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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

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美国机械工程师协会

SS

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PLASTIC
MOULD STEEL

PLASTIC MOULD STEEL

BÖHLER M261
EXTRA

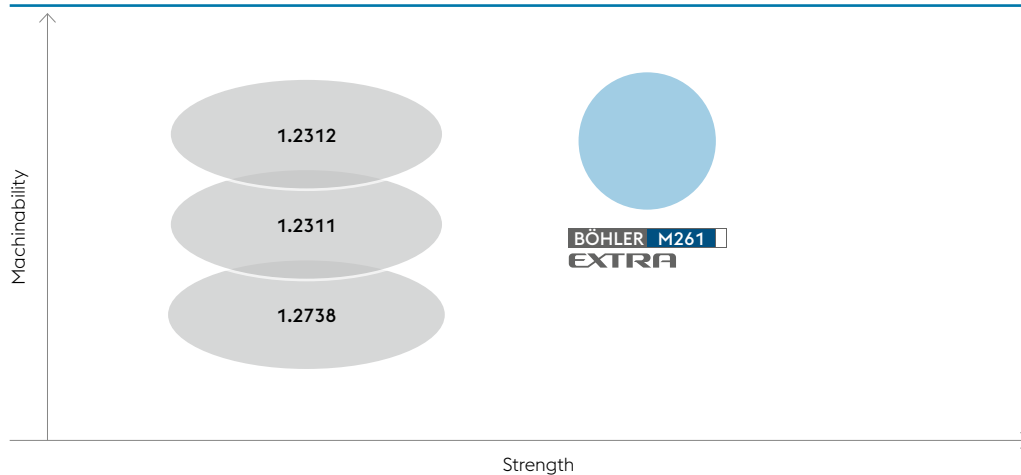
THE STEEL FOR INNOVATIVE TOOL MAKERS



BÖHLER M261 EXTRA is a **precipitation-hardening steel grade for plastic moulds**, featuring excellent machinability in the as-supplied, i.e. **solution annealed** and **aged**, condition. There is no need for an additional heat treatment, **significantly shortening the throughput time**.

When producing tools from the solution-annealed steel, simple ageing allows strength levels of max. 44 HRC to be achieved without significant changes in dimension or the surface, resulting in a substantial increase in compressive strength and wear resistance.

Product placement



On request, BÖHLER M261 EXTRA can also be supplied in the solution-annealed condition



BÖHLER M261 EXTRA – follows current trends in tool and die-making:

- » Excellent machinability coupled with higher hardness
- » Good dimensional stability
- » Excellent nitriding properties

And in the **processing of plastics** by offering:

- » High compressive strength
- » High wear resistance



Chemical composition (%)

C	Si	Mn	Cr	Ni	Cu	Al	
0.13	0.30	2.00	0.35	3.50	1.20	1.20	+ S

Supplied condition:

Stock standard: precipitation hardened to 38 – 42 HRC
 alternatively: solution annealed ~30 HRC

MANIFOLD APPLICABLE

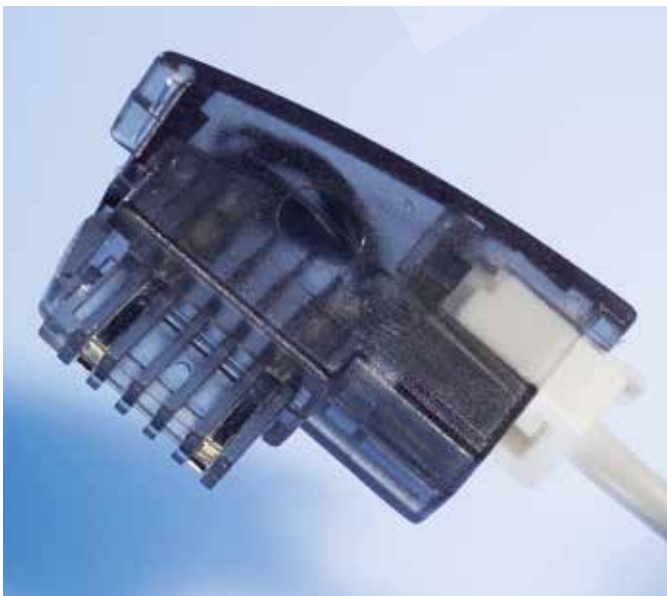
ADVANTAGES

- » no heat treatment required if supplied in the precipitation-hardened condition
- » simple heat treatment if supplied in the solution-annealed condition
- » high hardness of up to 44 HRC after ageing
- » minimum dimensional changes during ageing
- » isotropic mechanical properties
- » excellent machinability in the solution-annealed condition and very satisfactory machinability in the precipitation-hardened condition
- » conditionally weldable
- » suited for gas and bath nitriding treatments to improve the surface wear resistance; no hardness decrease during bath nitriding thanks to high retention of hardness at temperatures up to 570 °C (1058 °F) (low over-ageing tendency); in the solution annealed condition, nitriding and ageing can be carried out in one step
- » suited for chromium plating and for any other type of surface coating
- » high tool life of the tool, therefore reduced downtimes and maintenance costs

APPLICATIONS

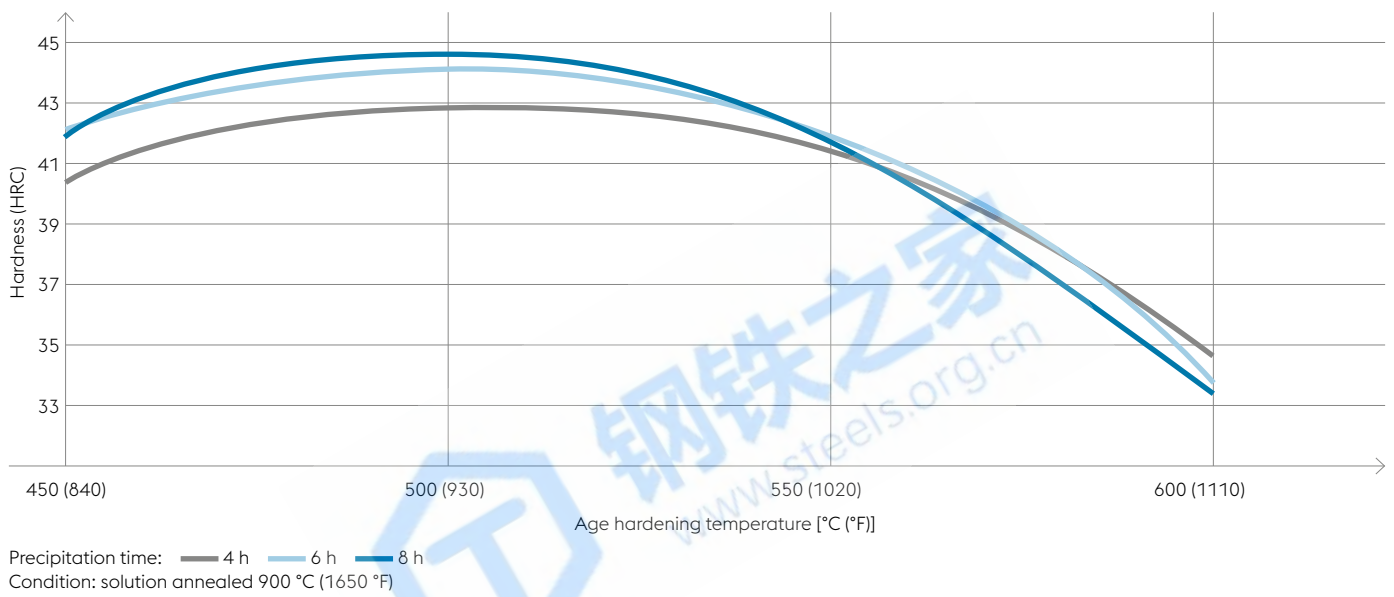
- » High-precision plastic injection moulds e.g. for the production of camera parts, electronic parts and household items
- » compression moulds for all types, e.g. for plastic containers
- » moulds for elastomers
- » moulds for the production of sealing rings (O-ring seals)
- » hot runner systems
- » tool holder



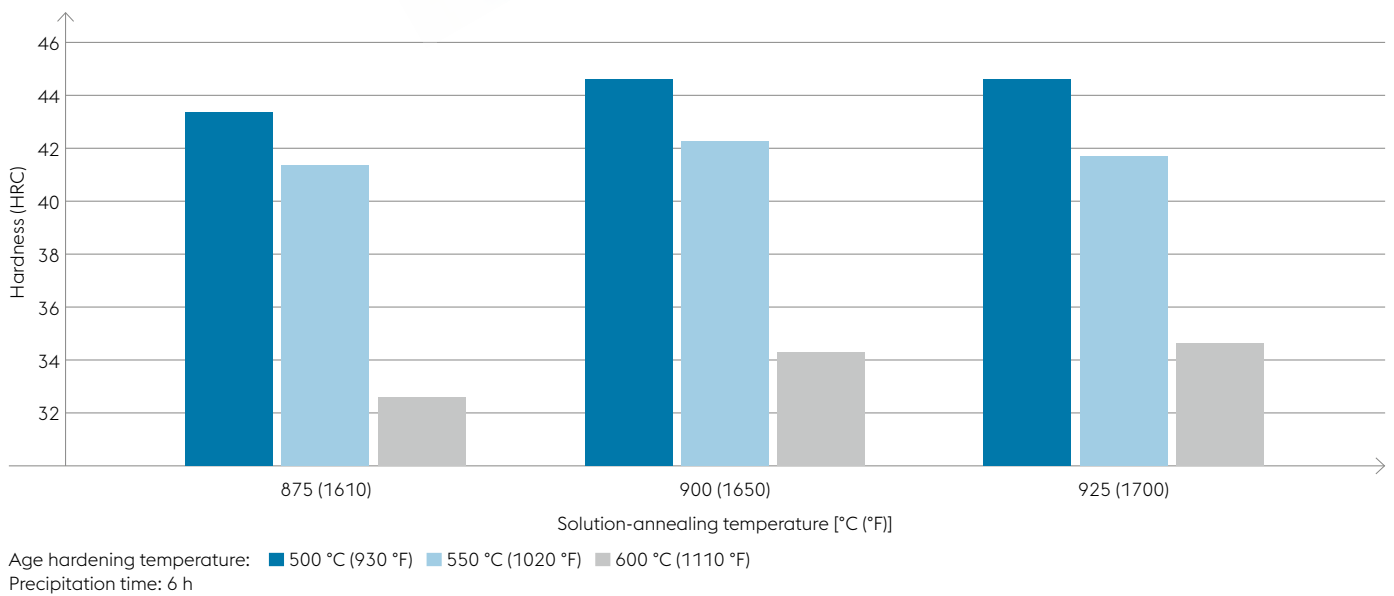


NUMBERS, DATA, FACTS

Age hardening chart (no sub zero treatment)

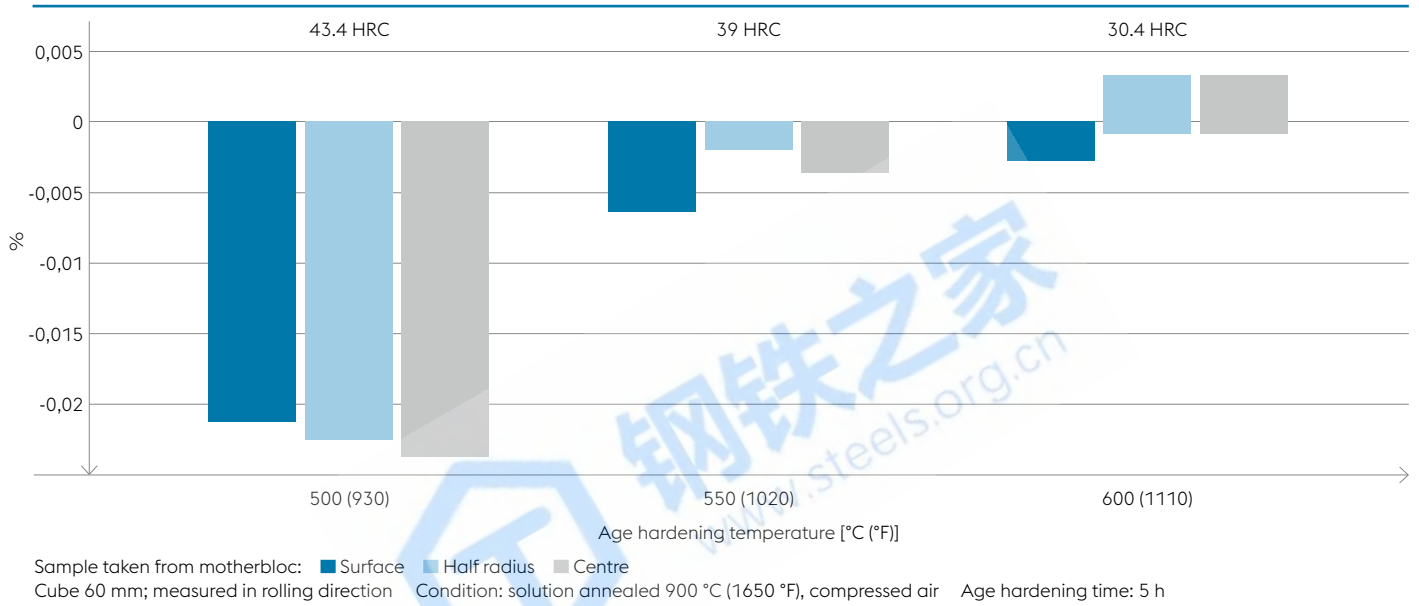


Precipitation hardening behaviour

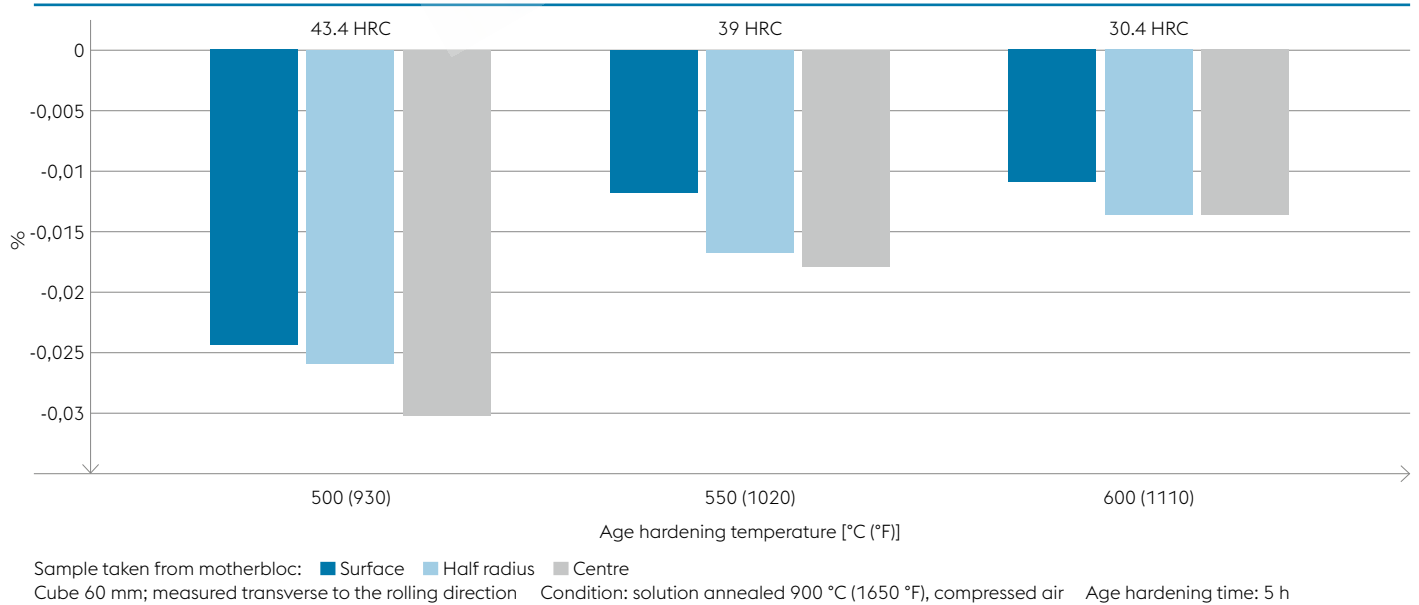




Dimensional change in longitudinal direction



Dimensional change in transverse direction



MACHINING RECOMMENDATIONS

Turning with carbide tools

Depth of cut mm (inch)	0.5 - 2 (.02 - .08)	1 - 4 (.04 - .16)	4 - 8 (.16 - .31)	over 8 (.31)
Feed mm/rev. (inch/rev.)	0.1 - 0.3 (.004 - .012)	0.2 - 0.4 (.008 - .016)	0.3 - 0.8 (.012 - .031)	0.5 - 1.5 (.02 - .06)
Cutting speed v_c m/min (f.p.m)	130 - 260 (425 - 850)	90 - 180 (165 - 590)	70 - 130 (230 - 425)	30 - 80 (100 - 260)
Recommended BOEHLERIT-geometry	FP, FMP	MP, MRP	MRP	RP, BR, BRP
BOEHLERIT grade	LCP15T	LCP15T, LCP25T	LCP25T, LC240F	LC240F
ISO grade	P15	P15, P20	P20, P30	P30, P40

(Condition: age hardened to 38 - 42 HRC; average values)

Drilling with sintered carbide: ISO HC-K10

Drill diameter mm (inch)	3 - 8 (.12 - .31)	8 - 20 (.31 - .80)	20 - 40 (.80 - 1.6)
Feed mm/rev. (inch/rev.)	0.02 - 0.05 (.001 - .002)	0.05 - 0.1 (.002 - .004)	0.1 - 0.15 (.004 - .005)
Cutting speed v_c m/min (f.p.m)	30 - 50 (100 - 165)	30 - 50 (100 - 165)	30 - 50 (100 - 165)
Point angle	115 - 120°	115 - 120°	115 - 120°
Clearance angle	5°	5°	5°

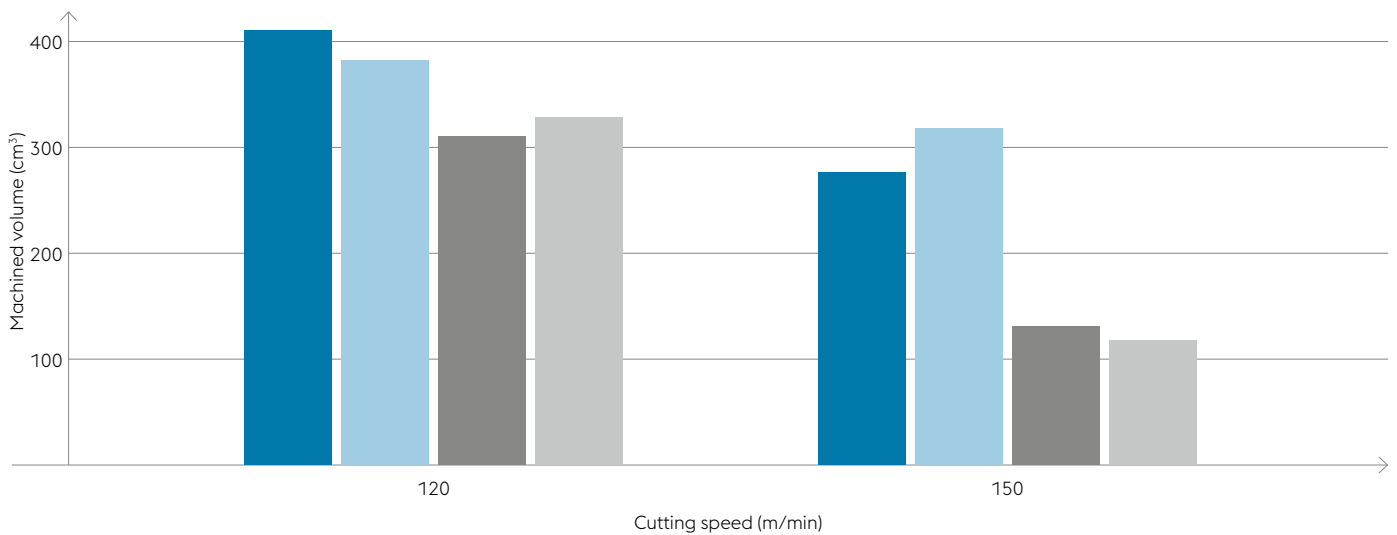
Milling with carbide tools

Cutting speed v_c m/min (f.p.m)	140 - 220 (330 - 720)	120 - 180 (395 - 590)	100 - 160 (330 - 525)
BOEHLERIT grade	BCH10M, BCP25M	BCH30M, BCP35M	BCH30M, BCK20M
ISO grade	H10, P25	H30, P35	H30, K20
F_z Milling 90° mm (inch)	0.1 - 0.25 (.004 - .010)	0.1 - 0.25 (.004 - .010)	0.1 - 0.3 (.004 - .012)
F_z Milling 45° mm (inch)	0.15 - 0.7 (.006 - .028)	0.15 - 0.7 (.006 - .028)	0.15 - 0.8 (.006 - .031)
F_z High feed cutting mm (inch)	1.0 - 2.5 (.04 - .10)	1.0 - 2.5 (.04 - .10)	0.6 - 3.0 (.024 - .12)



NUMBERS, DATA, FACTS

Machinability



Milling

Depth of cut: 2.0 mm
 Feed: 0.24 mm/tooth
 Tool material: LC 225T

- **1.2312** hardened + tempered 1025 N/mm²
- **BÖHLER M261 EXTRA** solution annealed ~30 HRC
- **Competitor** solution annealed ~30 HRC
- **BÖHLER M261 EXTRA** age hardened 38.5 HRC



Physical properties

Modulus of elasticity at	20 °C	$204 \times 10^3 \text{ N/mm}^2$
	68 °F	$29.6 \times 10^3 \text{ KSI}$
Density at	20 °C	7,73 kg/dm ³
	68 °F	0.279 lbs/in ³
Specific heat capacity at	20 °C	465 J/(kg.K)
	68 °F	0.11 Btu/lb°F

Thermal expansion between 20 °C (68 °F) and ... °C (°F)

100 °C	200 °C	300 °C	400 °C	500 °C	
12.63	13.06	13.50	13.89	14.27	10^{-6} m/(m.K)
210 °F	390 °F	570 °F	750 °F	930 °F	
7.02	7.26	7.50	7.72	7.93	$10^{-6} \text{ in/in}^\circ\text{F}$

Thermal conductivity

20 °C	100 °C	200 °C	300 °C	400 °C	500 °C	
29.0	30.7	31.9	31.8	31.4	31.5	W/(m.k)
68 °F	210 °F	390 °F	570 °F	750 °F	930 °F	
16.76	17.74	18.43	18.37	18.14	18.20	Btu/ft h°F

Source: Measured values at Materials Center Leoben / ÖGI 2001



Regarding applications and processing steps that are not expressly mentioned in this product description/data sheet, the customer shall in each individual case be required to **consult us**.