

[PRODUCTS DATA] SELECTION OF BUTTON DIES

The following is a summary of the procedure for the correct clearances of punches and dies and the outside diameters of button dies for ordinary punching work.

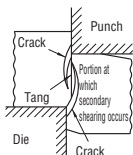
- STEP 1** Select the material code from Table 1.
(Example: SPCC1.6t.....Material code 42)
- STEP 2** Select the hole tolerance code from Table 2.
Example: $\phi 6 \pm 0.15$Hole tolerance code S
- STEP 3** Determine the clearance from Table 3 based on the material type.
Example: $10\% \times 1.6 = 0.16$
- STEP 4** Determine the die hole diameter using the following formula.
Punch end diameter + (2 × Clearance) = Die hole diameter
Example: $6.0 + (2 \times 0.16) = 6.32$
- STEP 5** Determine the outer diameter of the die from Table 4, according to the material code, hole tolerance code, and the die hole diameter.
Example: Material code 42, hole tolerance code S
Die hole diameter $\phi 6.32$Outer diameter $\phi 13$
- STEP 6** Determine button die length L in the design, and then select a headed type or a straight type.
Example: Length 16, headed type
- STEP 7** Place the order using the catalog number.
Example: MHD 13-16-P6.32.....Qty. 10

(Table 1) Material codes

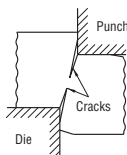
Tensile strength kg/mm ²	Material thickness		
	1 or less	1~2	2~4
20 or less	21	22	24
40 or less	41	42	44
80 or less	81	82	84

(Table 2) Hole tolerance codes

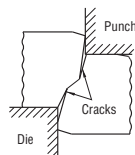
	Precision grade	Standard grade
Code	P	S
Hole tolerance	± 0.1 or less	More than ± 0.1
Hole cross section	Shear surface 50%	Shear surface 30% or less
Application	Shaft bearing Rivet hole	Drill hole Ventilation hole Unfinished tap hole Weight-reduction hole



(a) Clearance too small

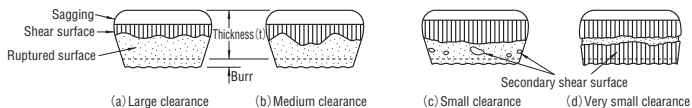


(b) Appropriate clearance



(c) Clearance too large

Differences in crack growth according to the amount of clearance



Effects of clearance on the cut cross-section shape of sheared products

(Table 3) Standard for clearance selection

Material type		Tensile strength kgf/mm ²	Recommended clearance (one side) %	
			Precision grade P	Standard grade S
Aluminum Aluminum alloys	Soft	Less than 10	3	6
	Medium	10~18	4	8
	Hard	20 or more	8	10
Tough pitch copper	Soft	20 or less	6	8
	Hard	28 ϕ	8	10
Brass	Soft	28 ϕ	4	8
	Hard	35 ϕ	8	10
Phosphate bronze	Soft	30 ϕ	6	10
	Hard	50 ϕ	10	15
Steel	Extra soft	28 ϕ	6	10
	Soft	34 ϕ	10	12
	Hard	70 ϕ	12	15
Stainless steel	Soft	60 ϕ	6	12
	Hard	100 ϕ	8	15
Silicon steel		35~39	8	12
Vinyl chloride fiber		4~8	3	5
Phenol laminate		5~10	4	4

(Table 4) Recommended outside diameter for button die

Material code Hole diameter \ Hole tolerance	21		22		24		41		42		44		81		82		84		
	P	S	P	S	P	S	P	S	P	S	P	S	P	S	P	S	P	S	
1.0 ~ 1.99			6	6	—	—	6	6	6	6	—	—	8	8	8	8	—	—	
2.0 ~ 2.99	6	6	8	8	8	8	8	8	8	8	10	10	10	10	10	10	10	10	
3.0 ~ 3.99	8	8			10	10													10
4.0 ~ 4.99	10	10	10	10	13	13	10	10	13	13	13	13	13	13	13	13	13	13	
5.0 ~ 5.99																			13
6.0 ~ 6.99					13	13	13	13	13	13	16	16	16	16	16	16	16	16	
7.0 ~ 7.99	13	13	13	13															13
8.0 ~ 8.99					16	16	16	16	16	16	16	16	16	16	16	16	20	20	
9.0 ~ 9.99	16	16	16	16															16
10.0 ~ 10.99																			
11.0 ~ 11.99																		25	25
12.0 ~ 14.99																			
15.0 ~ 19.99																			
20.0 ~ 25.00																			