



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



中国材料与试验协会

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

DATA SHEET

MD™

~AISI P20+Ni - W.Nr. 1.2738 - 40CrMnNiMo8-6-4

QUALITY PREHARDENED MOLD STEEL

TYPICAL APPLICATIONS

- Injection molds up to 40" (1015 mm)
- Grained or Textured molds
- Compression molds
- Dies for non corrosive plastic extrusion

GENERAL:

Delivery Condition:

Hardened and tempered
Hardness Range

	BHN	HRC	N/mm ²
Regular	285-321	30-34	963-1082
High Hard	321-352	34-38	1082-1202

MD™ is a prehardened mold steel grade specially designed for through hardenability, ease of machining and simple post-production mold maintenance. It has high impact strength and excellent temper resistance. The well-balanced chemistry assures homogeneous hardness and low section hardness loss due to mass.

MD™ is forged on our largest presses equipped with wide dies assuring maximum deformation during forging process.

MD™ is forged using a special densifying process which assures optimum consolidation of centers.

Typical Chemical Analysis - % weight

C	Mn	Si	Ni	Cr	Mo
0.33	0.85	0.35	0.55	1.85	0.50

MD™ is melted to a low sulphur content to enhance polishability.

MD™ is quenched in water. Best properties in steel are produced with the highest achievable quench severity.

MD™ is characterized by :

- Excellent Machinability
- Good polishability
- Excellent weldability
- Uniform hardness
- Improved wear resistance

MD™ is 100 % ultrasonic tested to very stringent acceptance levels. It is defect free.

MD™ improved hardenability over standard grades ensures hardness levels to be maintained at the working surfaces, even on large molds with deep impressions.

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QUALITY PREHARDENED MOLD STEEL

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MATERIAL CHARACTERISTICS

The benefits of through hardness are:

- Stable and continued machining can be performed with (C.N.C.) automatic machines.
- A defect free machined surface can be obtained.
- Dimensional stability of parting lines.

Structure

After hardening and tempering, the structure of MD™ consists of tempered martensite to fine bainite.

The benefits of the through hardness combined with a uniform and stable micro-structure are:

- For mold design, consistent properties are assured.
- The machining distortion is minimized in the finished mold.
- A uniform luster can be obtained upon surface polishing.

PROPERTIES MD™

• Cleanliness:

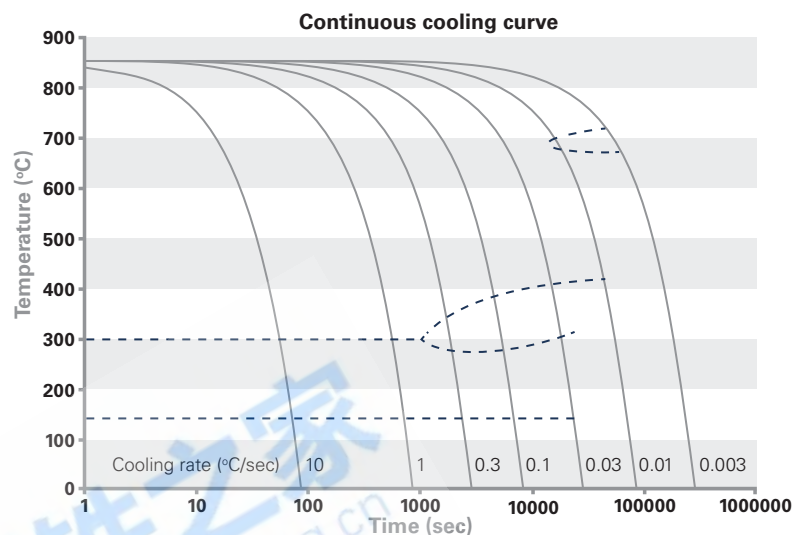
Method	A	B	C	D
ASTM E45	≤ 1.5	≤ 1.0	≤ 0.5	≤ 1.0
DIN 50602	K4 ≤ 20			

• Physical Properties:

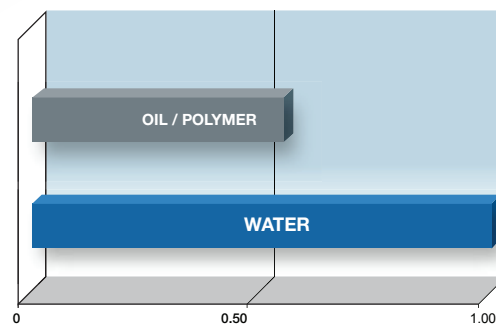
Thermal conductivity	Thermal expansion coefficient (10 ⁻⁶ K ⁻¹)			Thermal capacity	Density
(W.m ⁻¹ .K ⁻¹)	25-100 °C	25-300 °C	25-400°C	(J.Kg ⁻¹ .K ⁻¹)	-
30	12.3	13.7	14.8	384	7.85

• Mechanical Properties : Typical values for a 4" (101.6 mm) thick plate.

Hardness range	Hardness BHN (HRC)	Y.S. 0.2 MPa (KSI)	UTS MPa (KSI)	EI (%)	Impact@RT J (Ft-lb)	
					Long.	Trans.
285-320 BHN	311 (33)	827 (120)	979 (142)	> 15	111 (82)	108 (80)
320-355 BHN	331 (36)	924 (134)	1062 (154)	> 15	88 (65)	81 (60)



Relative Quenching Power:



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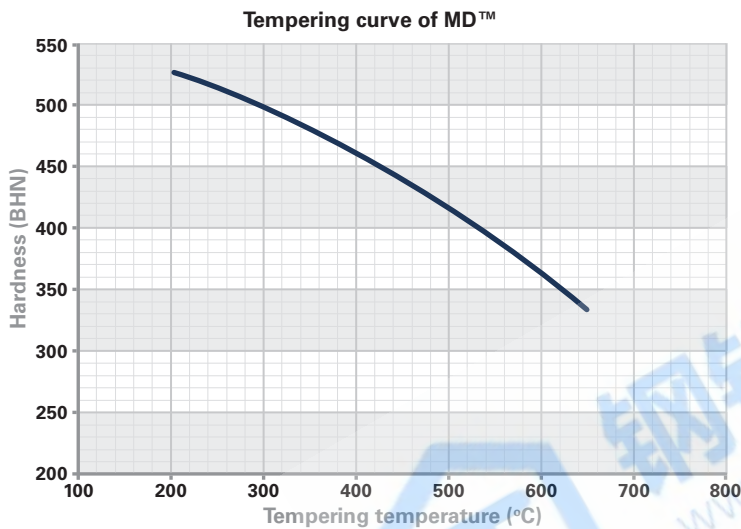
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HEAT TREATMENT

Attainable Hardness of MD™

Quenched from 1550 °F (816 °C)
and Tempered 4 hours
(Size of section – 4" X 4" (101.6 mm X 101.6 mm))



Stress Relieving

Mold can be finish machined to their final dimensions. Heat finished die at a rate of one hour per inch (25.4 mm) of maximum thickness to 850 to 900 °F (454-482 °C) Hold at temperature for one hour per inch (25.4 mm) and air cool.

Tempering

Tempering treatments vary for different sizes and applications. The following instructions will provide through tempering:

Heat uniformly at the selected tempering temperatures and hold at temperature for one hour per inch (25.4 mm) of total thickness.

INDUCTION AND LASER HARDENING

MD™ lends itself to induction or laser hardening of selective surfaces creating a surface hardness of up to 60-63 HRC varying in depth from skin hardness up to 0.125" (3 mm).

EDM (ELECTRIC DISCHARGE MACHINING)

This method of machining is widely used on prehardened MD™. However, precaution should be taken since this method of machining leaves a rehardened surface layer (white layer) on the steel. It is advisable to remove this layer.

HARD-CHROMIUM PLATING

After hard-chromium plating, the tool should be tempered for a minimum of four (4) hours at 350 °F (180 °C) in order to avoid hydrogen embrittlement. In case of replating, the tool should be tempered after it has been acid stripped.



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TEXTURING

MD™ offers excellent response to texturing because of the great homogeneity of its structure.

POLISHING

Successful polishing requires talent, patience and experience. But some known basics are:

- Practice extreme cleanliness between steps to avoid carryover of contaminant particles
- Use high quality consumables
- Over polishing is detrimental to the steel surface leading to so called orange-peeling and pitting

Grit	180	240	320	400	600
µm	80	60	35	20	8

When the requirements for finish are particularly high (>600 grit), it is recommended to use grade **MLQ™** or **MLQ™Xtra**.

SIZE MD™ REGULAR AND HIGH HARD

(As forged / approx.)

Max weight	25 000 kg	55 000 lbs
Max section	1.55 m ²	2400 sq in
Max width	2 130 mm	84"
Max thickness	1 245 mm	49"

METALLURGICAL SERVICE

The Metallurgical Laboratory provides standard mechanical properties testing for *Tensile Testing* (ASTM A 370), *Impact Testing* (ASTM E 23), *Hardness Testing* (ASTM E 10, E 18, A 956), *Macroetch Testing* (ASTM E 381), and other metallurgical testing with certification of results where requested.

Metallurgical facilities are made available to customers through your sales representative to assist in analysis of technical issues that may arise during processing or performance of Finkl forgings. Reports and consultation are offered as a service to customers with the aim of improving product performance.