

[PRODUCTS DATA] SELECTION OF BUTTON DIES

The following is a summary of the procedures for selecting proper clearances of punches, dies and outside diameters of button dies for ordinary punching processes.

Follow steps from 1 to 7.

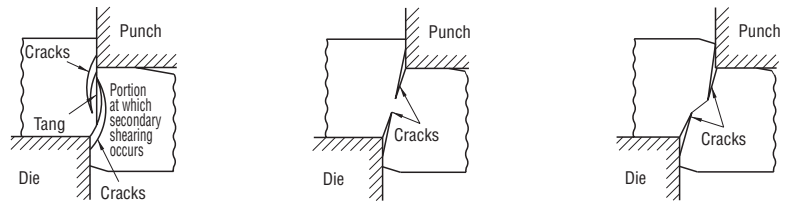
- STEP 1** See Table 1 for the material code.
Example : SPCC 1.6t.....code42
- STEP 2** See Table 2 for hole tolerances.
Example : $\phi 6 \pm 0.15$code S
- STEP 3** Determine clearances based on the material code and the hole tolerances, Table 3.
Example : $10\% \times 1.6 = 0.16$
- STEP 4** Determine the hole diameter of die using the following formula.
Punch diameter + (2 × Clearance) = Die hole diameter
Example : $6.0 + (2 \times 0.16) = 6.32$
- STEP 5** Determine the outside diameter of die according to the tolerance code and the die hole diameter, Table 4.
Example : Material code 42, hole tolerance code S
Die hole diameter $\phi 6.32$outside diameter $\phi 13$
- STEP 6** Determine button die length L based on design and then select head or straight type.
Example : Length of 16 long button die with head
- STEP 7** Place order by catalog number.
Example : MHD 13-16-P6.32.....10pcs.

(Table 1) Material code

Tensile strength kgf/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

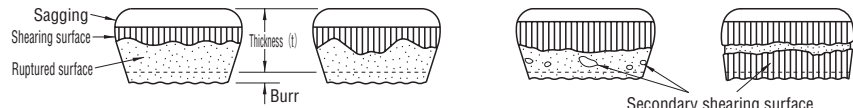
(Table 2) Code for hole tolerance

	Precision class	Standard class
Code	P	S
Hole tolerance	± 0.1 or less	Over ± 0.1
Hole cut surface	Shearing surface 50%	Shearing surface 30% or less
Usage	Shaft holding hole Rivet hole	Drill hole Vent Unfinished tap hole Weight-reduction hole



(a) Clearance is too small. (b) Clearance is appropriate. (c) Clearance is too large.

Difference in growth of cracks according to the amount of clearance



(a) Clearance is large. (b) Clearance is medium. (c) Clearance is small. (d) Clearance is very small.

Effects of clearance on sectional surface of sheared products

(Table 3) Standard for clearance selection

Material	Tensile strength kgf/mm ²	Recommended (on one side) %		
		Precision class P	Standard class S	
Aluminum Aluminum alloy	Soft	Less than 10	3	6
	Medium	10~18	4	8
	Hard	Over 20	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	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 of button die

Material Code	21		22		24		41		42		44		81		82		84	
	Hole diameter	Hole tolerance	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	6	6	—	—	8	8	8	8	—	—
2.0~ 2.99			8	8	8	8	8	8	8	8	10	10	10	10	10	10	10	10
3.0~ 3.99			10	10	10	10	10	10	10	10	10	10	10	10	10	10	13	13
4.0~ 4.99			10	10	10	10	10	10	10	10	13	13	13	13	13	13	16	16
5.0~ 5.99			13	13	13	13	13	13	13	13	13	13	13	13	13	16	16	16
6.0~ 6.99			13	13	13	13	13	13	13	13	16	16	16	16	16	20	20	20
7.0~ 7.99			16	16	16	16	16	16	16	16	16	16	16	16	16	20	20	20
8.0~ 8.99			16	16	16	16	16	16	16	16	16	16	16	16	16	20	20	20
9.0~ 9.99			16	16	16	16	16	16	16	16	16	16	16	16	16	20	20	20
10.0~10.99									20								25	25
11.0~11.99																		
12.0~14.99									25									
15.0~19.99									32									
20.0~25.00									38									