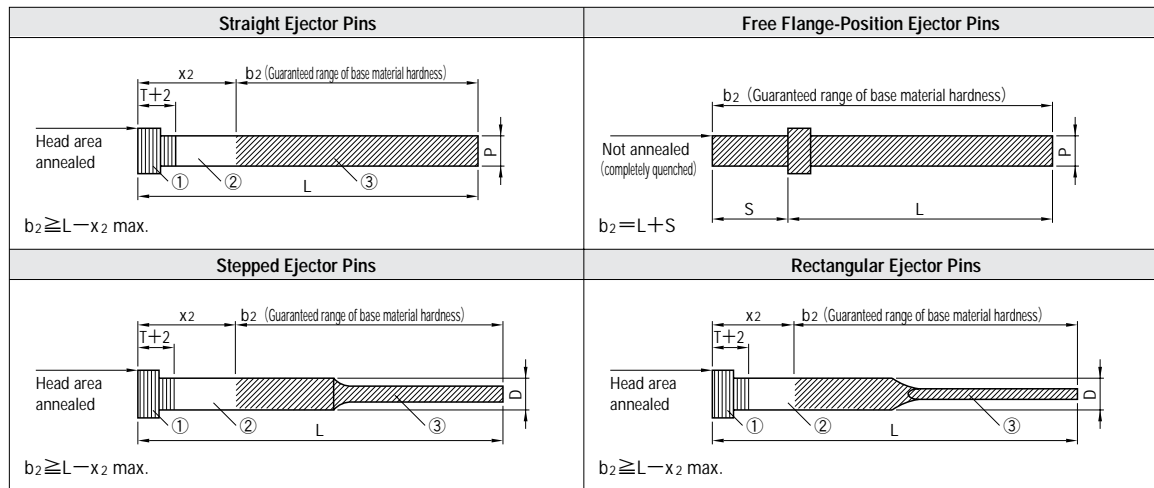


[PRODUCT DATA]
**GUARANTEED RANGE OF HARDNESS OF THE EJECTOR PIN BASE MATERIAL,
 AND GUARANTEED RANGES OF NITRIDING AND SURFACE HARDNESS**

[PRODUCT DATA]
EJECTOR PIN HARDNESS

Guaranteed Range of Hardness of the Ejector Pin Base Material

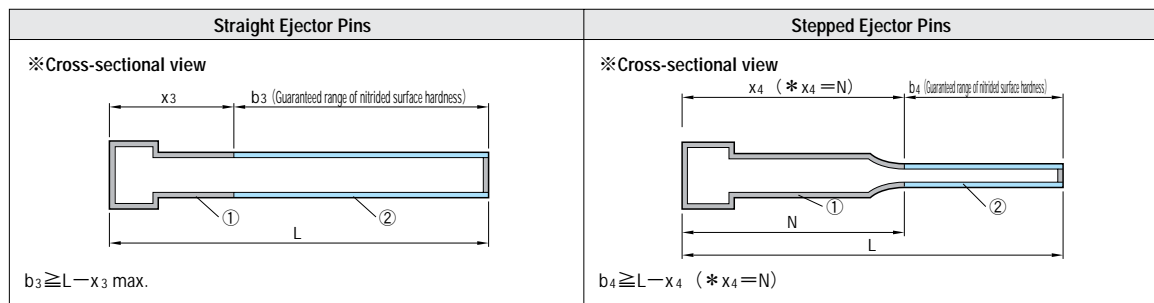


M	Head Thickness (T)	x ₂ max.	Ejector Pin Base Material Hardness		
			①	②	③ (Guaranteed Range of Base Material Hardness)
※SKH51	T4 (EPY-L EPV-L EPVB EPY-G EPV-G EPVB EVSL EVSG EVSF EHYF ERVYF)	0	58~60HRC Overall quenching (no annealing)	58~60HRC Overall quenching (no annealing)	58~60HRC
	T4 (4mm)	30	28~35HRC (reference value)	28~60HRC (reference value)	58~60HRC
	JIS (4.6.8mm)	35			
SUS440C	T4 (4mm)	30	26~35HRC (reference value)	26~60HRC (reference value)	56~60HRC
	JIS (4.6mm)	35			
SKD61	T4 (4mm)	30	28~45HRC (reference value)	28~55HRC (reference value)	50~55HRC
SKD61 + Nitriding	T4 (4mm)	30	28~45HRC (reference value) (excluding nitrided surface)	28~45HRC (reference value) (excluding nitrided surface)	40~45HRC (excluding nitrided surface)
	JIS (4.6.8mm)	35			
SKD61 Prehardened	T10 (10mm)	40	28~43HRC (reference value) (excluding nitrided surface)	28~43HRC (reference value) (excluding nitrided surface)	40~43HRC (excluding nitrided surface)
	JIS (4.6.8mm)	35	28~45HRC (reference value)	28~45HRC (reference value)	40~45HRC

※The following products are applied with overall quenching.
 P≤0.2 for straight ejector pins EPH
 D1.5, D2 of stepped ejector pins EHSE, EHSEL
 D1.5, D2 of rectangular ejector pins ERVB, ERVL, ERVF, ERVJ, ERVSF, ERVSJF, ERV□R, ERV□□R, ERV□□□R, ERV□□□, ERV□□□, ERJF.

• Annealing was performed on the heads of **SKH51**, **SUS440C** and **SKD61** to achieve a level of 30HRC.
 Annealing was performed on heads of **SKD61+nitriding** and **SKD61 prehardened** to achieve a level of 40HRC.

Guaranteed Ranges of Nitriding and Surface Hardness



M	Head Thickness (T)	x ₃ max.	Ejector Pin Surface Hardness	
			①	② (Guaranteed range of nitrided surface hardness)
SKD61 + Nitriding	T4 (4mm)	30	Base Material Hard (without nitrided layer)	900HV~
	JIS (4.6.8mm)	35		
	T10 (10mm)	40		900HV~

●**Nitriding (Nitrided)**

Nitriding is one of the steel surface treatment methods. The steel is placed in a furnace that is then filled with nitrogen gas, and at high temperatures (around 500°C) a hardened layer combined with the nitrogen is formed on the surface of the steel.

●**Nitrided Depth**

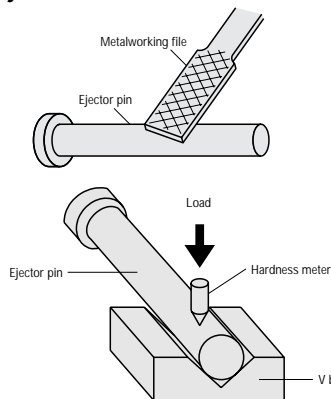
This refers to the depth of the hardened layer formed on the surface of the steel by nitriding treatment. The nitrided depth of MISUMI's **900HV~** plastic mold ejector pins is 0.003~0.008 mm (reference value), and the depth of the hardened layer is 0.1 mm deeper (reference value) than the surface.

The nitrided depth of straight ejector pins is controlled by adjusting nitriding temperature and treatment time in accordance with shaft diameter size.

In the case of stepped ejector pins, nitrided depth is controlled by adjusting nitriding temperature and treatment time in accordance with tip diameter (P) size.

For this reason, the surface hardness of the shaft diameter (D) area is slightly lower at around 500HV (reference value).

■**Ejector Pin Hardness**



Normally, it is quite easy to file down an ejector pin using a regular file (metalworking file). With the **SKD61+Nitriding** ejector pin, however, the nitriding treatment makes it difficult to file down, because the file does not bite as easily into the surface. The nitrided layer is several microns thick, so a little pressure should be applied to the file.
 ※Most regular metalworking files have a hardness of 68 to 70HRC.

How to measure hardness of ejector pins :

- When quick identification of hardness is desired
 → A simple file for hardness checking is convenient.
 Simple file for hardness checking (HDTST) is on Machining Face TOOL BOX.
- When precise hardness measurement is desired
 → Use of a Vickers hardness meter or micro-Vickers hardness meter is recommended.
 Test load is variable for Vickers hardness meter in hardness measurement so that it is suited for hardness checks on small, thin, or round objects such as ejector pins.

Tip

Rockwell hardness meter is generally said to be inappropriate for hardness measurement on small cylindrical object like ejector pin. Rockwell hardness meter (C scale) applies a large load (150kgf) on the measured object by diamond cone indenter when measuring. When measured object is not flat (spherical surface), cone indenter slips and measurement error may occur to yield hardness lower than the actual value. This error needs data correction according to the hardness meter manual. (Thinner the object, larger the error.) In order to minimize the measurement error in Rockwell hardness meter (C scale), a flat surface must be created as the measuring point. Therefore it is not suited for measuring thin plates. (It generally needs thickness of 1.2mm or more for hardness measurement.)

General guide (reference) for measuring cylindrical object (curved surface) with Rockwell hardness meter :

- ~Near φ6mm..... Not suited because error is too large and measuring is difficult.
- φ6.5~9mm..... Though correction in accordance with the manual is necessary, error is large and generally not suited.
- φ10~25mm..... Correction in accordance with the manual is necessary.
- Near φ30mm..... No data correction necessary after measurement

※ Although there are some models in the Rockwell hardness meter which can change scale from C scale (HRC) to A Scale (HRA) or D Scale (HRD), these models are not suited to rounded shapes, because a load applied on A or D scale at the time of the measurement is very high load of 60 or 100kgf.

※ Please refer to manual for the hardness meter for details.

■**MISUMI's Ejector Pin Thermal Refining Hardness and General Thermal Refining Hardness**

M SKH51 (JIS high-speed steel)			M SKD61 (JIS die steel), prehardened, and nitrided		
70HRC	68~70HRC	Metalworking files (reference value)	70HRC	68~70HRC	Metalworking files (reference value)
68HRC			65HRC		
66HRC	64~67HRC	SKH51 Cutting tools (reference value)	60HRC		
64HRC			55HRC		
62HRC	61~64HRC	SKH51 Press die punches (reference value)	50HRC	48~52HRC	SKD61 (Regular type of overall quenching) Examples: plates, etc.
60HRC			45HRC		
58HRC	58~60HRC	SKH51 Plastic mold ejector pins	40HRC	40~45HRC	SKD61 Plastic mold ejector pins

■**Precautions when Using Ejector Pins for Applications other than Plastic Mold Ejection**

MISUMI's ejector pins are thermally refined to a tough hardness that is ideal for use with plastic molds. For this reason, the **SKH51**, **SKD61+Nitriding** and **SKD61 Prehardened** product groups have been given a base-material hardness that is slightly lower than that of products widely being employed for general applications. In addition, the head section of our ejector pins have been annealed, giving them a hardness that is slightly below that of the indicated base-material hardness.

Please refer to the section on "Guaranteed Range of Hardness of the Ejector Pin Base Material" on the previous page.