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

ASTM INTERNATIONAL 美材料与试验协会
GJB 国家军用标准
SAE INTERNATIONAL 动力机械工程师协会
EU 前欧洲标准化
AISI 美国钢铁学会
DIN 德国工业标准
AMS 国空航天材料规范
ISO 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
ASME 美国机械工程师协会
SS 瑞典标准
GB 国家标准
JIS 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

Solution annealed + precipitation hardened	
Ultimate tensile strength (UTS)	min. 1900 MPa

Heat treatment

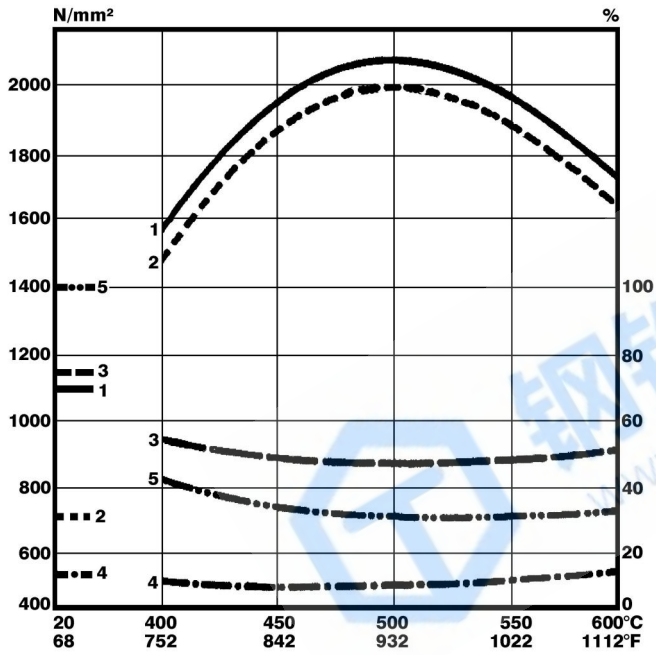
Solution annealing

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

Precipitation hardening

Temperature (°C / °F)	430 / 806	3 hours / air 1720 to 1870 N/mm²
Temperature (°C / °F)	480 / 896	3 hours / air 1860 to 2260 N/mm²

Ageing chart



Auslagerungstemperatur (Haltezeit 3 Stunden)
Ageing temperature (holding time 3 hours)

1... Tensile strength N/mm²
2... 0.2% proof stress N/mm²
3... Reduction of area %
4... Elongation A_5, %
5... Impact strength (DVM), J

Physical Properties at 20°C / 68°F

Density	8.2 / 0.3	[kg/dm³ / lb/in³]
Thermal conductivity	14 / 8.09	[W/(m.K) / BTU (IT) ft/hr/ft²/F]
Specific heat	460 / 109.87	[J/(kg.K) / BTU (IT) lb/F]
Spec. electrical resistance	0.4 / 0	[Ohm.mm²/m / Ohm.inch²/ft]
Modulus of elasticity	193 / 27.99	[10³N/mm² / 10³ksi]

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