






**Shapes of punches and dies**

Shape	Profile length of tip $\ell$	Diagonal (circumscribing circle) K	Cross section area S
Round 	$\pi P$	P	$\pi P^2/4$
Square 	$2(P+W)$	$\sqrt{P^2+W^2}$	PW
Corner R 	$2\pi R+P+W-4R$	$2R+\sqrt{(P-2R)^2+(W-2R)^2}$	$PW-(4R^2-\pi R^2)$
Oblong 	$\pi W+2(P-W)$	P	$\frac{\pi}{4}W^2+W(P-W)$
Key flat 	$2\sqrt{P^2-W^2}+(\pi P \sin^{-1} W/P)/90$	P	$\pi P^2/4-(\pi P^2-\cos^{-1} W/P)/360+W/2 \sqrt{P^2-W^2}$

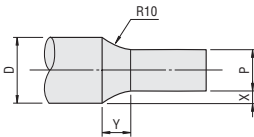
**■ Finding the length of R (Y)**

① Length of punch R (Y)

Find Y from  $X=(D-P)/2$ .

$Y=\sqrt{X(20-X)}$  .....For R10

$Y=\sqrt{X(2R-X)}$  .....For other than R10



**Example 1: Finding Y for SPAS10-60-P6.80**

$$X=(D-P)/2=(10-6.8)/2$$

$$=1.6$$

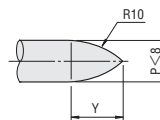
$$Y=\sqrt{1.6(20-1.6)} \approx 5.426$$

② Length of pilot punch R (Y)

$Y=\sqrt{P(10-P/4)}$  .....For R10

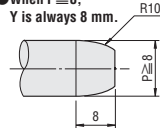
$Y=\sqrt{P(R-P/4)}$  .....For other than R10

● When  $P < 8$



● When  $P \geq 8$ ,

Y is always 8 mm.



**Example 2: Finding Y for SPT5-20-P4.5**

$$Y=\sqrt{P(10-P/4)}$$

$$=\sqrt{4.5(10-4.5/4)} \approx 6.32$$