

[PRODUCT DATA]

GUARANTEED RANGE OF SHAFT-DIAMETER PRECISION FOR EJECTOR PINS

Guaranteed Range of Shaft-Diameter Precision for Ejector Pins

Shaft diameter (P) Guaranteed precision range Length (b ₁)	Straight Ejector Pins	Free Flange-Position Ejector Pins
	<p>$b_1 \geq L - x_1 \text{ max.}$</p>	<p>$b_1 \geq L - T - R - 5$ * R is the size of R below the flange.</p>
Shaft diameter (D) Guaranteed precision range Length (e)	Stepped Ejector Pins	Rectangular Ejector Pins
	<p>$e \geq N - 5 - x_1 \text{ max.} - a - 3$ * 5 : Tolerance of length of N. * a : Length of Step R section. * 3 : Tolerance of Step R section length.</p>	<p>$e \geq N - 5 - x_1 \text{ max.} - a_1 - 3$ * 5 : Tolerance of length of N. * a₁ : Length of Step R section. * 3 : Tolerance of Step R section length.</p>

M	Head thickness (T)	x ₁ max.
SKH51	T4 (EPY-L, EHYF, EVSL, EVSF)	10
	T4 (EPV-L · P < 0.8)	10
	T4 (EPV-L · P ≥ 0.8)	30
	T4 (4mm)	30
SUS440C	T4 (4mm)	30
	JIS (4·6·8mm)	35
SKD61	T4 (4mm)	30
SKD61 + Nitriding	T0 (Headless)	0
	T4 (4mm)	30
	JIS (4·6·8mm)	35
SKD61 Prehardened	T10 (10mm)	40
	JIS (4·6·8mm)	35

Refer to the section below regarding the shaft diameter designation (0.01mm increments) types.

Straight Ejector Pins		Stepped and Rectangular Ejector Pins	
T (P)	p ₁ Precision	T (D)	d ₁ Precision
P ⁰ _{-0.002}	p ₁ = P ⁰ _{-0.1}	D ⁰ _{-0.01}	d ₁ = D ⁰ _{-0.1}
P ⁰ _{-0.005}	p ₁ = P ⁰ _{-0.01}	D ⁰ _{-0.02}	d ₁ = D ⁰ _{-0.1}
P ^{-0.01} _{-0.02}			
P ^{-0.01} _{-0.03}	p ₁ = P ^{-0.01} _{-0.15}		
P ^{-0.01} _{-0.04}			
P ^{-0.01} _{-0.05}			

Refer to **SKH51** for the guaranteed range of precision for **SKH51 + hard chrome plating**.

Straight Ejector Pins—Shaft Diameter Designation (0.01mm Increments) Types—

Misumi's straight ejector pin with relief enables to be designated in 0.01 mm increments of the shaft diameter (P), even with long length L. The guaranteed range of shaft-diameter (P) precision is b₁, and the shaft-diameter area outside of this is relief processed.

Detail of Part A

As shown in the illustration, smooth Step R processing is performed on the junction section between the shaft-diameter (P) area and the relief area.
*Size of Step R: approximately 100R (reference value).

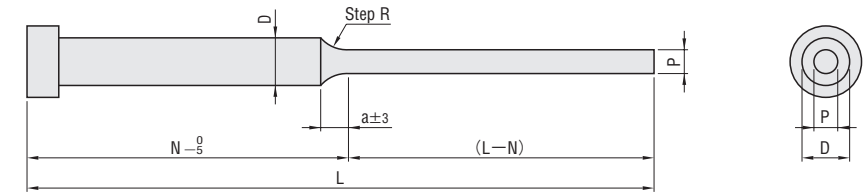
M	Head thickness (T)	T (P)	p ₁ Precision	x ₁ max.								
				L150.00 or less	L150.01 ~200.00	L200.01 ~250.00	L250.01 ~300.00	L300.01 ~350.00	L350.01 ~400.00	L400.01 ~450.00	L450.01 ~500.00	
SKH51	T4 (EPV-G, EPVB · P < 0.800)	P ⁰ _{-0.002}	p ₁ = P ⁰ _{-0.1}	10								
	T4 (EPV-G, EPVB · P ≥ 0.800)			30								
	T4 (EPY-G, EPYB)	P ⁰ _{-0.005}	p ₁ = P ⁰ _{-0.1}	10								
	T4 (4mm)			30	30							
	JIS (4·6·8mm)			35	35	110	160	210				
SUS440C	T4 (4mm)	P ^{-0.01} _{-0.02}	p ₁ = P ^{-0.01} _{-0.1}	30	30							
	JIS (4·6·8mm)			35	35							
SKD61	T4 (4mm)	P ⁰ _{-0.005}	p ₁ = P ⁰ _{-0.1}	30	60	110	160	210	260	310	360	
		P ^{-0.01} _{-0.02}		30	60	110	160	210	260	310	360	
SKD61 + Nitriding	T4 (4mm)	P ^{-0.01} _{-0.02} (P ≤ 12.00)	p ₁ = P ^{-0.01} _{-0.1}	30	30	30	30	210				
	JIS (4·6·8mm)			35	35	35	35					
	T10 (10mm)			40	40	40	40					
SKD61 Prehardened	JIS (4·6·8mm)	P ^{-0.01} _{-0.03} (P > 12.00)		35	35	35	35					

Refer to **SKH51** for the guaranteed range of precision for **SKH51 + hard chrome plating**.

[PRODUCT DATA]

STEP R AND CONCENTRICITY OF STEPPED AND RECTANGULAR EJECTOR PINS

Step R and Concentricity of Stepped Ejector Pins



In order to ensure the effective dimensions of the length (L - N) of tip diameter (P), (L - N) is designed to be a plus tolerance and N is a minus tolerance.

Step R is configured to form a smooth transition between tip diameter (P) and shaft diameter (D).

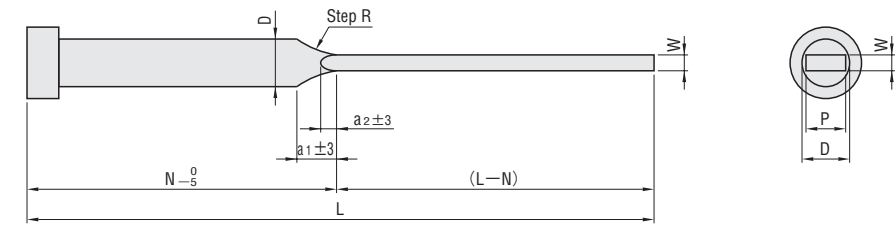
Size of step R: approximately R8 to 12. *

* The size of step R is determined by the size of the grindstone used to process it. This is not a guaranteed value for R.

Formula used for calculating the length (a) of step R: $a = \sqrt{\frac{D-P}{2}} \times (2R - \frac{D-P}{2})$

Concentricity of tip diameter (P) and shaft diameter (D) : 0.2mm or less

Step R and Concentricity of Rectangular Ejector Pins



In order to ensure the effective dimensions of the length (L - N) of the rectangular tip section (P·W), (L - N) is designed to be a plus tolerance and N is a minus tolerance. Step R is configured to form a smooth transition between the rectangular tip section (P·W) and the shaft diameter (D).

Size of step R: approximately R85 to 95. * (N Short type R65~75)

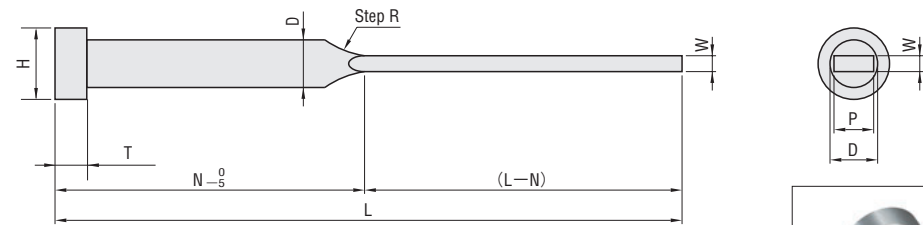
* The size of step R is determined by the size of the grindstone used to process it. This is not a guaranteed value for R.

Formula used for calculating the length (a₁ and a₂) of step R : $a_1 = 5 + \sqrt{\frac{D-W}{2}} \times (2R - \frac{D-W}{2})$
 $a_2 = 5 + \sqrt{\frac{D-P}{2}} \times (2R - \frac{D-P}{2})$

* The above formulas include profile error from rough and finish processing.

Concentricity of the rectangular tip section (P·W) and shaft diameter (D) : 0.2mm or less

Relationship with Step R and Head Part of Stepped Center Pins



Head part (φ H) may contact to grindstone depending on specifications between Step R and P · W, N, φ D or φ H dimensions. (Refer to the right photo)

Following formula is solutions to avoid the contact. This is theoretical value, but not a guaranteed one. (In case of P dimensions direction, please calculate by replacing W by P)

Size of step R : approximately R 85~95. * (R65~75 for N dimension short type)

The size of step R is determined by the size of grindstone used to process it.

This is not a guaranteed value for R.

$N > T + 5 + \sqrt{\left[\frac{H-W}{2} \times \left\{ 2 \times (R-0.2) - \frac{H-W}{2} \right\} - 0.04 \right]}$

