



钢铁之家

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全球钢号百科!

Global Steel Grade Encyclopedia



涵盖的行业或国家与地区类别



美国材料与试验协会

GJB

国家军用标准



动力机械工程师协会

EU

前欧洲标准化

AISI

美国钢铁学会



德国工业标准

AMS

航空航天材料规范



国际标准

JASO

日本汽车标准组织

EN

欧洲标准

JB

中国机械行业标准

UNS

统一编号系统

UNI

意大利标准



美国机械工程师协会

SS

瑞典标准



国家标准



日本工业标准

HOT WORK TOOL STEELS

Available Product Shapes

Long Products

Open Die Forgings

Product Description

Tool steel that has proved highly satisfactory for hot and cold work and long-time service up to approx. 450°C (842°F) in various fields of application. Tools for hydrostatic presses, cold extrusion tools, cold heading and embossing tools, molds for the plastics industry, die casting tools for aluminium and zinc alloys, hot pressing tools, cold pilger mandrels.

Properties

Ultra-high-strength maraging steel. In contrast to heat treatable steels its outstanding tensile properties are not due to a hardened structure with relatively high carbon content, but to precipitation of intermetallic phases from a ductile nickel bearing matrix containing almost no carbon. This results in the following advantages: High tensile strength and excellent yield point ratio, satisfactory toughness (reduction of area, elongation, impact strength, fracture toughness) even at low temperatures, superior notched tensile strength and heat checking resistance, practically no size change in heat treatment, no decarburization, no cracking, full hardening even in sizes above average. Convenient machinability in the solution annealed condition (machining is also possible in the precipitation-hardened condition). Good cold forming properties owing to reduced susceptibility to work hardening, eminent weldability, simple heat treatment at low temperatures.

Applications

- > Extrusion
- > Injection Molding
- > Fasteners, Bolts, Nuts
- > General Components for Mechanical Engineering
- > High Pressure Die-Casting

Material designation	
1.6358	SEL
~1.2709	
K93120	UNS

Chemical composition

C	Si	Mn	Mo	Ni	Co	Ti	Al
≤ 0,030	≤ 0,10	≤ 0,10	5.00	18.50	9.00	0.70	0.10

Delivery condition

Solution annealed

Hardness	max. 353 HB
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Solution annealed + precipitation hardened

Ultimate tensile strength (UTS)	min. 1900 MPa
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Heat treatment

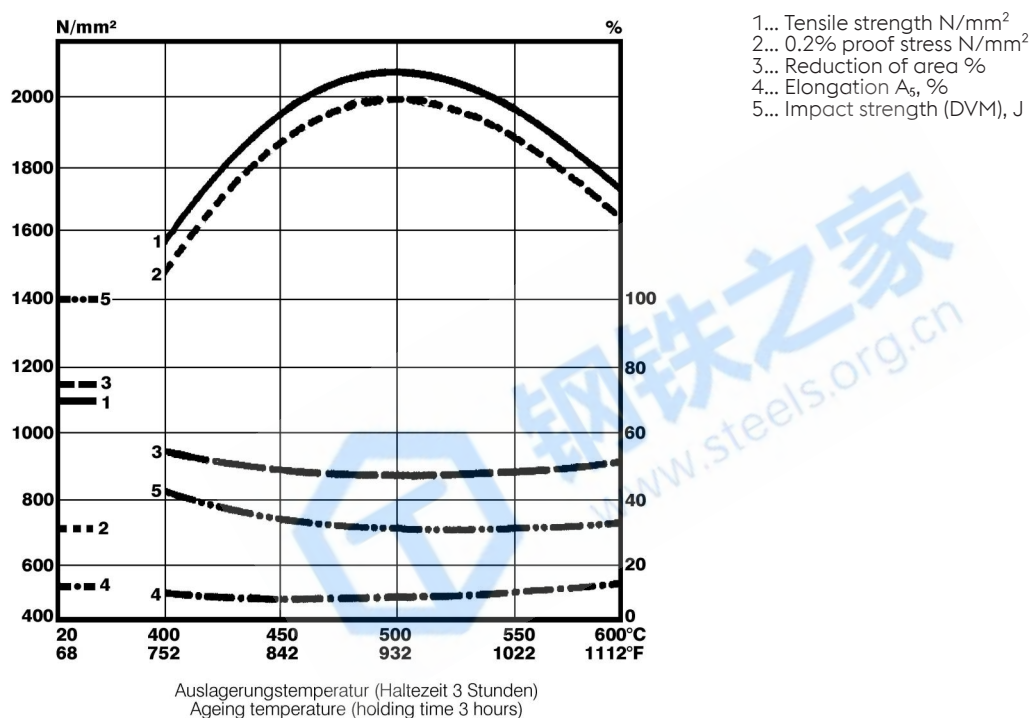
Solution annealing

Temperature (°C / °F)	820 / 1508	1 hour air, gas
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Precipitation hardening

Temperature (°C / °F)	430 / 806	3 hours / air 1720 to 1870 N/mm ²
Temperature (°C / °F)	480 / 896	3 hours / air 1860 to 2260 N/mm ²

Ageing chart



Physical Properties at 20°C / 68°F

Density	8.2 / 0.3	[kg/dm ³ / lb/in ³]
Thermal conductivity	14 / 8.09	[W/(m.K) / BTU (IT) ft/hr/ft ² /F]
Specific heat	460 / 109.87	[J/(kg.K) / BTU (IT) lb/F]
Spec. electrical resistance	0.4 / 0	[Ohm.mm ² /m / Ohm.inch ² /ft]
Modulus of elasticity	193 / 27.99	[10 ³ N/mm ² / 10 ³ ksi]

Thermal Expansions

Temperature (°C / °F)	100 / 212	200 / 392	300 / 572	400 / 752	500 / 932	600 / 1112
Thermal expansion (10^{-6} m/(m.K) / 10^{-6} inch/(inch.F))	10.2 / 5.667	10.8 / 6	11 / 6.111	11.4 / 6.333	11.8 / 6.556	11.8 / 6.556

For more information see www.voestalpine.com/bohler-edelstahl

