

# [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.

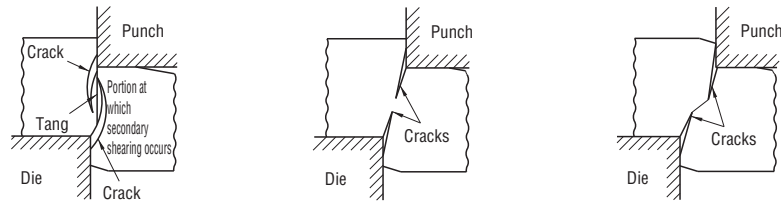
- STEP 1** Select the material code from Table 1.  
(Example: SPCC1.6t.....Material code 42)
- STEP 2** Select the hole tolerance code from Table 2.  
Example:  $\phi 6 \pm 0.15$ .....Hole tolerance code S
- STEP 3** Determine the clearance from Table 3 based on the material type.  
Example:  $10\% \times 1.6 = 0.16$
- 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 kgf/mm <sup>2</sup>	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

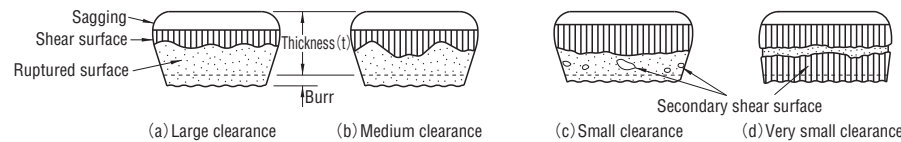
(Table 2) Hole tolerance codes

	Precision grade	Standard grade
Code	P	S
Hole tolerance	$\pm 0.1$ or less	More than $\pm 0.1$
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



(a) Large clearance (b) Medium clearance (c) Small clearance (d) Very small 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 <sup>2</sup>	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 /	8	10
Brass	Soft	28 /	4	8
	Hard	35 /	8	10
Phosphate bronze	Soft	30 /	6	10
	Hard	50 /	10	15
Steel	Extra soft	28 /	6	10
	Soft	34 /	10	12
	Hard	70 /	12	15
Stainless steel	Soft	60 /	6	12
	Hard	100 /	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	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			6	6	8	8	8	8	8	8	10	10	10	10	10	10	10	10	10	10
3.0 ~ 3.99			8	8	8	8	10	10	10	10	10	10	10	10	10	10	13	13	13	13
4.0 ~ 4.99			10	10	10	10	10	10	10	10	10	10	13	13	13	13	13	13	16	16
5.0 ~ 5.99			10	10	10	10	13	13	13	13	13	13	13	13	13	13	16	16	16	16
6.0 ~ 6.99			13	13	13	13	13	13	13	13	13	16	16	16	16	16	16	20	20	20
7.0 ~ 7.99			13	13	13	13	13	13	13	13	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	16	20	20	20	20
9.0 ~ 9.99			16	16	16	16	16	16	16	16	16	16	16	16	16	16	20	20	20	20
10.0 ~ 10.99									20	20	20	20	20	20	20	20	25	25	25	25
11.0 ~ 11.99									25	25	25	25	25	25	25	25	25	25	25	25
12.0 ~ 14.99									32	32	32	32	32	32	32	32	32	32	32	32
15.0 ~ 19.99									38	38	38	38	38	38	38	38	38	38	38	38
20.0 ~ 25.00									38	38	38	38	38	38	38	38	38	38	38	38