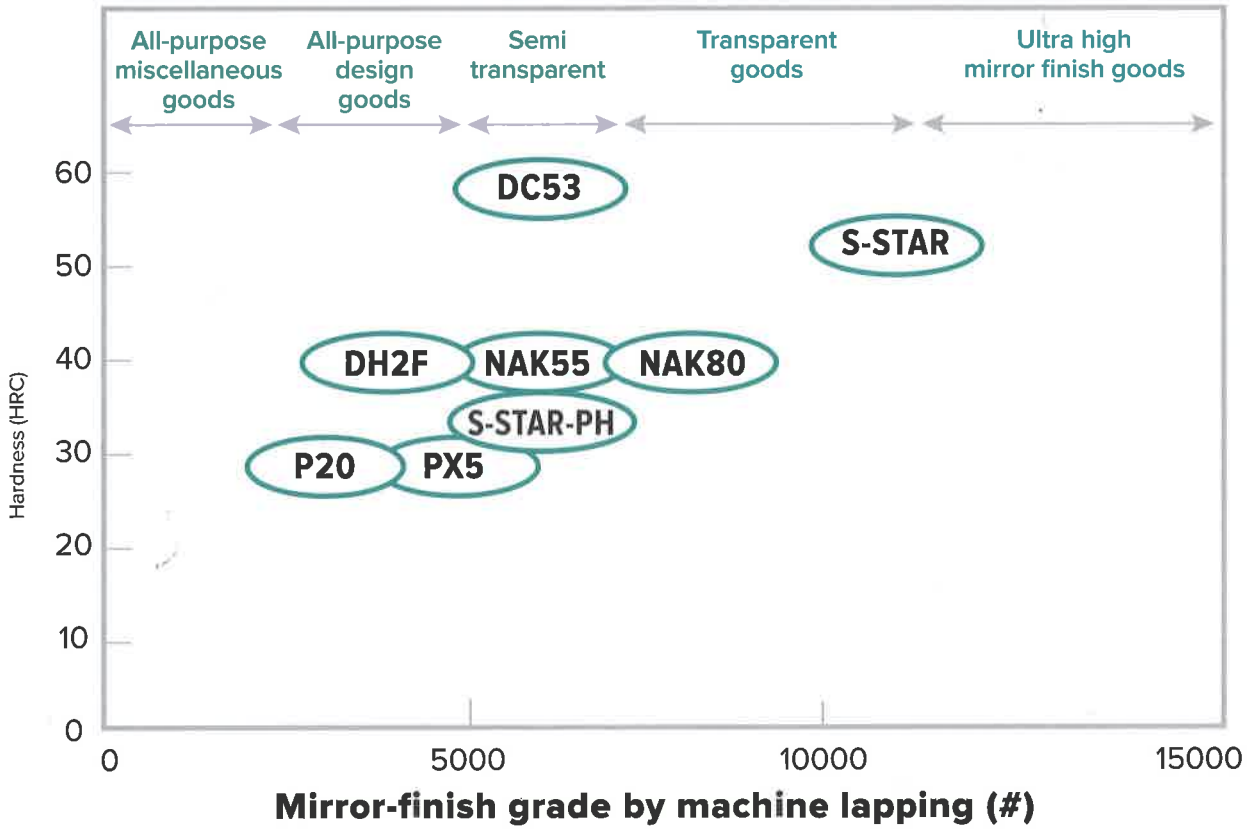
DAIDO STEEL

CHEMICAL COMPOSITION

Daido Brand (JIS)	Supply Condition (hardness)	Chemical Composition (%)				
		C	Si	Cr	Mo	V
S-STAR (420 MOD)	Annealing (HB≦229)	0.38	0.9	13.5	0.1	0.3
	Pre-hardened (31~34HRC)					

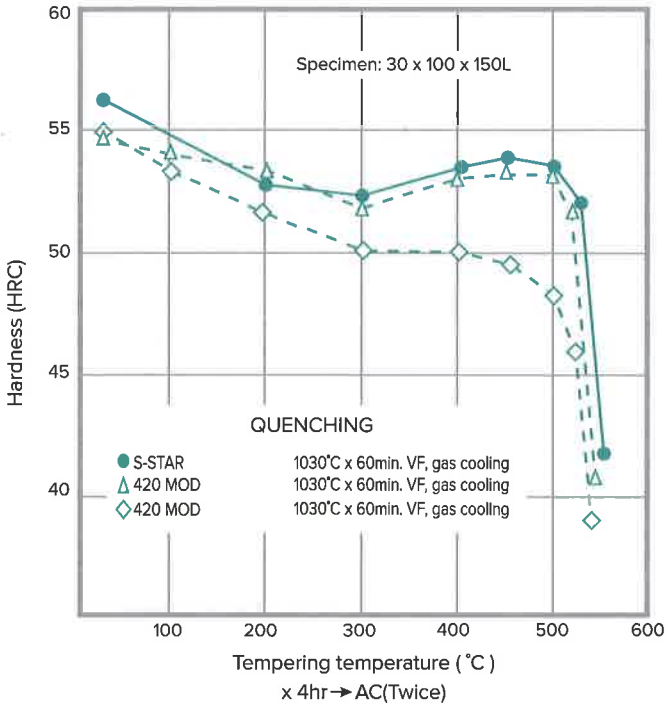
MIRROR FINISH GRADE



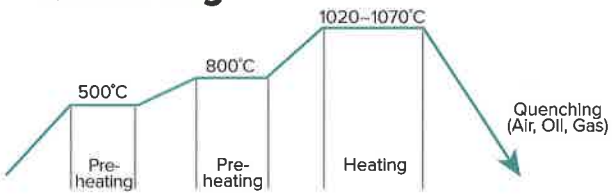
HEAT TREATMENT

Hardened-Tempered Hardness

Maximum hardness of 53HRC is obtained.

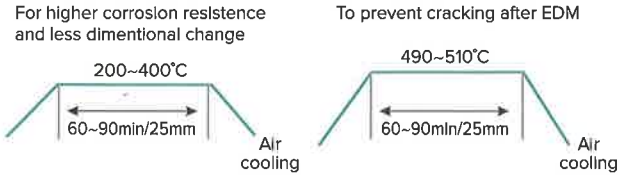


Quenching



Tempering

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

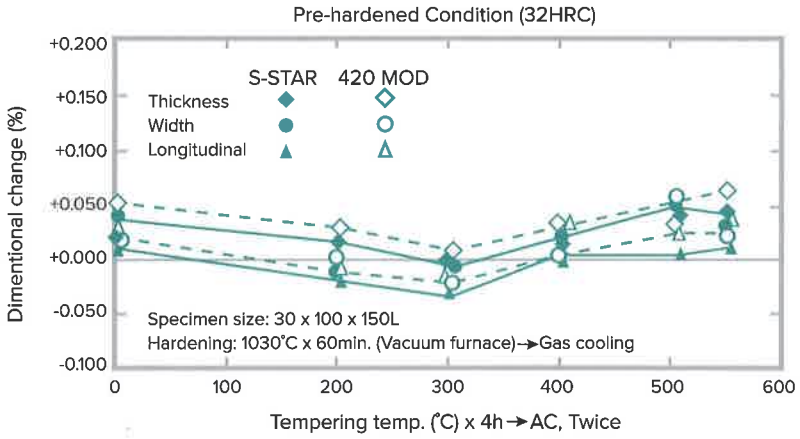


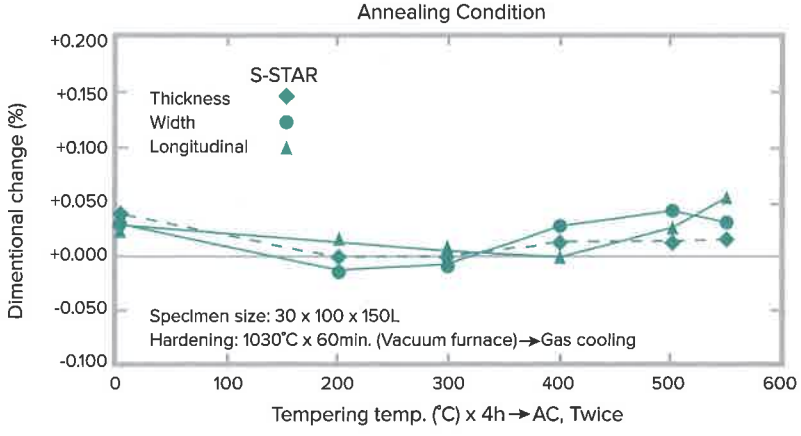
Notes:

- For higher corrosion resistance, tempering should be carried out at temperatures of 400°C or lower.
- To prevent 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.





MECHANICAL & PHYSICAL PROPERTIES

Mechanical Properties

	Hardness (HRC)	
	32	53
Tensile strength (N/mm²)	1100	1940
0.2% Proof stress (N/mm²)	890	1540
Elongation (%)	15	9
Reduction in area (%)	55	28
Charpy impact value 2uE20°C (J/cm²)	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)				
20°C	100°C	200°C	300°C	400°C
214,500	212,500	209,500	200,000	190,000

Density

Density (kg/m³)				
20°C	100°C	200°C	300°C	400°C
7800	7780	7750	7730	7700

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	Pre-heating
Pre-hardened (32HRC)	AWS: ER420 (420 MOD)	200~250°C	650°C
Quench-tempered (52HRC)		200~250°C	250°C Twice or 510°C Twice (Below tempering temperature)

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