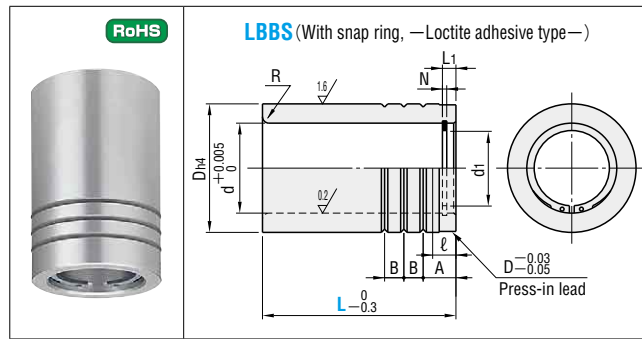


# BALL GUIDE BUSHINGS FOR LOWER DIE SETS

# BALL CAGES FOR DIE SETS



**Order** Catalog No. — L  
LBBS 50 — 120

**Days to Ship** Quotation

**Price** Quotation

SUJ2  58HRC~  
 Snap ring (Spring steel 44~52HRC)

PD Post diameter	d	D <sub>h4</sub>	ℓ	A	B	L <sub>1</sub>	N	R	d <sub>1</sub>	Catalog No.		L	Base unit price 1~9 pieces
										Type	PD		
20	+0.020	26 37	0	4	10	6	4	1.35	2.5	21.4	LBBS	20 50	Quotation
22	+0.015	28 40										22 50 60	
25		31 45										25 60 80	
28	+0.025	36 50	-0.007	5	12	7	4.5	1.65	3	30	LBBS	28 60 80	Quotation
32	+0.020	40 55										32 80 100	
38	+0.030	48 64										38 80 100	
45	+0.025	55 74	-0.008	6	15	10	5	2.2	3.5	46.8	LBBS	45 100 120	Quotation
50	+0.035	60 83										50 100 120	
60	+0.030	70 95										60 100 120	

- Features of ball guide bushings for lower die sets**
- Stable guide ... The distance between punch and die blades and the guide (post and bushing) can be shortened. (A<B)
  - Easy regrinding of punch & die ... Due to the short distance between the punch/die blade and guide post end, it is possible to perform regrinding without detaching the guide post.

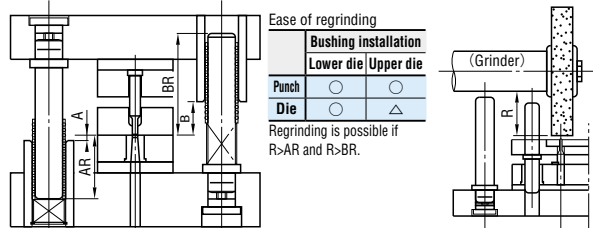


Figure 1: Lower die bushing and normal bushing

Figure 2: Regrinding of punch

**Alterations** Catalog No. — L(LC)  
LBBS 22 — LC45

Alteration	Code	Spec.	1Code
	LC	Full length change L/2 ≤ LC < L 1mm increments	Quotation

Do not use a cooling-fit for the bushings. In the same way as with sub-zero treatment, cooling causes residual austenite to transform into martensite and expand. This expands both the bushing inner and outer diameters, rendering the bushing unusable.

**SWPB** (Special spring for LBBS)

FL (Free length)

Note: SWPB is a spring specially designed for LBBS (bushing reference). For post-reference springs (SWP, SWPL), refer to P.935.

**Order** Catalog No. — FL  
SWPB 25 — 50

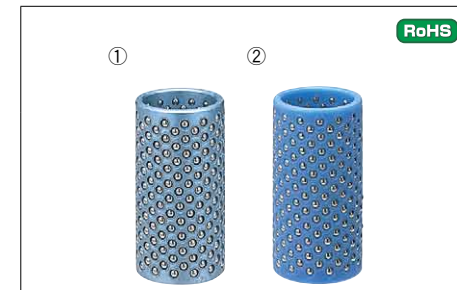
**Days to Ship** Quotation

**Price** Quotation

D	D <sub>1</sub>	d	P	Catalog No.	FL	Base unit price
				Type	5mm increments	1~9 pieces
25	23.2	0.9	12	SWPB	20 25 ~ 40	Quotation
27	25.0	1.0	13		22 25 ~ 50	
30	27.8	1.1	13		25 25 ~ 60	
35	32.6	1.2	15		28 25 ~ 60	
39	36.0	1.5	15		32 35 ~ 70	
47	43.4	1.8	18		38 35 ~ 70	
54	50.0	2.0	20		45 45 ~ 80	
59	54.4	2.3	20		50 45 ~ 80	
69	63.8	2.6	20	60 45 ~ 80		

**Spring solid height**

PD	FL (Free length)														
	25	30	35	40	45	50	55	60	65	70	75	80			
20	3.7	4.0	4.4	4.8	—	—	—	—	—	—	—	—	—	—	—
22	4.1	4.5	4.9	5.3	5.7	6.2	—	—	—	—	—	—	—	—	—
25	4.3	4.7	5.2	5.6	5.9	6.4	6.8	7.3	—	—	—	—	—	—	—
28	4.4	4.8	5.2	5.6	6.0	6.4	6.8	7.2	—	—	—	—	—	—	—
32	—	—	6.4	7.0	7.5	8.0	8.5	9.5	9.4	10.0	—	—	—	—	—
38	—	—	7.0	7.6	8.0	8.6	9.0	9.5	10.0	10.6	—	—	—	—	—
45	—	—	—	—	8.6	9.0	9.6	10.0	10.6	11.0	11.6	12.0	—	—	—
50	—	—	—	—	9.9	10.4	11.0	11.5	12.2	12.6	13.3	13.8	—	—	—
60	—	—	—	—	11.2	11.7	12.5	13.0	13.8	14.3	15.1	15.6	—	—	—

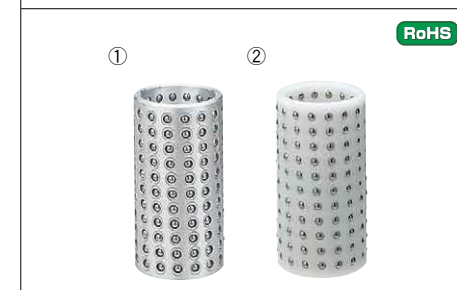


**Order** Catalog No. — L  
MBJ 50 — 110

**Days to Ship** Quotation

**Price** Quotation

A5056 (Aluminum)  
 POM (Polyacetal resin)  
 SUJ2 Sphericity 0.25 μm  
 62~67HRC



**Order** Catalog No. — L(LC)  
MBJH 22 — LC45

**Days to Ship** Quotation

**Price** Quotation

A5056 (Aluminum)  
 POM (Polyacetal resin)  
 SUJ2 Sphericity 0.25 μm  
 62~67HRC

PD Post diameter	Outer diameter φ D	Inner diameter φ D <sub>1</sub>	Ball diameter φ d	Number of balls			Catalog No.		Base unit price 1~9 pieces					
				MBSH MBJH	MBS MBJ	Ratio	Type	PD	L	MBSH	MBJH	MBS	MBJ	
20	25.5	20.5	3	165	96	1.72	MBSH (Aluminum)	20	50					
22	+0.020 +0.015	27.5		22.5	180	112		1.61	22	50				
					228	140		1.63	25	60				
25		30.5	25.5	266	160	1.66	MBSH (Resin)	25	60					
				350	208	1.68		28	75					
28	+0.025 +0.020	35.5	28.5	204	126	1.62	MBSH (Resin)	28	60					
				252	154	1.64		32	75					
32		39.5	32.5	294	176	1.67	MBS (Aluminum)	32	90					
				350	208	1.68		38	75					
38	+0.030 +0.025	47.5	38.5	238	144	1.65	MBS (Resin)	38	90					
				280	176	1.67		45	90					
45		54.5	45.5	320	198	1.70	MBSH (Resin)	45	90					
				400	234	1.71		50	110					
50	+0.035 +0.030	59.5	50.5	450	260	1.73	MBSH (Resin)	50	90					
				400	242	1.74		60	90					
60		69.5	60.5	500	286	1.75	MBSH (Resin)	60	110					

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MBJ 50 — 110

**Days to Ship** Quotation

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A5056 (Aluminum)  
 POM (Polyacetal resin)  
 SUJ2 Sphericity 0.25 μm  
 62~67HRC

**Alterations** Catalog No. — L(LC)  
MBJH 22 — LC45

**Days to Ship** Quotation

**Price** Quotation

Alteration	Code	Spec.	1Code
	LC	Full length change 20 ≤ LC < L 1mm increments Ball holes may remain on the cut surface.	Quotation

MBSH and MBJH are also listed in P.942. (For stripper guides: PD10~25)