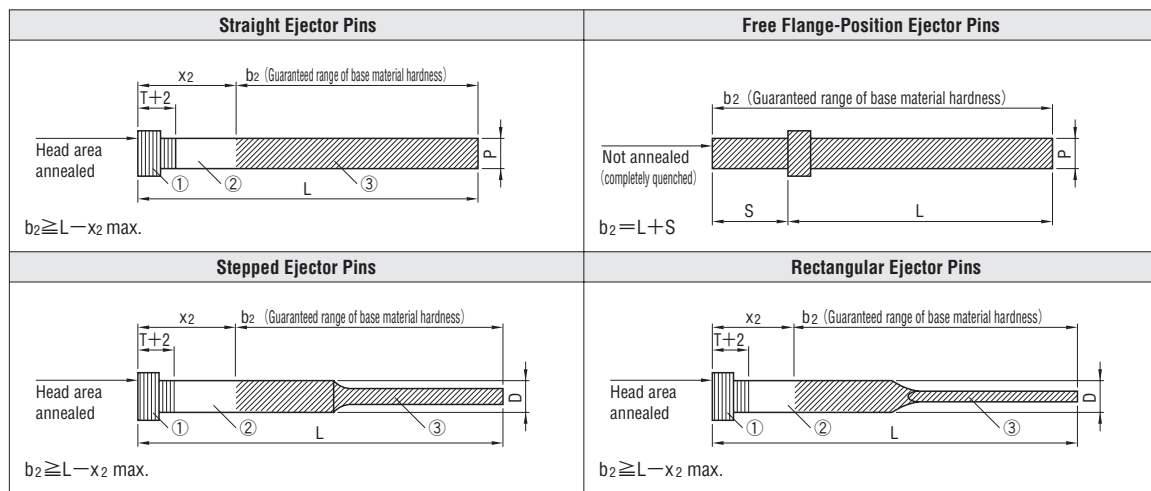


**[PRODUCT DATA]**  
**GUARANTEED RANGE OF HARDNESS OF THE EJECTOR PIN BASE MATERIAL,  
 AND GUARANTEED RANGES OF NITRIDING AND SURFACE HARDNESS**

**[PRODUCT DATA]**  
**EJECTOR PIN HARDNESS**

**Guaranteed Range of Hardness of the Ejector Pin Base Material**

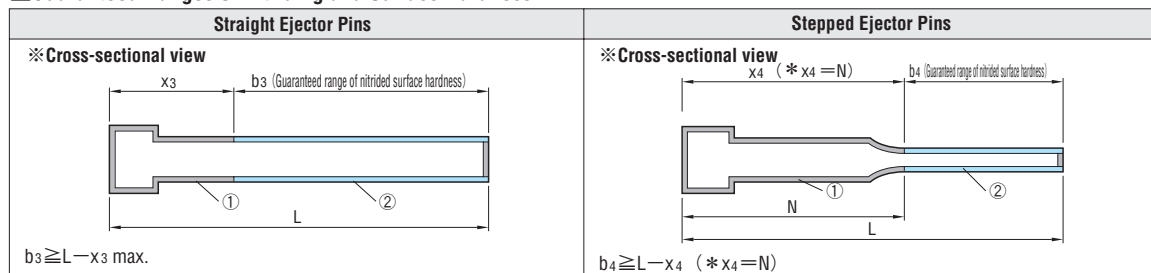


Material	Head Thickness (T)	x <sub>2</sub> max.	Ejector Pin Base Material Hardness		
			①	②	③ (Guaranteed Range of Base Material Hardness)
*SKH51	T4 (EPY-L EPV-L EPVB EPY-G EPV-G EPVB EVSL EVSG EVSF EHYF ERVYF)	0	58~60HRC Overall quenching (no annealing)	58~60HRC Overall quenching (no annealing)	58~60HRC
	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	T0 (Headless)	0	40~45HRC (excluding nitrided surface)	40~45HRC (excluding nitrided surface)	40~45HRC (excluding nitrided surface)
	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			
	T10 (10mm)	40	28~43HRC (reference value) (excluding nitrided surface)	28~43HRC (reference value) (excluding nitrided surface)	40~43HRC (excluding nitrided surface)
SKD61 Prehardened	JIS (4·6·8mm)	35	28~45HRC (reference value)	28~45HRC (reference value)	40~45HRC

\*The following products are applied with overall quenching.  
 $P \leq 0.2$  for straight ejector pins EPH

- 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**



Material	Head Thickness (T)	x <sub>3</sub> max.	Ejector Pin Surface Hardness	
			①	② (Guaranteed range of nitrided surface hardness)
SKD61 + Nitriding	T0 (Headless)	0	Base Material Hard (without nitrided layer)	900HV~ (with nitrided layer)
	T4 (4mm)	30		
	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**

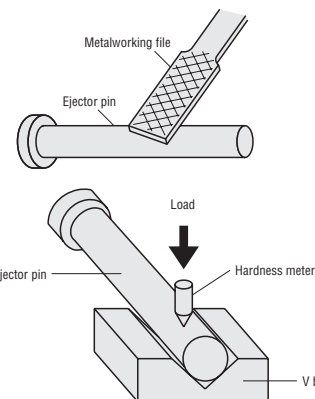
This refers to the depth of the hardened layer formed on the surface of the steel by nitriding treatment. The nitrided depth of MISUMI's 900HV~ plastic mold ejector pin is 0.003~0.008 mm (reference value), and the depth of the hardened layer is 0.1 mm deeper (reference value) than the surface.

The nitrided depth of straight ejector pin 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 (HDTSTS) is on Tool Direct catalog.
- 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  $\phi$  6mm..... Not suited because error is too large and measuring is difficult.
- $\phi$  6.5~9mm..... Though correction in accordance with the manual is necessary, error is large and generally not suited.
- $\phi$  10~25mm..... Correction in accordance with the manual is necessary.
- Near  $\phi$  30mm..... 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**

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

**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.