

YSS、SLD、SLD-MAGIC、SGT、YCS、HMD、DAC、DAC-MAGIC、YXR、FDAC、HPM、HPM-MAGIC、CENAI、YXM、HAP 为日立金属的注册商标。

YSS、SLD、SLD-MAGIC、SGT、YCS、HMD、DAC、DAC-MAGIC、YXR、FDAC、HPM、HPM-MAGIC、CENAI、YXM、HAP は日立金属の登録商標です。

## 日立金属(东莞)特殊钢有限公司

总公司	中国广东省东莞市茶山镇茶山工业园 邮编 523380	电话: (0769)8640-6726 传真: (0769)8640-6716
大连分公司	中国大连市大连保税区III B-1-1-1 光伸模具工业园3#工厂-第2栋 邮编 116600	电话: (0411)8718-1011, 1022 传真: (0411)8718-1033
天津津南区分公司	天津市津南区八里台镇建设四支路11号 邮编 300356	电话: (022)8699-3101 传真: (022)8699-3103
上海分公司	上海市青浦区青浦工业园双盈路69号 邮编 207012	电话: (021)3929-2202 传真: (021)3929-2201

## 日立金属株式会社 <http://www.hitachi-metals.co.jp>

本社	〒108-0075 東京都港南一丁目 2番70号(品川シズンテラス)高級金属カンパニー	Tel. (03)6774-3372 Fax. (03)6774-4314
支店		
北日本支店	〒980-0021 宮城県仙台市青葉区 中央二丁目10番30号(仙台明芳ビル)	Tel. (022) 267-0216(代表) Fax. (022) 266-7891
中部東海支店	〒460-0003 愛知県名古屋市中区 錦二丁目13番19号(瀧定ビル)	Tel. (052) 220-7465 Fax. (052) 220-7485
関西支店	〒541-0041 大阪府大阪市中央区 北浜三丁目5番29号(日生淀屋橋ビル)	Tel. (06) 6203-9720 Fax. (06) 6222-3417
中国支店	〒730-0013 広島県広島市南区 八丁楯16番11号(日本生命広島第2ビル)	Tel. (082)221-4486(代表) Fax. (082)221-4499
九州支店	〒812-0013 福岡県福岡市博多区博多駅 東一丁目9番11号(大成博多駅東ビル)	Tel. (092) 432-8604(代表) Fax. (092) 451-8620

### Hitachi Metals America, Ltd.

Head Office	2 Manhattanville Road, Suite 301, Purchase, NY 10577, U.S.A.	Tel. +1-914-694-9200 Fax. +1-914-694-9279
Other Office	Chicago, Detroit, Pittsburgh, Charlotte, San Jose	

### Hitachi Metals Europe GmbH

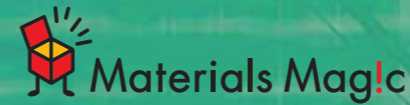
Head Office	Immermannstrasse 14-16, 40210 Duesseldorf, Germany	Tel. +49-211-16009-0 Fax. +49-211-16009-29
Other Office	London, Milano, Paris	

### Hitachi Metals Singapore Pte. Ltd.

	12 Gul Avenue, Singapore 629656	Tel. +65-6861-7711 Fax. +65-6861-1519
--	---------------------------------	--

### Hitachi Metals, Ltd.

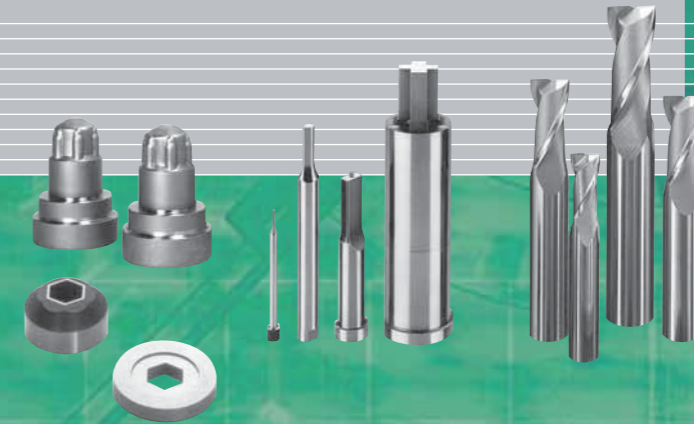
Beijing Liaison Office	Room No.1418, Beijing Fortune Building, 5 Dong San Huan Bei-Lu, Chaoyang District, Beijing, 100004 China	Tel. +86-10-6590-8775 Fax. +86-10-6590-8776
------------------------	---	--



**HITACHI**  
Inspire the Next

## YSS 高速工具钢 YSS HIGH SPEED TOOL STEELS

- 本目录中已记载的特性值为代表性数据，不同于保证值，请注意。
- 在本目录中所记载的事项将有可能无预告进行更改。
- 禁止任意转载本目录记载内容
- 不明点请致电本公司特殊钢担当
- 本カタログに記載の特性値は代表的データであり、保証値とは異なりますので、ご注意ください。
- 本カタログに記載の事項は余告なく変更することがございます。
- 本カタログ記載内容の無断転載を禁じます。
- ご不明な点は左記最寄りの弊社特殊鋼担当までご相談ください。



本目录记载地址、联系人为2016年11月现状，如有电话或传真不通的情况，请用以下联系方式进行联系。

本カタログ記載の住所、連絡先は2016年11月現在のものです。変更になる場合がありますので、電話がフクシミリつけない場合は、あしずか下記までご連絡をお願いいたします。

日立金属(东莞)特殊钢有限公司 技术部  
Tel. +86-769-8640-6726  
Fax. +86-769-8640-6716

**日立金属(东莞)特殊钢有限公司**  
Hitachi Metals (Dong Guan) Special Steel, Ltd.

(mass%)

	钢种 Grade	JIS G4403 (2006)类似 JIS equivalent	AISI/ASTM	C	Cr	W	Mo	V	Co								
			W.Nr														
			NIN/ISO														
传统 高速 钢 Conventional High speed tool steels	Mo系	YXM1	SKH51	M2	0.80~0.90	3.80~4.50	6.00~7.00	4.80~5.80	1.80~2.30	-							
			1.3343														
			HS6-5-2														
	YXM4	SKH55	1.3243	0.85~0.95	3.80~4.50	6.00~7.00	4.80~5.80	1.80~2.30	4.50~5.50								
			HS6-5-2-5														
	YXM27	-	-	1.15~1.25	3.80~4.50	4.80~5.80	5.80~6.80	2.60~2.80	-								
	YXM42	SKH59	M42	1.00~1.10	3.50~4.25	1.25~2.00	9.00~10.00	1.00~1.50	7.75~8.75								
			1.3247														
			HS2-9-1-8														
	YXM60	-	-	1.00~1.10	3.80~4.50	5.00~6.00	6.00~7.00	1.50~1.80	7.50~8.50								
V系	XVC5	SKH57	-	1.20~1.30	3.80~4.50	9.00~11.00	3.00~4.00	3.20~3.70	9.50~10.50								
			1.3207														
W系	YHX2	SKH2	T1	0.73~0.83	3.80~4.50	17.00~18.00	-	0.80~1.20	-								
			1.3355														
基质系	YXR3	基质高速	-	0.6	4.3	-	2.9	1.8	-								
			YXR33							基质高速	-	0.5	4.2	1.6	2.0	1.2	1.0以下 or less
			YXR7							基质高速	-	0.8	4.7	1.3	5.5	1.3	-
粉末 高速 钢 P/M High Speed Tool Steels	HAP10	-	-	1.30~1.40	4.50~5.50	2.50~3.50	5.50~6.50	3.60~4.00	-								
	HAP40	SKH40	-	1.27~1.37	3.70~4.70	5.60~6.40	4.60~5.40	2.80~3.30	7.50~8.50								
			HS6-5-3-8														
	HAP50	-	-	1.54~1.64	3.70~4.70	7.50~8.50	5.50~6.50	3.80~4.30	7.50~8.50								
	HAP72	-	-	2.02~2.32	3.70~4.70	9.00~10.00	8.00~8.50	4.80~5.10	9.00~10.00								
HAP5R	-	-	0.9	4.3	2.0	3.0	3.0	-									

※Mo系: Molybdenum High Speed tool Steel、V系: Vanadium High Speed Tool Steel、W系: Tungsten High Speed Tool Steel、  
基质系: Matrix High Speed Tool Steel

# Isotropy



YSS 高速工具钢不仅应用于切削工具，也适用于对耐磨耗性、韧性要求较高的冷作模具。此外，通过粉末冶金法，使其组织均一化、细微化，拥有以往未有的高合金成分，具有优越的耐磨耗性、韧性。

YSS High Speed Tool Steels are used not only for cutting tools but also Various forming tools which require higher wear resistance and toughness. Along with conventional type steels, there are some grades made by powder metallurgy process(HAP series) that has superb wear resistance and toughness because of higher alloy content and uniform fine microstructure.



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。

<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.

钢种 Grade	特点	Features
YXM1	韧性优越的Mo系标准型高速工具钢	Standard Molybdenum high speed steel with superior toughness
YXM4	耐热性优越的Mo-Co系高速工具钢	Standard Cobalt alloyed Molybdenum high speed steel with superior heat resistance
YXM27	耐磨耗性、磨削加工性兼备的高速工具钢	High Vanadium high speed steel with good wear resistance and grindability
YXM42	适用于硬质材料加工的高速工具钢	Super-hard high speed steel suitable for cutting for hard materials
YXM60	耐久性、韧性、磨削加工性优越的高性能高速工具钢	High-performance high speed steel with superior durability, toughness and grindability
XVC5	耐磨、耐热性优越的高C高V-Co系高速工具钢	High performance Cobalt alloyed Vanadium high speed steel with wear/heat resistance
YHX2	W系标准型高速工具钢	Standard Tungsten high speed steel
YXR3	用于高韧性要求的模具(56 ~ 61HRC)	Matrix high speed steel for forging tools with superior toughness
YXR33	用于高韧性要求的模具(54 ~ 59HRC)	Matrix high speed steel for forging tools with most superior toughness
YXR7	用于高强度、高韧性要求的模具(62 ~ 65HRC)	Matrix high speed steel for forging tools with superior strength/toughness
HAP10	具有优越的高韧性、耐崩缺性	Superior toughness effective to avoid chipping
HAP40	硬度、韧性、耐磨耗性兼备的通用钢种	Most standard grade with good balance of hardness toughness and wear resistance
HAP50	可获得高硬度，耐热性、耐磨耗性优越	Higher hardness, good heat and wear resistance
HAP72	可获得70HRC的高硬度，拥有优越的耐热性、耐磨耗性	Good heat wear resistance and highest obtainable hardness of 70HRC
HAP5R	塑性加工用粉末高速钢，高韧性	Toughest P/M high speed steel

## YSS 高速工具钢的特点

- 1、韧性高，可避免切削加工中发生崩缺
- 2、耐磨耗性高，切削性良好
- 3、热处理特性稳定
- 4、碳化物均一化、细微化分布，品质稳定
- 5、晶粒均一化、细微化分布，机械特性良好
- 6、夹杂物、气体元素成分降低，钢材纯净度提高

## Outstanding features:

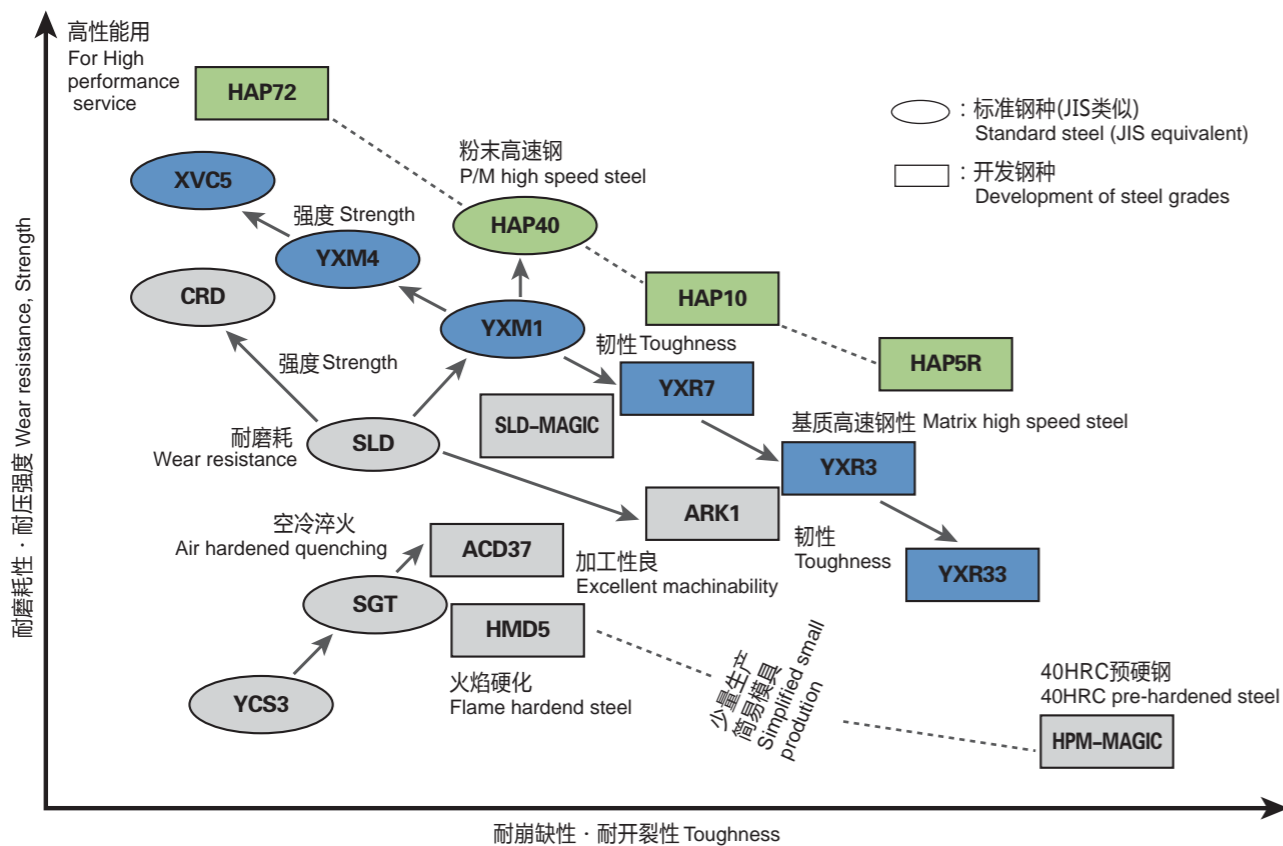
- 1.High toughness
- 2.High wear resistance
- 3.Stablized heat treatment property
- 4.Stable performance due to uniform and fine carbide distrblution
- 5.Good mechanical properties coming from fine and uniform grain size
- 6.High purity with least inclusions and gases



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。

<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.

## ◆各钢种特性关系图 Characteristics of steels



## ◆特性比较表

钢种 Grade	高温强度 Strength at elevated temperature	热处理硬度 Quench and treatment hardness	耐磨耗性 Wear resistance	加工性 Machinability	韧性 Toughness
YXM1	A	C	C	C	B
YXM4	A	C	B	C	B
YXM27	B	C	B	C	B
YXM42	A	B	A	B	C
YXM60	A	B	A	B	C
XVC5	A	C	A	D	D
YHX2	A	C	C	B	C
YXR3	D	D	D	A	A
YXR33	C	D	D	A	A
YXR7	D	C	C	C	B
HAP10	D	C	A	B	B
HAP40	B	B	A	C	B
HAP50	B	B	A	B	B
HAP72	B	A	A	D	D
HAP5R	D	D	C	B	A

優A→良B→品C→可D→劣E  
Excellent "A" → Ordinary "C" → Poor "E"

## ◆耐磨耗性(大越式磨耗)

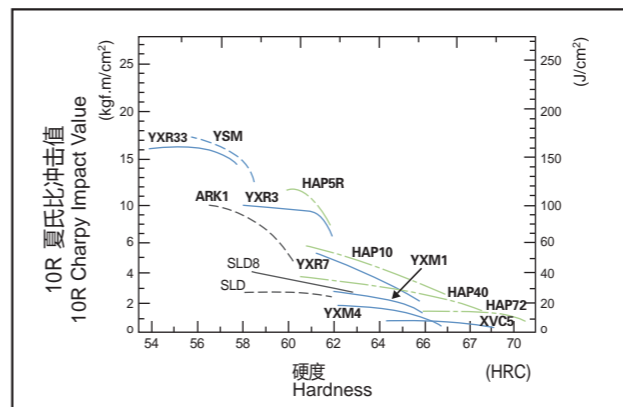
Wear resistance(Ogoshi method)

钢种 Grade	硬度(HRC) Hardness	相对磨耗量 Index of Specific abrasion volume
YXM1	65.5	0.5
YXM4	65.0	0.5
YXM27	65.0	0.5
XVC5	67.0	0.5
YXR33	58.0	0.8
YXR3	59.0	0.8
YXR7	65.0	0.8
HAP5R	60.7	0.8
HAP10	64.0	0.8
HAP40	67.2	0.8
HAP72	70.0	0.8
SKD11	60.5	1.2
SKD61	55.5	1.85

试验条件 Test condition  
对象材: SCM415 摩擦距离: 400m 荷重: 67N(6.8kgf)  
Co-friction material Friction length Load: 67N(6.8kgf)  
摩擦速度: 0.78m/sec Friction Speed

## ◆夏氏比冲击值

Charpy impact value



## ◆耐磨耗性(磨粒磨耗)

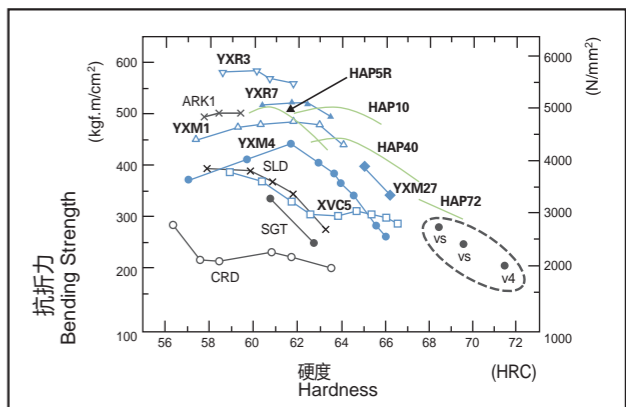
Wear resistance(Abrasive Wear)

钢种 Grade	硬度(HRC) Hardness	相对磨耗量 Index of Specific abrasion volume
YXM1	65	1.0
YXM4	65	1.0
XVC5	67	1.0
YXR3	61	1.0
YXR33	58	2.0
HAP10	65	2.0
HAP72	70	2.0
SKD11	59	3.0

试验条件 Test condition  
研磨砂纸: 500#砂纸 旋转数: 980rpm 距离: 1000mm  
Sandpaper Al2O3 Revolution Friction length  
研磨方式: 干式 荷重: 49N(5kgf)  
Grinding mode: Dry Load: 49N(5kgf)

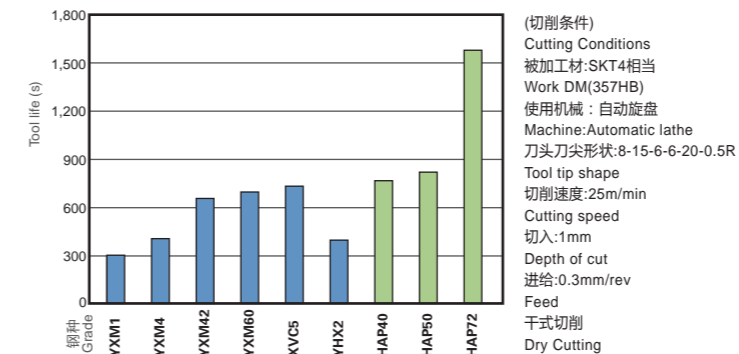
## ◆抗折力

Bending strength



## ◆连续切削试验

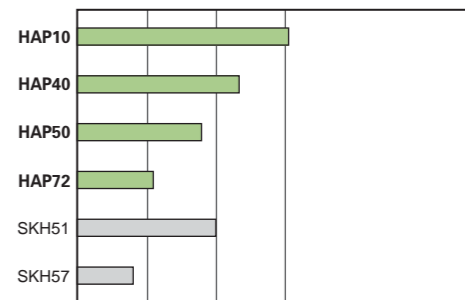
Continuous Cutting test by turning tool



(切削条件)  
Cutting Conditions  
被加工材: SKT4相当  
Work DM(357HB)  
使用机械: 自动旋盘  
Machine: Automatic lathe  
刀头刀尖形状: 8-15-6-6-20-0.5R  
Tool tip shape  
切削速度: 25m/min  
Cutting speed  
切入: 1mm  
Depth of cut  
进给: 0.3mm/rev  
Feed  
干式切削  
Dry Cutting

## ◆磨削加工性

Grindability



被磨削的指数(以SKH51为100)  
Index of grindability(SKH51=100)



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。

本产品册中记载的内容，可能在未通知的情况下进行变更。  
<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。

本产品册中记载的内容，可能在未通知的情况下进行变更。  
<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.

◆ 切削工具 Cutting tools

用途 Application	推荐钢种 Recommended Grade		
	一般用 For general use	难加工材用 For hard material cutting	高速重载加工用 For high speed heavy duty cutting
刀头	XVC5(65-68)、HAP72(69-71)		
钻头	YXM1(63-66)	YXM60、YXM42(66-68) HAP50(66-68)、HAP72(68-70)	HAP40、HAP50(66-68)
丝锥	YXM1(63-66)	YXM27(65-67)、HAP10 HAP40(65-67)、HAP72(68-70)	YXM27(65-67)、HAP40(65-67)
绞刀	YXM1(63-66)	YXM4、YXM60(65-67)	YXM4(64-67)
铣刀	YXM1(63-66)	YXM42、YXM60(65-67) HAP40(66-68)	YXM4、XVC5(65-67) HAP40、HAP50(66-68)
端铣刀	YXM1、YXM4(64-66) YXM60(67-69)	YXM60(67-69)、HAP72(69-71)	XVC5(66-68)、HAP50(66-69) HAP72(69-71)
拉刀	YXM1(63-66)、YXM4(64-67)	YXM60(66-68)、HAP10 HAP40、HAP50(66-68)	YXM27(65-67)、HAP10 HAP40、HAP50(66-68)
滚刀	YXM4、YXM1(64-66)	YXM60(67-69)、HAP50(67-69)	HAP40、HAP50(66-68)
齿轴切削刀	YXM1、YXM4(63-65)	HAP40(65-67)	HAP10、HAP40(64-66)
剃齿刀	YXM1(64-66)	YXM27(65-67) YXM42、YXM60(66-68)	
齿条刀具	YXR7、YXM1(63-66)	YXM4(65-67)	YXM4(65-67)
螺纹刀	YXM1(62-65)	YXM27(65-67)、HAP10(65-67)	YXM4、YXM27(65-67)
钢锯	YXM1(63-66)		
弓锯	YXM1(62-65)	YXM42(66-68)、HAP40(66-68)	YXM42(66-68)、HAP40(66-68)
金属带锯		YXM42(66-68)	HAP50(66-68)
木工用刀具	YXR3(58-61) YXM1、YHX2(62-65)	YXM42(66-68)	YXM4(65-67)

( )标准使用硬度。( )Shows standard employed hardness/HRC.

◆ 冷作加工工具用 Cold working tools

用途 Application	标准 使用硬度 Required hardness range (HRC)	推荐钢种 Recommended Grade				
		一般用 For general use	大量用 For mass production use			
			耐磨耗用 For general resistance	耐冲击用 For impact resistance		
冷作 冲压模具 Die for cold perss	落料模(小物品, 连续模) Blanking die	58~62	SLD、SLD-MAGIC、ARK1	HAP10、HAP40	YXM1、YXR7、HAP5R	
	落料模 (板金) Blanking die	一般薄物用 Sheet use	55~60	火焰硬化钢 HMD5 Flame hardened steel	SLD、SLD-MAGIC	ARK1
		一般厚物用高强度钢 Heavy plate, high-tensile steel	58~62	SLD、SLD-MAGIC、ARK1	HAP10、HAP40	YXM1、YXR7、HAP5R
	弯曲· 拉伸模 Bender swaging dies	一般薄物用 Sheet use	58~62	SLD	SLD-MAGIC	ARK1
一般厚物用高强度钢 Heavy plate, high-tensile steel		58~62	SLD、SLD-MAGIC	XVC5	YXM1	
冷作 锻造模具 Cold working dies	锻造模 Cold working dies	公模 Male Die	58~63	SLD、SLD-MAGIC	YXM1、HAP40	YXR7、YXR3、HAP10
		母模 Female Die	55~60	SLD、SLD-MAGIC、ARK1	YXM1、HAP10	YXR3、YXR7、HAP5R
	冷墩模 Cold heading die	公模 Male Die	58~62	SLD、SLD-MAGIC	HAP40	YXM1、YXR7、YXR3
		母模 Female Die	55~60	YSM	SLD、SLD-MAGIC	YXM1、YXR7、YXR3
搓丝模具 Thread rolling dies		58~64	SLD、SLD-MAGIC	YXR7、YXM1、SLD10		
轧辊 Rolls	冷轧辊 Cold rolling mill rolls	80HS以上	SLD、SLD-MAGIC	YXM1、HAP50、HAP40		
其他 Other	修整模 Triming dies	薄物用(3mm以下) Thin material(under 3mm)	55~60	SLD、SLD-MAGIC、ARK1	YXM1、HAP40	YXR3、YXR7
		厚物用(3mm以上) Thick material(3mm or over)	50~55	DAC、DM		
拉丝模 Drawing dies		57~62	YXM1、CRD	XVC5		
压印模 Cold hobbing dies		55~60	SLD、SLD-MAGIC	YXM1		
机械刀具 Machine cutlery	剪切模具 Shearing blades (Straight blades)	薄板用(3mm以下) Thin material plate (under 3mm)	55~60	SLD、SLD-MAGIC、ARK1	YXM1、YXR7	YXR3
		中板用(3~9mm) Medium material plate (3mm to 9mm)	53~58	SLD、SLD-MAGIC、ARK1		YXR33
		厚板用(10mm以上) Heavy material plate (3mm or over)	48~53	DM		
	圆盘式纵剪切机 Rotary shear, slitters		54~60	SLD、SLD-MAGIC、ARK1	YXM1、HAP40	

( )标准使用硬度。( )Shows standard employed hardness/HRC.



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。  
本产品册中记载的内容，可能在未通知的情况下进行变更。

<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。  
本产品册中记载的内容，可能在未通知的情况下进行变更。

<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.

钢种 Grade	热处理温度(°C) Temperature			硬度 Hardness		
	退火 Annealing	淬火 Quenching	回火 Tempering	出货硬度(HBW) Annealed	淬火回火(HRC) Quenched and tempered	
传统高速钢 Conventional High Speed Steels	YXM1	800~880 徐冷 Slow cooling	(1)1.220~1.240 油(热浴) (2)1.200~1.220 Oil(Hot bath)	550~570 空冷 Air cooling	255 以下 Max	63 以上 Min
	YXM4	800~880 徐冷 Slow cooling	(1)1.230~1.250 油(热浴) (2)1.210~1.230 Oil(Hot bath)	560~580 空冷 Air cooling	277 以下 Max	64 以上 Min
	YXM27	800~880 徐冷 Slow cooling	1.180~1.210 油(热浴) Oil(Hot bath)	550~580 空冷 Air cooling	255 以下 Max	64 以上 Min
	YXM42	820~880 徐冷 Slow cooling	(1)1.190~1.210 油(热浴) (2)1.170~1.190 Oil(Hot bath)	520~590 空冷 Air cooling	285 以下 Max	66 以上 Min
	YXM60	820~880 徐冷 Slow cooling	(1)1.190~1.210 油(热浴) (2)1.170~1.190 Oil(Hot bath)	560~590 空冷 Air cooling	285 以下 Max	66 以上 Min
	XVC5	820~880 徐冷 Slow cooling	(1)1.230~1.250 油(热浴) (2)1.210~1.230 Oil(Hot bath)	550~580 空冷 Air cooling	285 以下 Max	64 以上 Min
	YHX2	820~880 徐冷 Slow cooling	(1)1.270~1.290 油(热浴) (2)1.250~1.270 Oil(Hot bath)	560~580 空冷 Air cooling	248 以下 Max	62 以上 Min
	YXR3	800~880 徐冷 Slow cooling	(1)1.150~1.170 油(热浴) (2)1.130~1.150 Oil(Hot bath)	560~590 空冷 Air cooling	241 以下 Max	57 以上 Min
	YXR33	800~880 徐冷 Slow cooling	1.080~1.140 油(热浴) Oil(Hot bath)	550~600 空冷 Air cooling	241 以下 Max	56 以上 Min
	YXR7	800~880 徐冷 Slow cooling	(1)1.160~1.180 油(热浴) (2)1.130~1.150 Oil(Hot bath)	540~580 空冷 Air cooling	241 以下 Max	62 以上 Min
粉末高速钢 P/M High Speed Tool steels	HAP10	820~880 徐冷 Slow cooling	(1)1.170~1.190 油(热浴) (2)1.050~1.170 Oil(Hot bath)	550~580 空冷 Air cooling	269 以下 Max	(1) 65~66 (2) 58~65
	HAP40	820~880 徐冷 Slow cooling	(1)1.180~1.210 油(热浴) (2)1.120~1.190 Oil(Hot bath)	560~580 空冷 Air cooling	277 以下 Max	(1) 66~68 (2) 64~66
	HAP50	820~880 徐冷 Slow cooling	(1)1.200~1.220 油(热浴) (2)1.180~1.200 Oil(Hot bath)	560~580 空冷 Air cooling	293 以下 Max	(1) 67~69 (2) 66~67
	HAP72	820~880 徐冷 Slow cooling	1.180~1.210 油(热浴) Oil(Hot bath)	560~580 空冷 Air cooling	352 以下 Max	68~70
	HAP5R	820~880 徐冷 Slow cooling	1.120~1.160 油(热浴) Oil(Hot bath)	530~580 空冷 Air cooling	269 以下 Max	58~62

(1) 重视高温强度的情况  
(2) 重视韧性的情况

Remarks (1) Tools required for High strength at elevated temperature  
(2) Tools required for Higher toughness

◆退火

- 1、原材料已实施球状化退火，无须再进行球状化退火。
- 2、重新锻造使用时，锻造后请实施球状化退火。
- 3、为去除冷加工（冷拉、冷轧及其他）或切削加工产生的应力，减轻软化或后续热处理变形而实施去应力退火。

Annealing

- 1.All material is delivered as spheroidized annealed condition.
  - 2.When used after reforging, spheroidized annealing is to be done before hardening.
  - 3.Stress relief annealing is to be done in order to remove stress occurred by cold working such as cold drawing, cold rolling or cutting and machining.
- Heating temperature : 650~750°C (to aim higher temperature when softening required)  
• Holding time :1h/25mm thickness

◆淬火加热保温时间

预热时间 第一段 500~550°C 壁厚每25mm /30分  
第二段 850°C淬火加热保温时间×2  
第三段 1050°C淬火加热保温时间×2

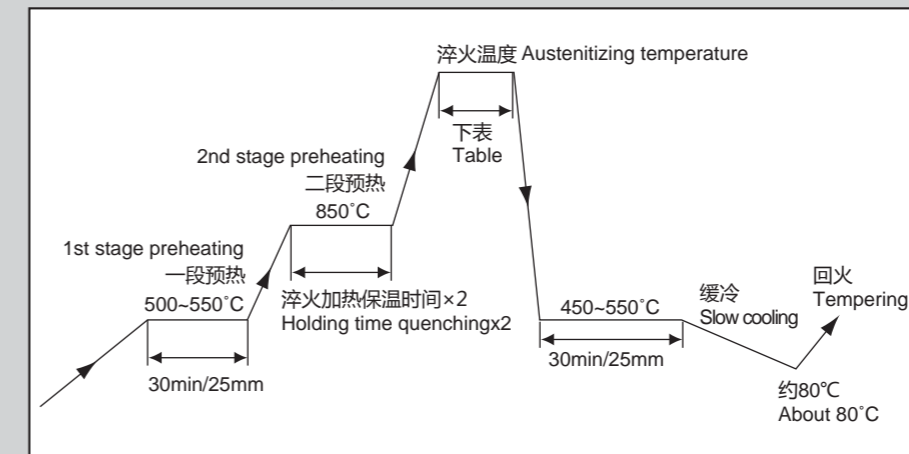
壁厚50mm以下，形状简单，设备上有限制的情况，采用850~900°C×淬火加热保温时间×2  
小物品也有省略第一段预热的情况

Holding time of austenitizing

Preheating time 1st stage: 30 minutes for every 25 mm of the tool at 500-550°C  
2nd stage:(Ta x 2) at 850°C  
3rd stage:(Ta x 2) at 1,050°C

Preheating is (Ta x 2) at 900°C for small thickness (50 mm max.) and simple shape tools, and wherever facilities are limited. The first stage can be omitted for small tools.

普通形状加工 Tools of ordinary shape



注1.形状简单的工具可省略第一段预热，可实施油淬代替盐浴淬火。  
2.形状复杂的工具，在第二段预热与淬火期间希望增加第三段预热(1050°C)

(Remarks) As for simple figure tools, 1st stage preheating can be skipped and oil quenching can be applied instead of hot salt bath quenching. For complex figure tools, 3rd stage preheat (1,050°C) applying is preferable.

◆淬火加热保温时间 Holding time at austenitizing temperature (Ta)

加热炉 Heating surface	时间Time	壁厚(mm) Thickness	5	10	20	30	40	50	60	70	80	90
盐浴炉 Salt bath	保温时间(秒) Holding time (sec)		60	90	160	240	280	350	390	420	440	495
	倍数 Magnification(Holding time/Thickness)		x12	x9	x8	x8	x7	x7	x6.2	x6	x5.5	x5.5

盐浴炉的保温时间=浸泡时间  
(Remarks) Holding time in salt bath = dipping time

◆回火保温时间 Holding time at tempering temperature (Tt)

壁厚(mm) Thickness	≤25	26-35	36-64	65-84	85-124	125-174	175-249	250-349	350-499
回火保温时间 Tempering holding time (hour)	1	1.5	2	3	4	5	6	7	8

回火次数：为提高韧性，至少需进行2次回火；含Co的高速工具钢至少需3次回火。  
(Remarks) Tempering is needed more than 2 times for grades contain no cobalt and needed more than 3 times for grades cobalt alloyed in order to make it tough enough.



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。本产品册中记载的内容，可能在未通知的情况下进行变更。

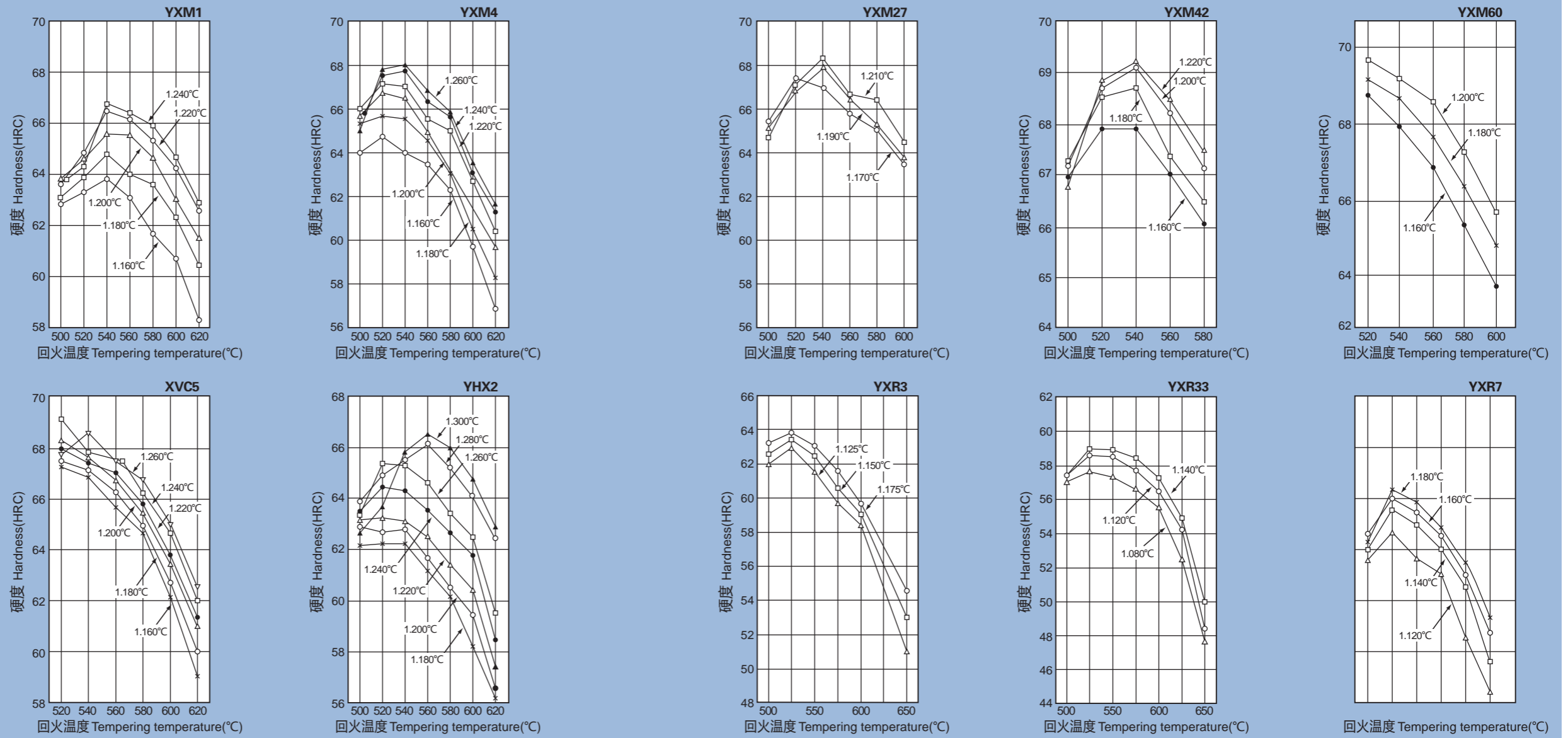
<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.



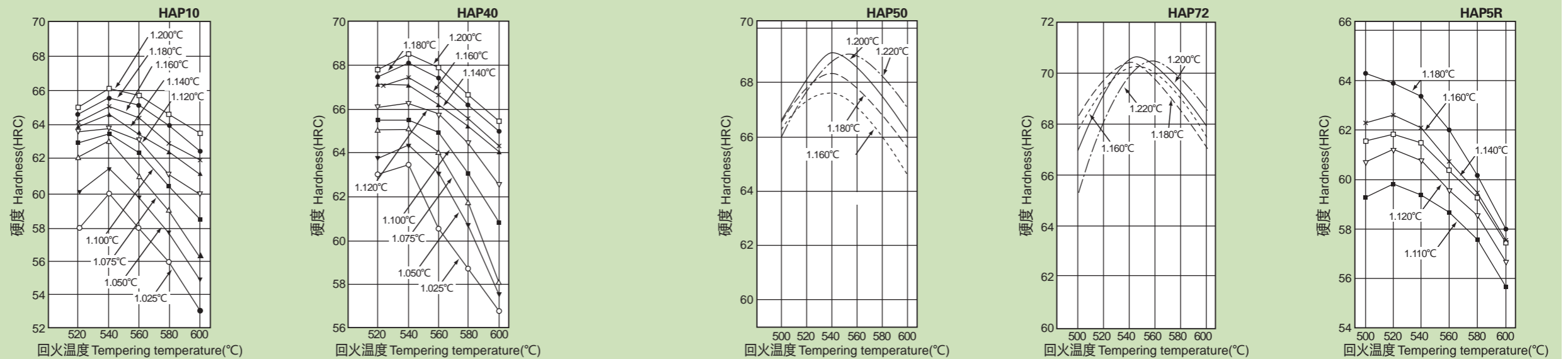
本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。本产品册中记载的内容，可能在未通知的情况下进行变更。

<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.

传统高速钢  
Conventional  
High Speed  
Tool Steels



粉末高速钢  
P/M  
High Speed  
Tool Steels



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。本产品册中记载的内容，可能在未通知的情况下进行变更。

<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.



本产品册中所记载的特性值、图片、图表、排序、评价等均为弊司通过实验得出的代表值，并非产品品质的保证值。本产品册中记载的内容，可能在未通知的情况下进行变更。

<Attention>:The characteristics, photos, charts, ranking and evaluation of this catalog are representative value by our test data, it does not guarantee the quality of the product. this catalog and its contents are subject to change without notice.