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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

PLASTIC
MOULD STEEL

PLASTIC MOULD STEEL

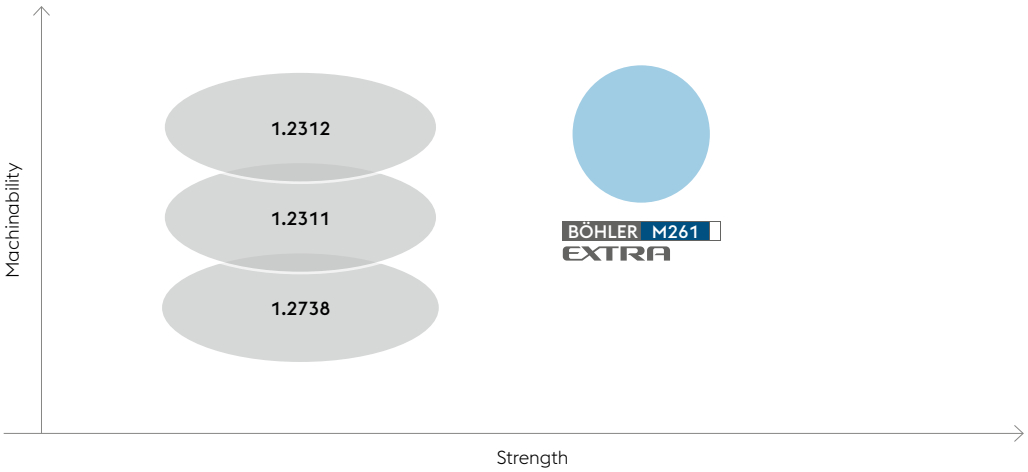
BÖHLER M261
EXTRA

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

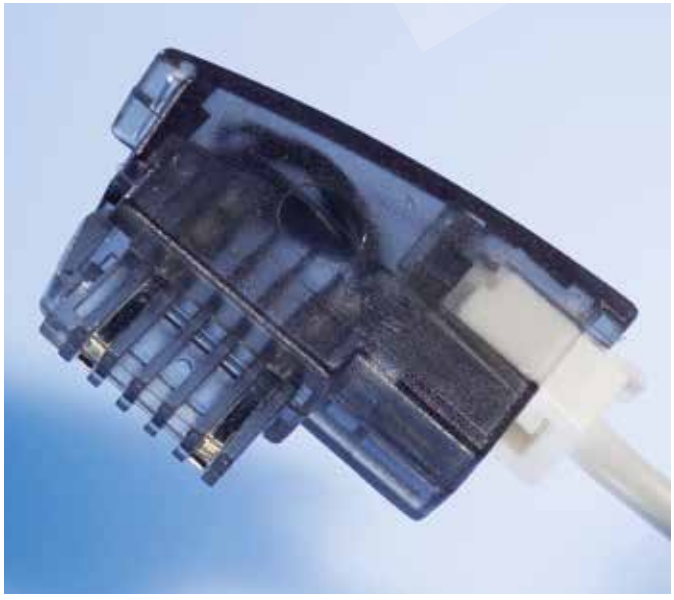
» compression moulds for all types, e.g. for plastic containers

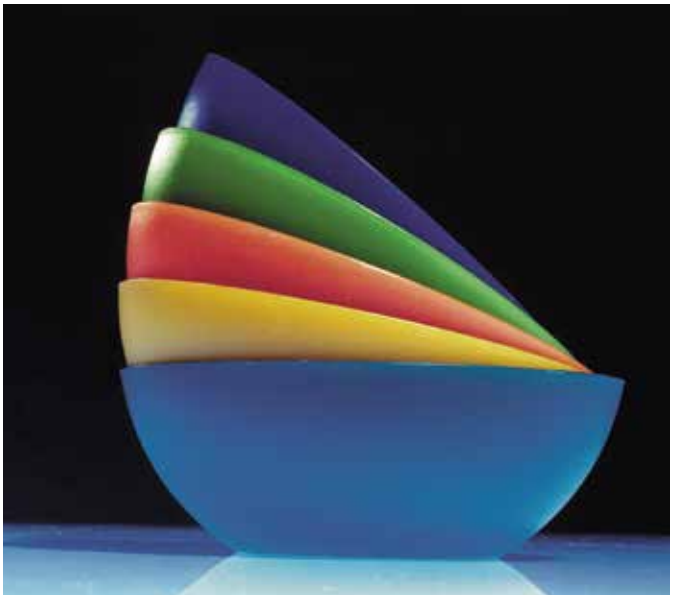
» moulds for elastomers

» moulds for the production of sealing rings (O-ring seals)

» hot runner systems

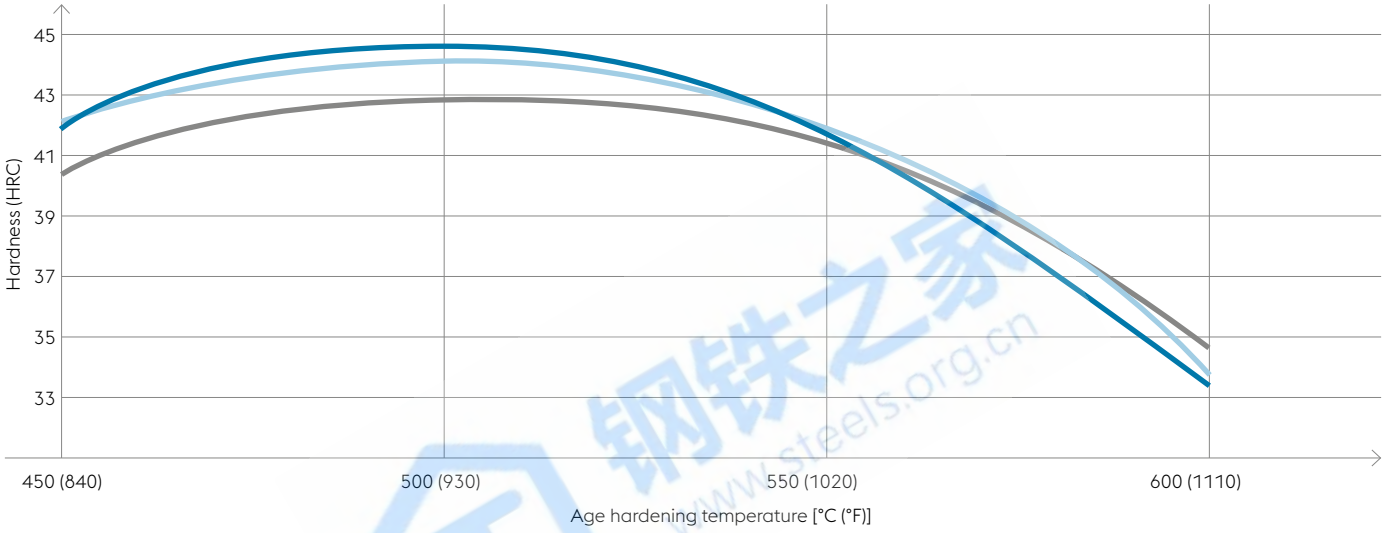
» tool holder





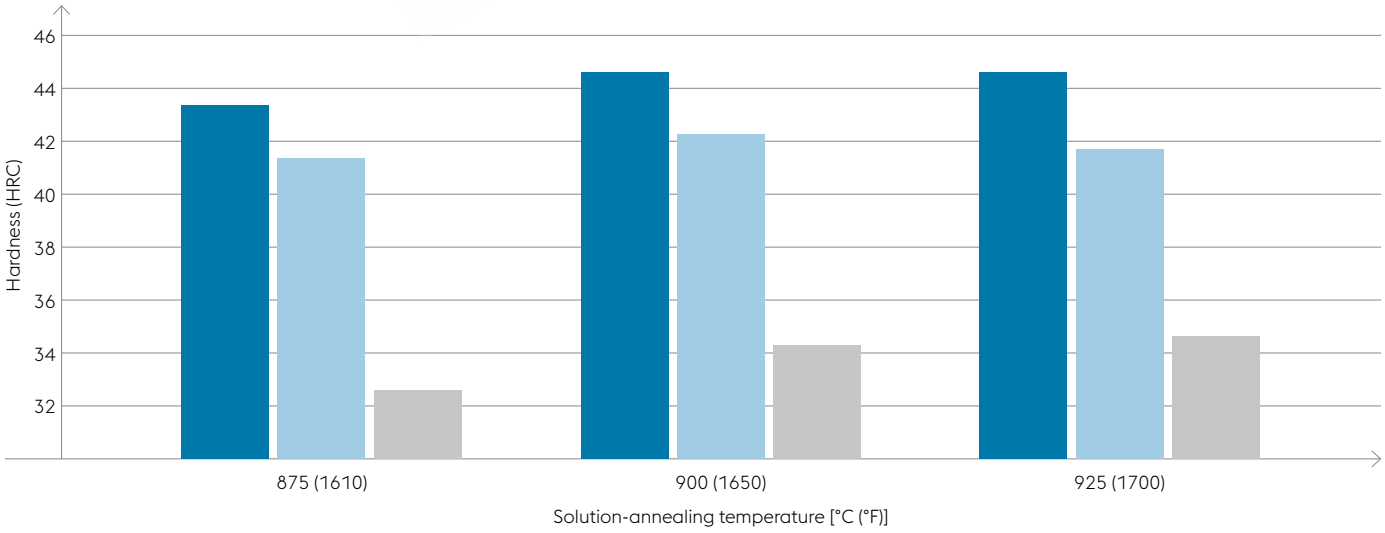
NUMBERS, DATA, FACTS

Age hardening chart (no sub zero treatment)



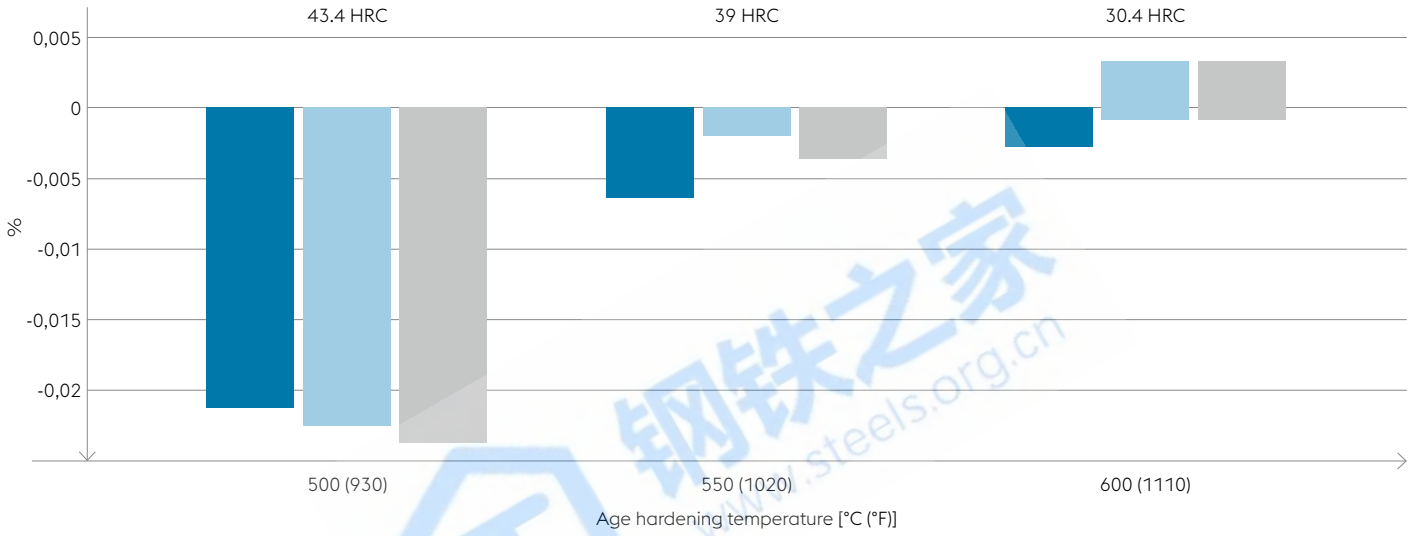
Precipitation time: 4 h 6 h 8 h
Condition: solution annealed 900 °C (1650 °F)

Precipitation hardening behaviour



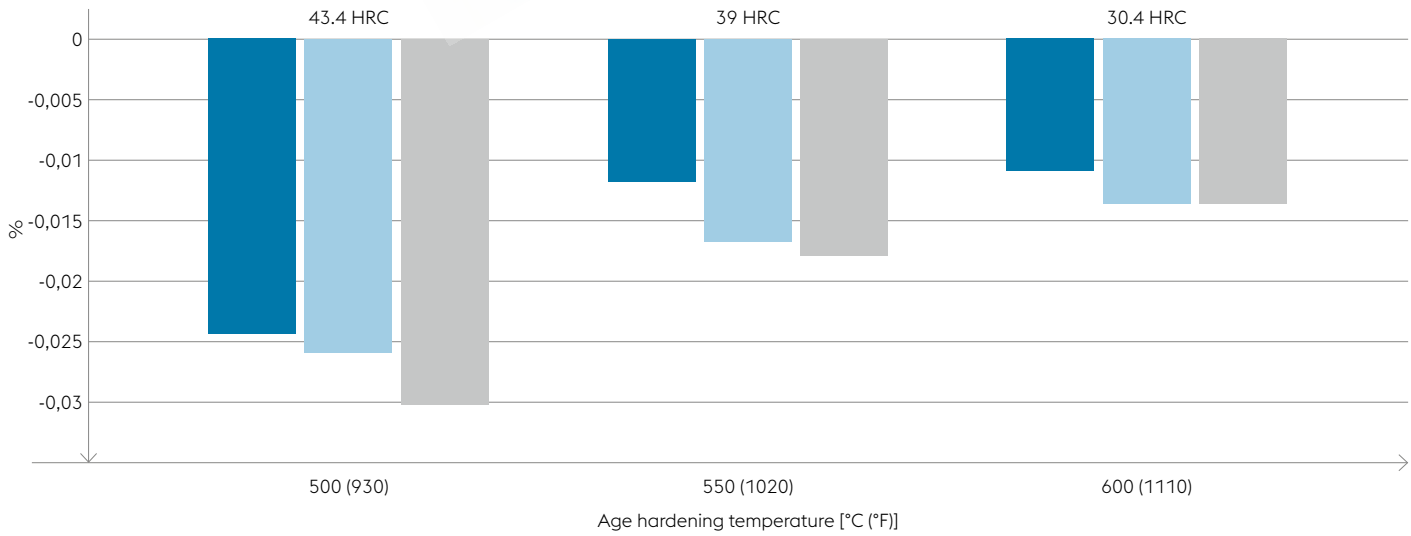
Age hardening temperature: 500 °C (930 °F) 550 °C (1020 °F) 600 °C (1110 °F)
Precipitation time: 6 h

Dimensional change in longitudinal direction



Sample taken from motherbloc: Surface Half radius Centre
Cube 60 mm; measured in rolling direction Condition: solution annealed 900 °C (1650 °F), compressed air Age hardening time: 5 h

Dimensional change in transverse direction



Sample taken from motherbloc: Surface Half radius Centre
Cube 60 mm; measured transverse to the rolling direction Condition: solution annealed 900 °C (1650 °F), compressed air Age hardening time: 5 h

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

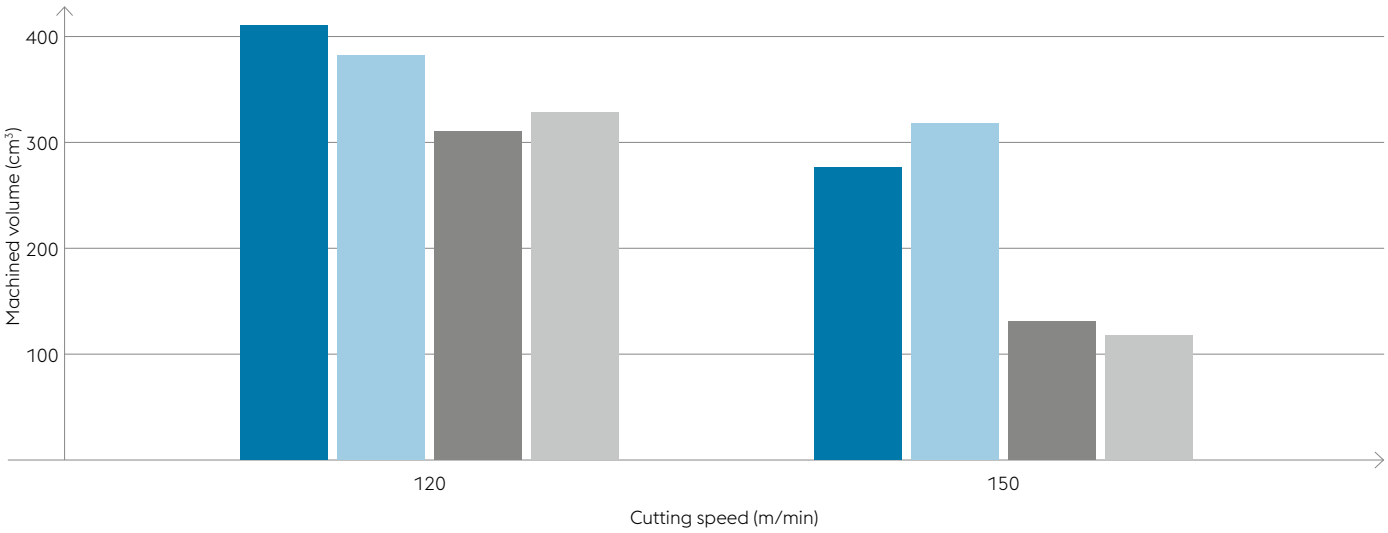
Drill diameter mm (inch)	3 – 8 (.12 – .31)	8 – 20 (.31 – .80)	20 – 40 (.80 – 1.6)
Feed mm/rev. (inch/rev.)	0.02 – 0.05 (.001 – .002)	0.05 – 0.1 (.002 – .004)	0.1 – 0.15 (.004 – .005)
Cutting speed v_c m/min (f.p.m)	30 – 50 (100 – 165)	30 – 50 (100 – 165)	30 – 50 (100 – 165)
Point angle	115 – 120°	115 – 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 68 °F	204 x 10^3 N/mm² 29.6 x 10^3 KSI
Density at	20 °C 68 °F	7,73 kg/dm³ 0.279 lbs/in³
Specific heat capacity at	20 °C 68 °F	465 J/(kg.K) 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} in/in°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**.