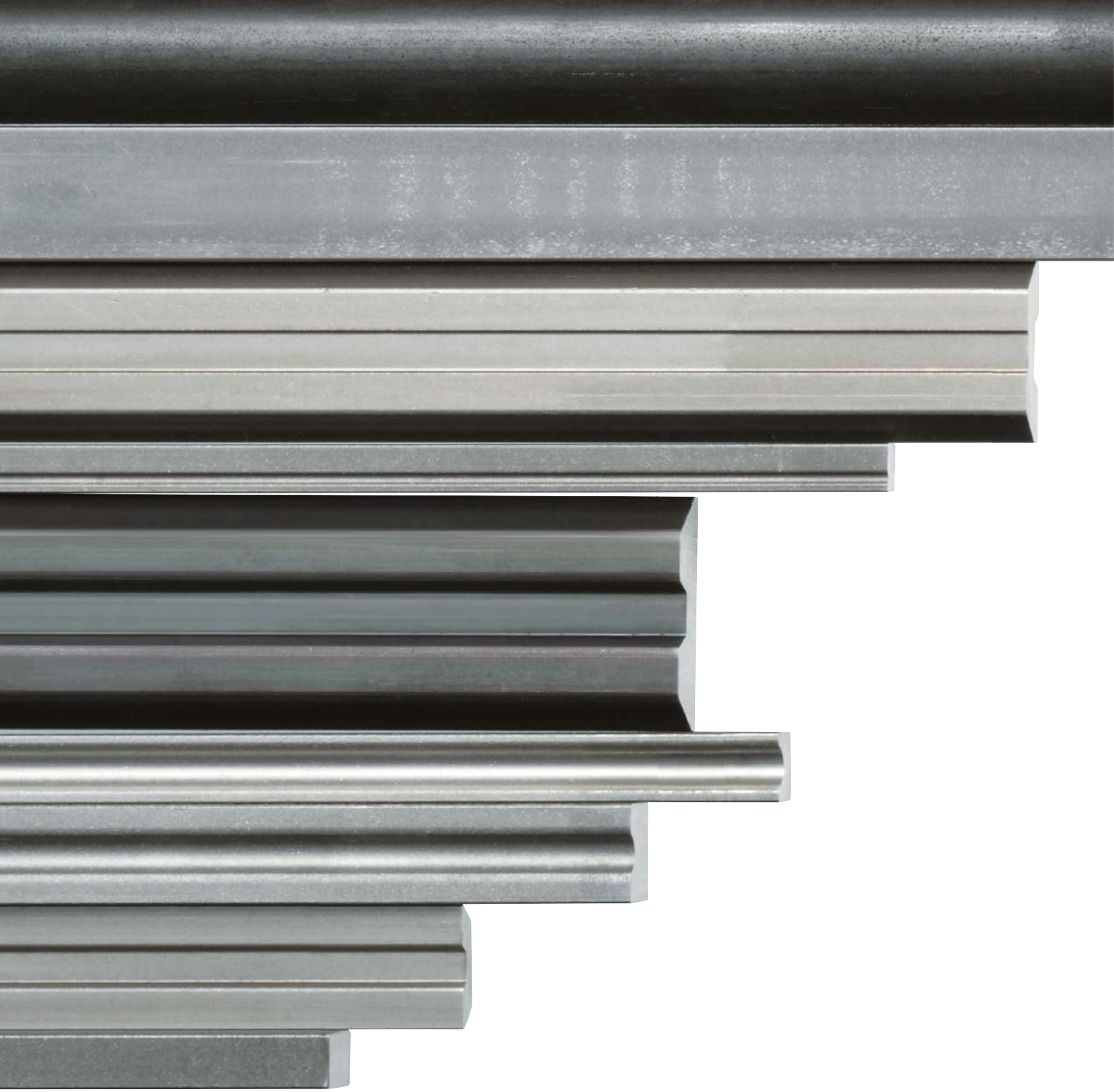
Pre-Harden

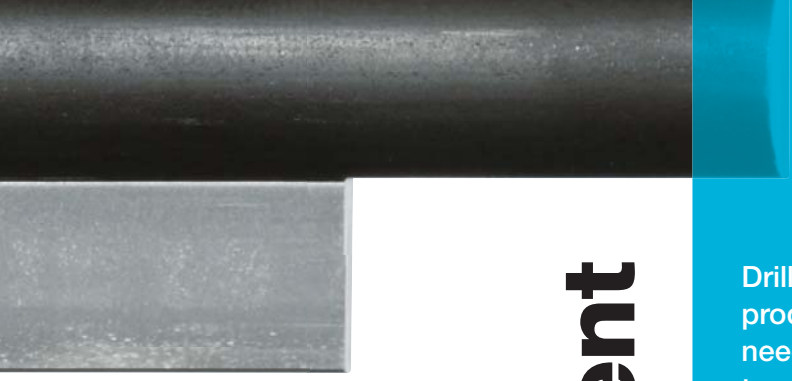
NACHI

High-speed steel that is hardened and ready for your process upon receipt.

Pre-Harden (Hardened Steel Wire Rod)



Pre-H



Eliminate Heat Treatment

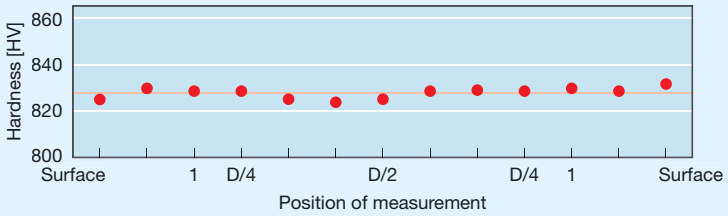
Drills, ejector pins and other steel products which are thin and long, need a lot of work after heat treatment to straighten any deformities created by the heat treatment.
Setting-up and re-straightening the product can add time and cost to the product. For products that require heat treatment at the end of the process, heat treatment defects may be more critical.
The demand for faster speed and longer tool life for machining is requiring more alloy content in materials. The alloy content restricts heat treatment conditions for those materials, making it more difficult for the materials to perform as required.
NACHI's "Pre-Harden" is a high performance steel wire rod which is already quenched and tempered. It was developed using the accumulated technology for high-speed tool steel production at NACHI-FUJIKOSHI since 1928, and it allows us to eliminate any problems in heat treatment.
Since NACHI's "Pre-Harden" production began in 1982, it has become widely appreciated as a basic way for lowering costs, shortening lead time and improving performance of products, such as drills, pins and punches, as well as automotive and machine parts which are made from heat treated steel wire.

Consistent Heat Treatment Quality

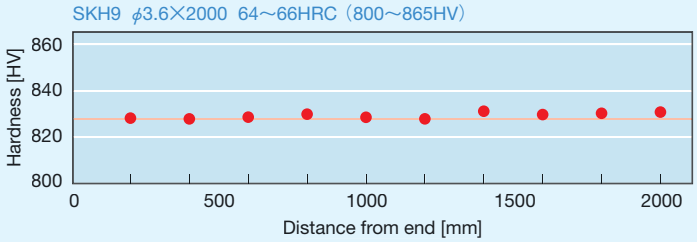
Consistent hardness

Precise temperature control and consecutive heat treating minimize the hardness difference between the interior and exterior and also keeps hardness uniform over the length of the material.

Cross section SKH9 ϕ7.0×2000 64~66HRC (800~865HV)



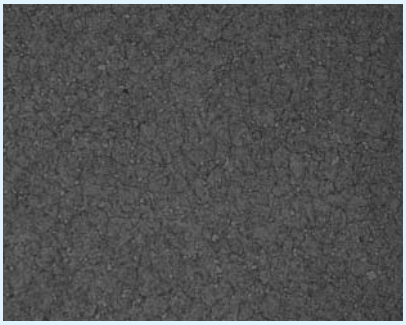
Lengthwise SKH9 ϕ3.6×2000 64~66HRC (800~865HV)



Uniform micro-structure

Micro-structure is consistent from the surface layer to the core.


Outer surface


Core

Shorter production time

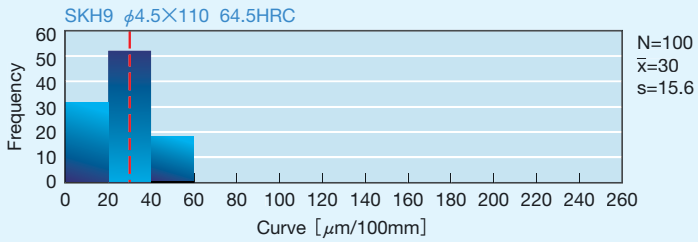
Punches	Conventional process	Cutting	Turning	Heat treatment
	Pre-Harden	Unnecessary	Rough grinding	Unnecessary
Stepped ejector pins	Conventional process	Cutting	Up-setting	Turning
	Pre-Harden	Unnecessary	Up-setting	Rough grinding
Drills	Conventional process	Cutting	Pointing and chamfering	Heat treatment
	Pre-Harden	Unnecessary	Pointing and chamfering	Unnecessary

Superior Heat Treatment Quality

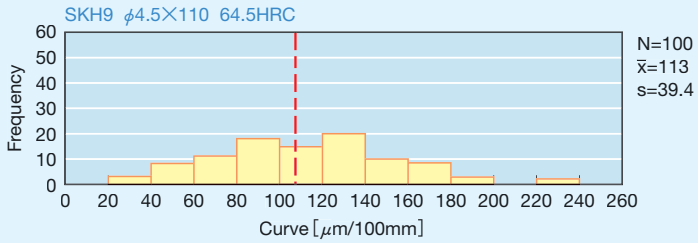
Outstanding straightness

Superior heat treatment achieves "Pre-Harden" highly precise straightness.

Pre-Harden



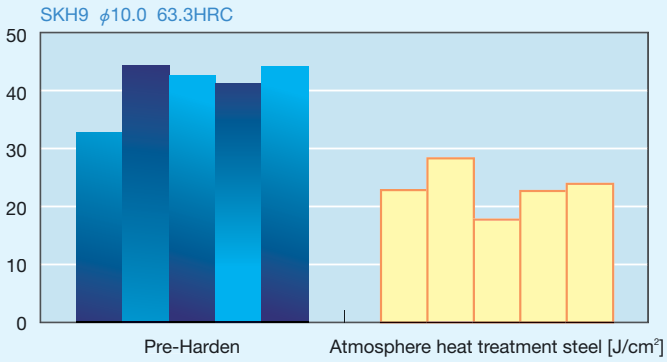
Cutting + vacuum furnace heat treatment



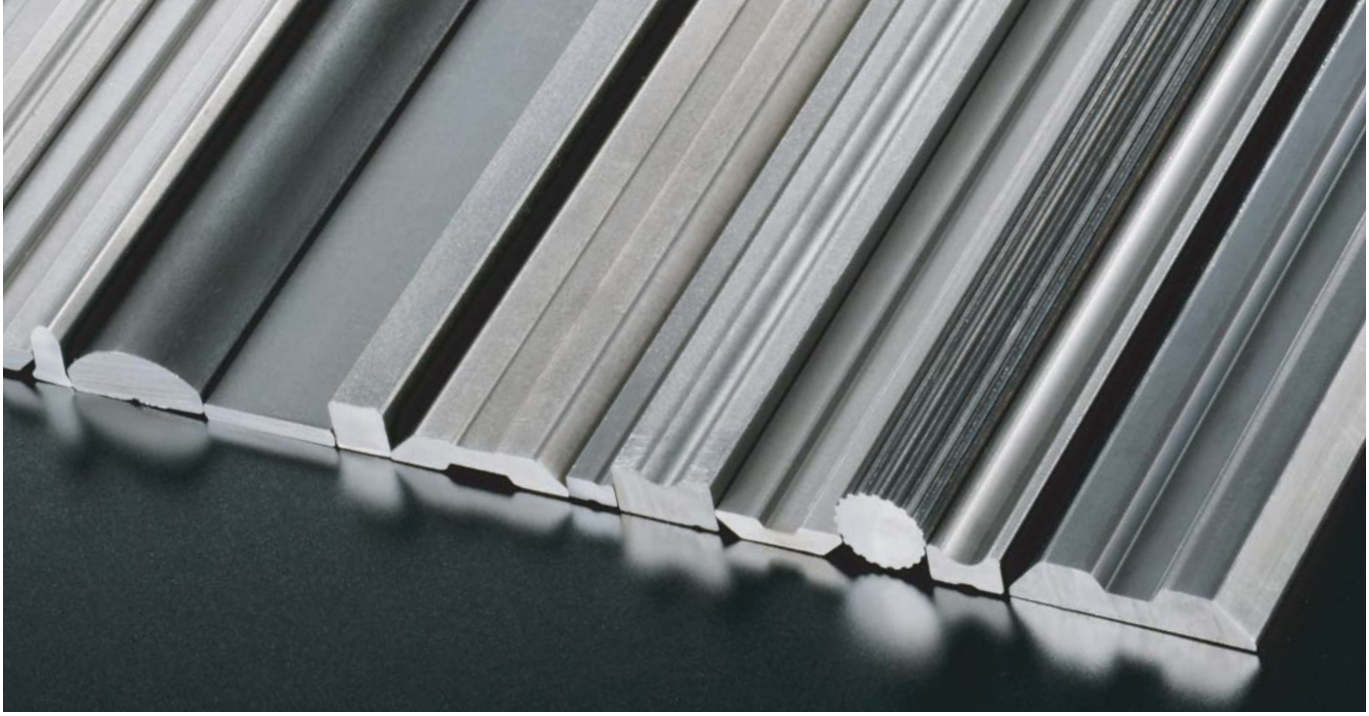
High toughness

Precise control of time and temperature during heat treatment produce uniform crystal particles in the steel micro-structure to make "Pre-Harden" tougher than normal steel produced by atmosphere heat treatment.

Charpy impact value [J/cm²]



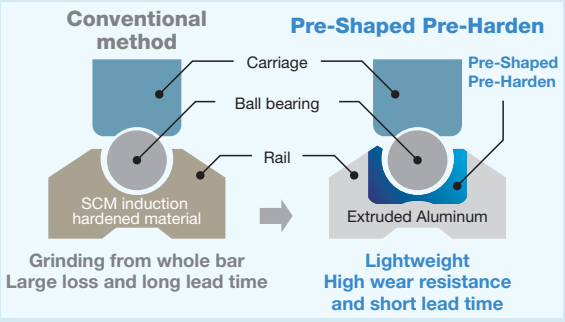
Straightening	Inspection	Finish grinding		Ready to ship
Unnecessary	Unnecessary	Finish grinding		Ready to ship
Heat treatment	Straightening	Inspection	Finish grinding	Ready to ship
Unnecessary	Unnecessary	Unnecessary	Finish grinding	Ready to ship
Straightening	Inspection	Fluting	Finish grinding	Ready to ship
Unnecessary	Unnecessary	Fluting	Finish grinding	Ready to ship



Pre-Shaped Pre-Harden

Reduce costs

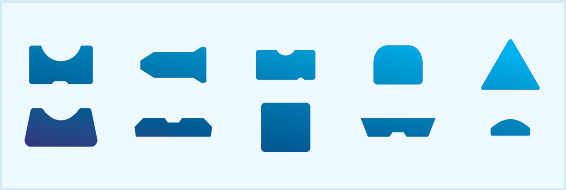
To produce railing parts for machine drives requires a lot of production time from shaping to grinding. "Pre-shape Pre-Harden" is precisely shaped heat treated material that is near the finished shape and size. This can sharply reduce production time and cut costs. Plus life expectancy can be greatly increased by using high-speed steel for parts exposed to wear. Size and weight can be reduced by combination that with extruded aluminum.



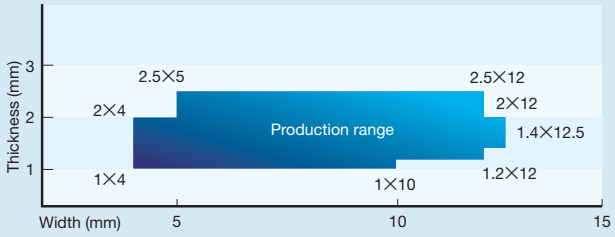
Wide variety of shapes

Pre-Shaped Pre-Harden is available in a wide variety of shapes.

●Typical Pre-Shaped Pre-Harden material shapes



●Pre-Shaped Pre-Harden production range



* Other shapes are available upon request.

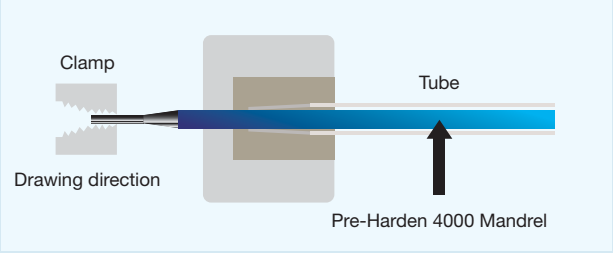
Pre-Harden 4000

Wide selection of lengths

"Pre-Harden 4000", 4000mm length "Pre-Harden" which is made by precise heat treatment, can be used as a mandrel drawing tube to make a tube. Mandrel of "Pre-Harden 4000" has tighter tolerance and achieves longer life than oil tempered steel wire.

Oil tempered wire ➡ Poor wear resistance and toughness ➡ Short tool life

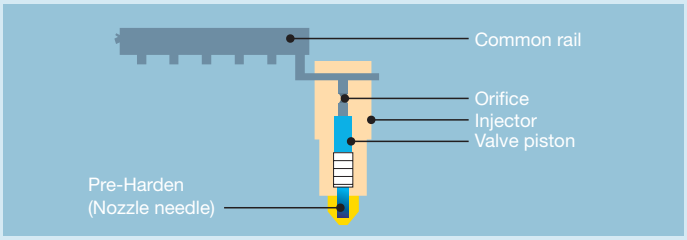
Pre-Harden 4000 ➡ High wear resistance and high toughness ➡ Longer tool life



Applications

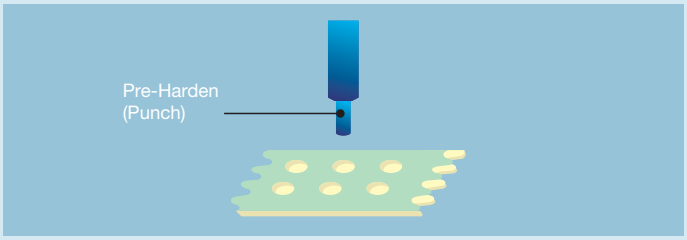
Automotive Parts

Engine components that require straightness and consistent strength.
With "Pre-Harden" only a little work is needed to complete the product.



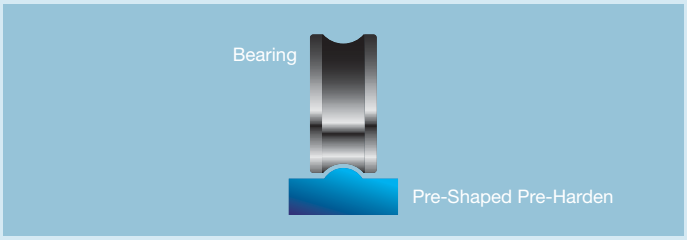
Electronic components

Tools for punching holes in IC boards requires high accuracy and longevity, with "Pre-Harden" only the tip needs to be machined for a highly durable pin



Machinery parts

"Pre-Harden" has been heat treated so it just needs to be installed for extremely straight conveyor rails for bearings.



Medical drills

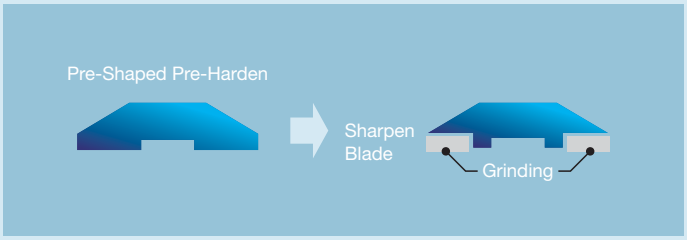
It is possible to get the best conditions for maximum anti-corrosive properties by using, for example, Pre-Harden martensitic stainless steel 420J2.

Immersion test in 5% saline solution for 24 hours

420J2 Pre-Harden micro-structure X500 (5% HCl picric acid)

Cutting Blades

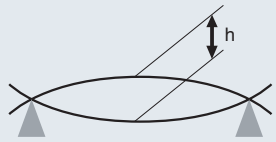
"Pre-Shaped Pre-Harden" can provide near finished shapes even for complicated blade forms. Heat treatment is already finished so the blade only needs to be sharpened.



Production Range

Surface conditions	Diameter (mm)			Standard length (mm)		Cut length (mm)		Surface defect depth (mm)
		Tolerance	Deviation		Tolerance		Tolerance	
Precision Drawn	ϕ0.2 to 0.9	+0/-0.012	<0.004	1,000	+10/-0	20 to 100	+0.5/-0	0
	ϕ1.0 to 1.1	+0/-0.014	<0.005	1,500	+10/-0			
	ϕ1.1 to 2.5	+0/-0.020	<0.006	2,000	+10/-0	101 to 500	+1.0/-0	
	ϕ2.6 to 3.6	+0/-0.025	<0.008					
Ground	ϕ2.0 to 3.0	+0/-0.014	<0.005	2,000	+10/-0	20 to 100	+0.5/-0	0
	ϕ3.1 to 6.0	+0/-0.018	<0.006					
	ϕ6.1 to 10.0	+0/-0.022	<0.007			101 to 500	+1.0/-0	
	ϕ10.1 to 16.0	+0/-0.027	<0.008					
Unground	ϕ2.0 to 3.0	+0.04/-0.02	<0.030	2,000	+10/-0	20 to 100	+0.5/-0	<0.02
	ϕ3.1 to 6.0	+0.06/-0.02	<0.040					<0.05
	ϕ6.1 to 10.0	+0.08/-0.02	<0.050			101 to 500	+1.0/-0	<0.12
	ϕ10.1 to 16.0	+0.10/-0.02	<0.060					<0.15

Straightness



S=h/2

Length (mm)	Straightness (s)
20 to 50	≦0.020
51 to 75	≦0.045
76 to 100	≦0.080
101 to 175	≦0.150
176 to 200	≦0.200
201 to 2000	(L/1000)×1.0 ※L=200～2000

Applicable Steel Type/Heat Treatment Hardness

Steel type	NACHI	Standard		Hardness (HRC)	
		JIS	AISI	For cutting tools	For metal forming
High-speed tool steel	SKH9	SKH51	M2	64-66	58-61
					61-64
	HM35	SKH55	M35	65-67	60-64
	HM33		M33	65-67	60-64
	HM42	SKH59	M42	66-68	60-65
Powdered high-speed tool steel	FAX38	SKH40		66-68	64-68
Martensitic stainless steel	440C	SUS440C	440C	55-60	55-60
	420J2	SUS420J2	420B	51-54	51-54

* Other grades and hardness are available upon request.

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