

Ball Bearing Components – METRIC –



LEMPICO[®] CO

**SERVICING
INDUSTRY
SINCE 1918**



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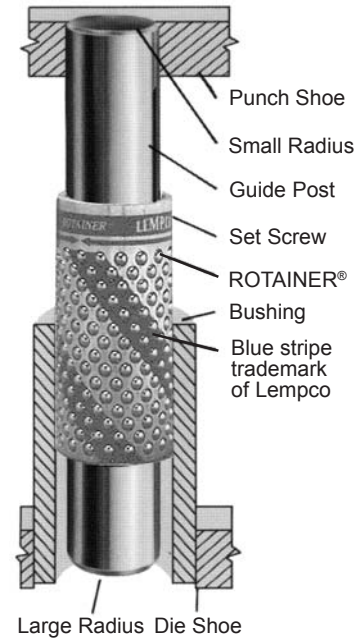
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The Industry Standard, Conformed to Your Needs

LEMPCO customization services will go to virtually any length to satisfy your needs. Now, the full range of answers to your requirements is at your command. It could be a simple modification or something quite exotic. Whatever your need, **LEMPCO** will work closely with you to make sure your specs are met.

The pride we have in our ability to perform (and to provide you with profitable production performance) is stamped on every part we make. The **LEMPCO** stamp means satisfaction in terms of quality, dependability and service since 1918. Other brands may appear the same; for a system to truly perform, look for the **LEMPCO** name.

We pledge that all of our products – innovative or conventional – will be manufactured to the same high quality level throughout the coming years.



LEMPCO customization services will go to virtually any length to satisfy your guidance system needs – any diameter; any material, hardness, or finish; in any component or configuration – anything!

You have a process or problem that standard guidance system solutions can't handle. That's where LEMPCO guidance systems come in.

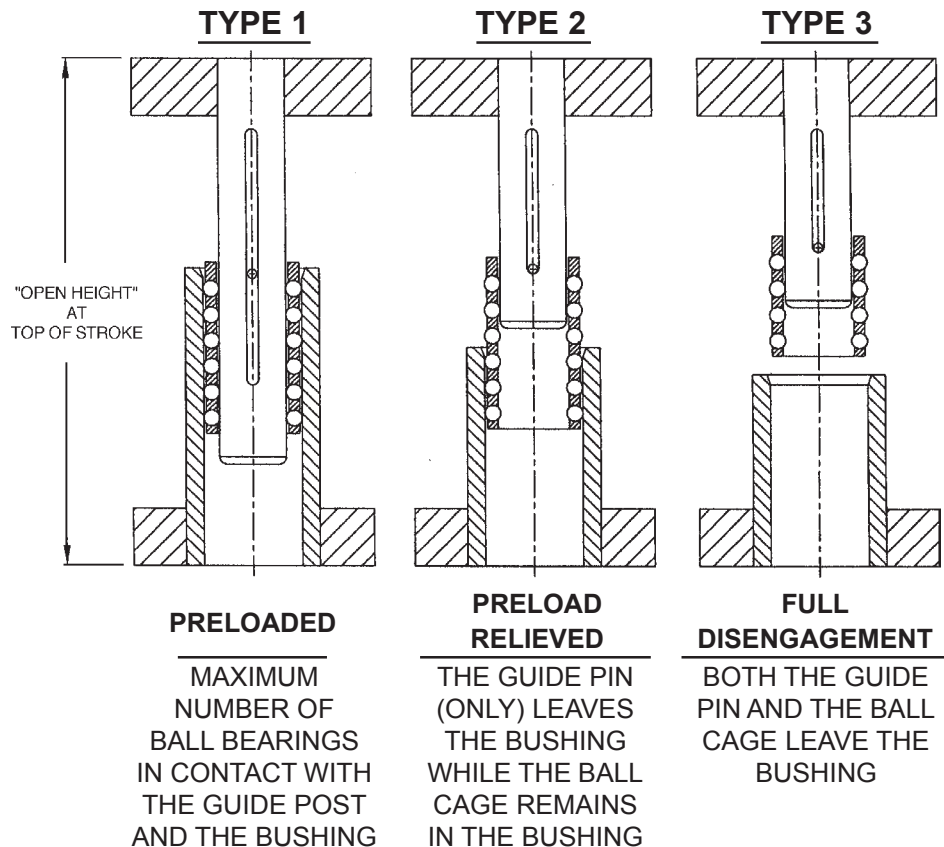
OPERATING CONDITIONS

BALL BEARING ASSEMBLY LUBRICATION RECOMMENDATION

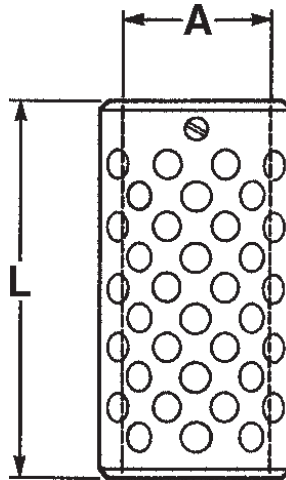
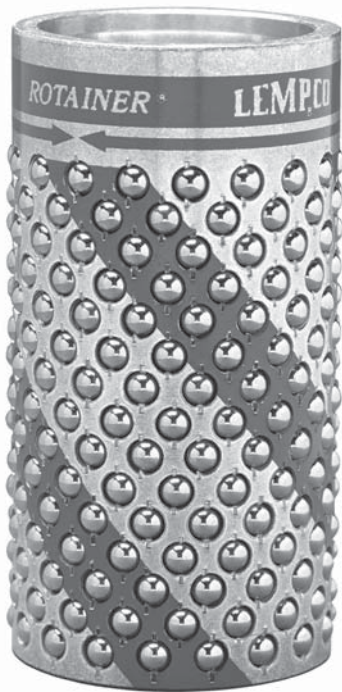
IN THE OPERATION OF THE BALL ASSEMBLY, ADD LUBRICANT ONCE EACH 8-HOUR SHIFT BY SPRAY OR BRUSH APPLICATION.

USE A LIGHTWEIGHT SPINDLE OIL OR AUTOMOTIVE TYPE AUTOMATIC TRANSMISSION FLUID.

CAUTION: NEVER USE GREASE!



For Ball Bearing Applications



Nom. Post Diameter A	Length (mm) L	Catalog Number
19	39	367-19390
	51	367-19510
	65	367-19650
25	39	367-25390
	51	367-25510
	65	367-25650
32	62	367-32580
	75	367-32700
	87	367-32830
40	68	367-40650
	81	367-40770
	100	367-40960
44	75	367-44700
	87	367-44830
	113	367-44108
50	89	367-50830
	108	367-50102
	121	367-50114
63	178	367-63178
80	178	367-80178

Designed to rotate on the post, as well as maintain its vertical motion, LEMPCO's ROTAINER® was developed to greatly reduce the amount of tracking. The disengagement of the guide post from the bushing by 6.35mm at the top of the stroke will allow the ROTAINER® to rotate 360° on the guide post. The ROTAINER®, while still designed to track, (assuring a measurable amount of preload) will enable stampers to achieve high press production by reducing expensive replacement costs.

- Diameters and lengths not listed are available by special order.
- The LAST length for each diameter shown in the table should be used for general die set applications. Other lengths are for limited space and special applications.

Rotainer® Slide Replacement With Screw Assembly		Number of Inserts
Nom. (mm)	Assembly Part No.	
19	899-9406	1
25	899-9408	1
32	899-9410	1
40	899-9412	1
44	899-9414	1
50	899-9416	2
63	899-9420	2
80	899-9424	2

NOTE: Under a preloaded condition, the ROTAINER® will only move vertically.

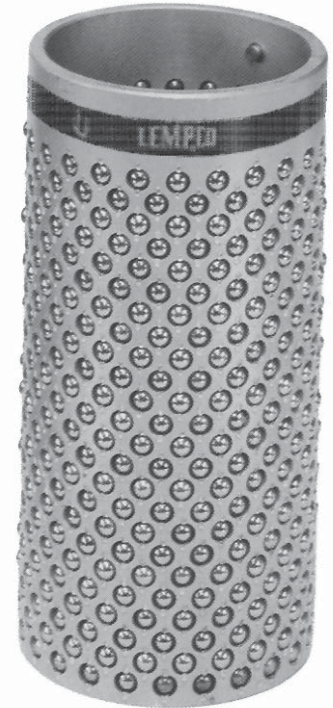
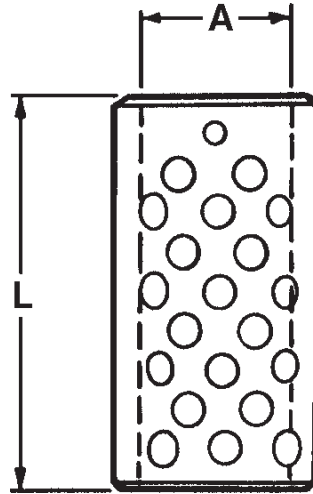


PRECISION BALL BEARING RETAINERS

For Ball Bearing Applications

Nom. Post Diameter (mm) A	Length (mm) L	Catalog Number
19	39	937-19390
	51	937-19510
	65	937-19650
25	39	937-25390
	51	937-25510
	65	937-25650
32	58	937-32580
	70	937-32700
	83	937-32830
40	65	937-40650
	77	937-40770
	96	937-40960
44	70	937-44700
	83	937-44830
	108	937-44108
50	83	937-50830
	102	937-50102
	114	937-50114
63	178	937-63178
80	178	937-80178

- The LAST length for each diameter shown in the table should be used for general die set applications. Other lengths are for limited space and special applications.



The **LEMPCO** Precision Ball Bearing Retainer possesses resistance to normal wear and to lateral motion, is smooth in high speed operation and offers precise die register. It is keyed to the guide post slot with a set screw.

DEMOUNTABLE STEEL GUIDE POST BUSHINGS



For Ball Bearing Applications



LEMPCO Demountable Guide Post Bushings are manufactured from 52100 tool steel and precision machined. See pages 10–11 for mounting instructions.

Diameters and lengths not listed are available by special order.

NOTE: The 966 Series product line is not stocked, but is available as a special order.

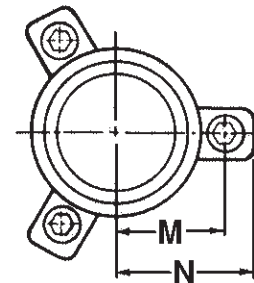
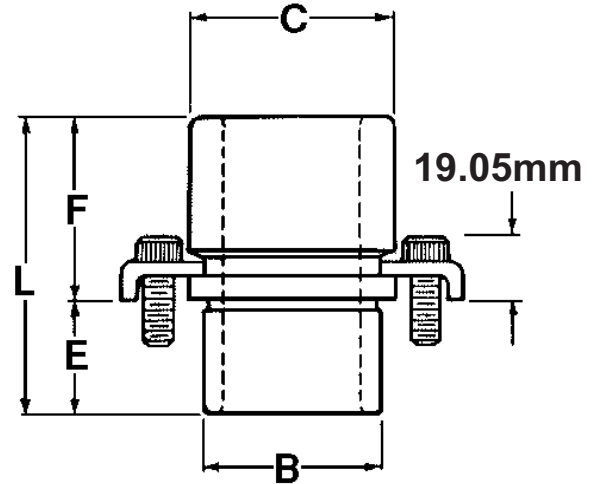
Nom. Post Diameter	B	C	E	F	Radius		L	Catalog Numbers
					M	N		
25	43.956	51	30	25	31	40.5	55	966-25055
				30			60	966-25060
				35			65	966-25065
				40			70	966-25070
				45			75	966-25075
				50			80	966-25080
				55			85	966-25085
				60			90	966-25090
				65			95	966-25095
32	53.959	61	30	35	36.627	47.346	65	966-32065
				40			70	966-32070
				45			75	966-32075
				50			80	966-32080
				55			85	966-32085
				60			90	966-32090
				65			95	966-32095
				75			105	966-32105
				80			110	966-32110
				85			115	966-32115
				100			130	966-32130
				110			140	966-32140
				125			155	966-32155
40	64.960	72	35	40	42.190	52.908	75	966-40075
				45			80	966-40080
				50			85	966-40085
				55			90	966-40090
				60			95	966-40095
				65			100	966-40100
				75			110	966-40110
				80			115	966-40115
				85			120	966-40120
				90			125	966-40125
				100			135	966-40135
				105			140	966-40140
				120			155	966-40155



DEMOUNTABLE STEEL GUIDE POST BUSHINGS

For Ball Bearing Applications

Nom. Post Diameter	B	C	E	F	Radius		L	Catalog Numbers
					M	N		
44	73.959	81	35	40	46.939	57.658	75	966-44075
				55			90	966-44090
				60			95	966-44095
				65			100	966-44100
				75			110	966-44110
				80			115	966-44115
				90			125	966-44125
				100			135	966-44135
				105			140	966-44140
				120			155	966-44155
				130			165	966-44165
				145			180	966-44180
				155			190	966-44190
				50			80.959	91
55	90	966-50090						
60	95	966-50095						
65	100	966-50100						
75	110	966-50110						
80	115	966-50115						
90	125	966-50125						
100	135	966-50135						
105	140	966-50140						
120	155	966-50155						
130	165	966-50165						
145	180	966-50180						
155	190	966-50190						
63	94.960	105	35		90	58.852		
				105	140		966-63140	
				120	155		966-63155	
				130	165		966-63165	
				145	180		966-63180	
				155	190		966-63190	
80	111.960	122	35	90	67.590	78.283	125	966-80125
				105			140	966-80140
				120			155	966-80155
				130			165	966-80165
				145			180	966-80180
				155			190	966-80190

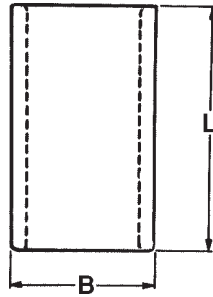


NOTE: The 966 Series product line is not stocked, but is available as a special order.

PRESS FIT STEEL SLEEVE BUSHINGS



For Ball Bearing Applications



LEMPCO's Press Fit Steel Sleeve Bushings are manufactured from 52100 tool steel and precision machined. The I.D. is ground and honed to a super-fine finish to minimize resistance to free action of the retainer/Rotainer® bearings.

See pages 10–11 of this catalog for mounting instructions.

Nom. Post Diameter	B	L	Catalog Numbers
19	36.000	50	967-19500
		55	967-19550
		65	967-19650
		70	967-19700
		75	967-19750
		80	967-19800
		90	967-19900
		95	967-19950
		100	967-19100
		110	967-19110
		125	967-19125
		150	967-19150
25	44.000	75	967-25750
		80	967-25800
		90	967-25900
		95	967-25950
		100	967-25100
		105	967-25105
		115	967-25115
		120	967-25120
		125	967-25125
		140	967-25140
		150	967-25150
		165	967-25165
175	967-25175		
32	54.000	75	967-32750
		80	967-32800
		90	967-32900
		95	967-32950
		100	967-32100
		105	967-32105
		115	967-32115
		125	967-32125
		140	967-32140
		150	967-32150
		165	967-32165
		175	967-32175
200	967-32200		
230	967-32230		

Nom. Post Diameter	B	L	Catalog Numbers
40	65.000	100	967-40100
		105	967-40105
		115	967-40115
		120	967-40120
		125	967-40125
		135	967-40135
		140	967-40140
		150	967-40150
		165	967-40165
		175	967-40175
		190	967-40190
		200	967-40200
		215	967-40215
		230	967-40230
		250	967-40250
		280	967-40280
		300	967-40300
		44	74.000
135	967-44135		
140	967-44140		
150	967-44150		
165	967-44165		
175	967-44175		
190	967-44190		
200	967-44200		
215	967-44215		
230	967-44230		
250	967-44250		
280	967-44280		
50	81.000	300	967-44300
		330	967-44330
		125	967-50125
		135	967-50135
		140	967-50140
		150	967-50150
		165	967-50165
		175	967-50175
		190	967-50190

Nom. Post Diameter	B	L	Catalog Numbers
50	81.000	200	967-50200
		215	967-50215
		230	967-50230
		250	967-50250
		280	967-50280
		300	967-50300
		330	967-50330
		350	967-50350
63	95.000	150	967-63150
		165	967-63165
		175	967-63175
		190	967-63190
		200	967-63200
		215	967-63215
		230	967-63230
		250	967-63250
80	112.000	280	967-63280
		300	967-63300
		330	967-63330
		350	967-63350
		150	967-80150
		165	967-80165
		175	967-80175
		190	967-80190
80	112.000	200	967-80200
		215	967-80215
		230	967-80230
		250	967-80250
		280	967-80280
		300	967-80300
		330	967-80330
		350	967-80350



STRAIGHT GUIDE POSTS

For Ball Bearing Applications

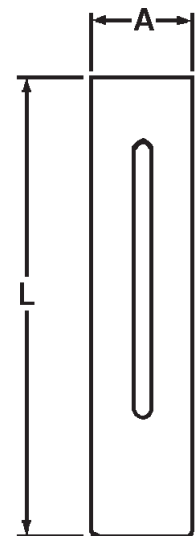
LEMPCO's Straight Guide Posts for ball bearing assemblies are manufactured from 52100 tool steel and precision ground.

See pages 10–11 for mounting instructions.

Post Diameter A	Length L	Catalog Numbers
19	75	957-19750
	90	957-19900
	100	957-19100
	110	957-19110
	115	957-19115
	120	957-19120
	125	957-19125
150	957-19150	
25	100	957-25100
	110	957-25110
	115	957-25115
	120	957-25120
	125	957-25125
	135	957-25135
	140	957-25140
	145	957-25145
	150	957-25150
	165	957-25165
	175	957-25175
	190	957-25190
	200	957-25200
215	957-25215	
230	957-25230	
32	125	957-32125
	135	957-32135
	140	957-32140
	145	957-32145
	150	957-32150
	165	957-32165
	175	957-32175
	190	957-32190
	200	957-32200
	215	957-32215
	230	957-32230
	250	957-32250
	260	957-32260
	280	957-32280
	300	957-32300

Post Diameter A	Length L	Catalog Numbers
40	125	957-40125
	135	957-40135
	140	957-40140
	145	957-40145
	150	957-40150
	165	957-40165
	175	957-40175
	190	957-40190
	200	957-40200
	215	957-40215
	230	957-40230
	240	957-40240
	250	957-40250
	265	957-40265
	280	957-40280
	290	957-40290
	300	957-40300
315	957-40315	
330	957-40330	
360	957-40360	
44	125	957-44125
	135	957-44135
	140	957-44140
	145	957-44145
	150	957-44150
	165	957-44165
	175	957-44175
	190	957-44190
	200	957-44200
	215	957-44215
	230	957-44230
	240	957-44240
	250	957-44250
	265	957-44265
	280	957-44280
290	957-44290	
300	957-44300	
315	957-44315	
330	957-44330	
360	957-44360	

Post Diameter A	Length L	Catalog Numbers
50	150	957-50150
	165	957-50165
	175	957-50175
	190	957-50190
	200	957-50200
	215	957-50215
	230	957-50230
	240	957-50240
	250	957-50250
	265	957-50265
	280	957-50280
	290	957-50290
	300	957-50300
	315	957-50315
	330	957-50330
	360	957-50360
	380	957-50380
400	957-50400	
430	957-50430	
460	957-50460	
63	200	957-63200
	215	957-63215
	230	957-63230
	240	957-63240
	250	957-63250
	265	957-63265
	280	957-63280
	300	957-63300
	315	957-63315
	330	957-63330
	360	957-63360
380	957-63380	
430	957-63430	
500	957-63500	
80	200	957-80200
	215	957-80215
	230	957-80230
	250	957-80250
	280	957-80280
	300	957-80300
	330	957-80330
	360	957-80360
	430	957-80430
	500	957-80500



FLANGED DEMOUNTABLE GUIDE POSTS



For Ball Bearing Applications



The LEMPCO Flanged Demountable Guide Post for ball bearing assemblies is designed for those who prefer the convenience of a removable post to expedite die repairs. The post is tap fitted into the pin plate bore with the flange flush to the ground surface. See pages 10–11 for bore size data.

These Demountable Guide Posts are manufactured from 52100 tool steel.

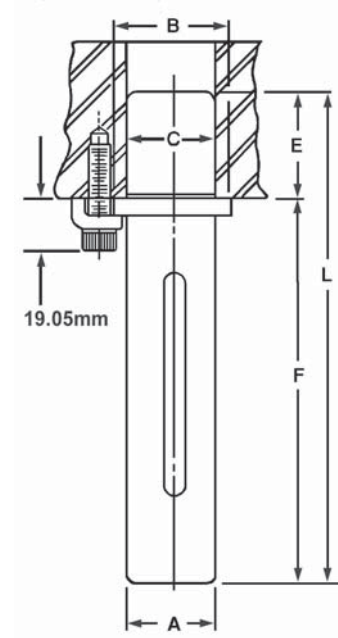
			Nominal Length			Catalog Numbers
A	Flange B	C	E	F	L	
24.953 24.940	33	24.953 24.940	30	60	90	958-25090
				70	100	958-25100
				80	110	958-25110
				85	115	958-25115
				90	120	958-25120
				95	125	958-25125
				105	135	958-25135
				110	140	958-25140
				115	145	958-25145
				120	150	958-25150
				135	165	958-25165
				145	175	958-25175
				160	190	958-25190
				170	200	958-25200
31.953 31.940	40	31.953 31.940	30	185	215	958-25215
				200	230	958-25230
				85	115	958-32115
				90	120	958-32120
				95	125	958-32125
				105	135	958-32135
				110	140	958-32140
				115	145	958-32145
				120	150	958-32150
				135	165	958-32165
				145	175	958-32175
				160	190	958-32190
				170	200	958-32200
				39.952 39.939	48	39.952 39.939
200	230	958-32230				
220	250	958-32250				
250	280	958-32280				
270	300	958-32300				
79	115	958-40115				
84	120	958-40120				
89	125	958-40125				
99	135	958-40135				
104	140	958-40140				
109	145	958-40145				
114	150	958-40150				
129	165	958-40165				
139	175	958-40175				
154	190	958-40190				
164	200	958-40200				
179	215	958-40215				
194	230	958-40230				
204	240	958-40240				
214	250	958-40250				
224	260	958-40260				
244	280	958-40280				
254	290	958-40290				
264	300	958-40300				
279	315	958-40315				
294	330	958-40330				
324	360	958-40360				
43.952 43.939	57	43.952 43.939	43	82	125	958-44125
				92	135	958-44135
				97	140	958-44140
				102	145	958-44145
				107	150	958-44150
				112	155	958-44155
122	165	958-44165				



FLANGED DEMOUNTABLE GUIDE POSTS

For Ball Bearing

Diameter			Nominal Length			Catalog Numbers
Post A	Flange B	C	E	F	L	
43.952 43.939	57	43.952 43.939	43	132	175	958-44175
				147	190	958-44190
				157	200	958-44200
				172	215	958-44215
				187	230	958-44230
				197	240	958-44240
				207	250	958-44250
				217	260	958-44260
				237	280	958-44280
				247	290	958-44290
				257	300	958-44300
				272	315	958-44315
				287	330	958-44330
				317	360	958-44360
				337	380	958-44380
				387	430	958-44430
				49.952 49.939	63	49.952 49.939
96	145	958-50145				
101	150	958-50150				
106	155	958-50155				
116	165	958-50165				
121	170	958-50170				
126	175	958-50175				
131	180	958-50180				
141	190	958-50190				
146	195	958-50195				
151	200	958-50200				
166	215	958-50215				
181	230	958-50230				
191	240	958-50240				
201	250	958-50250				
211	260	958-50260				
231	280	958-50280				
241	290	958-50290				
251	300	958-50300				
266	315	958-50315				
281	330	958-50330				
311	360	958-50360				
331	380	958-50380				
351	400	958-50400				
381	430	958-50430				
411	460	958-50460				
62.952 62.939	76	62.952 62.939	49	151	200	958-63200
				166	215	958-63215
				181	230	958-63230
				201	250	958-63250
				231	280	958-63280
				251	300	958-63300
				281	330	958-63330
				311	360	958-63360
				381	430	958-63430
				451	500	958-63500
79.952 79.939	93	79.952 79.939	62	138	200	958-80200
				153	215	958-80215
				168	230	958-80230
				188	250	958-80250
				218	280	958-80280
				238	300	958-80300
				268	330	958-80330
				298	360	958-80360
				368	430	958-80430
				438	500	958-80500



BALL BEARING ENGINEERING DATA



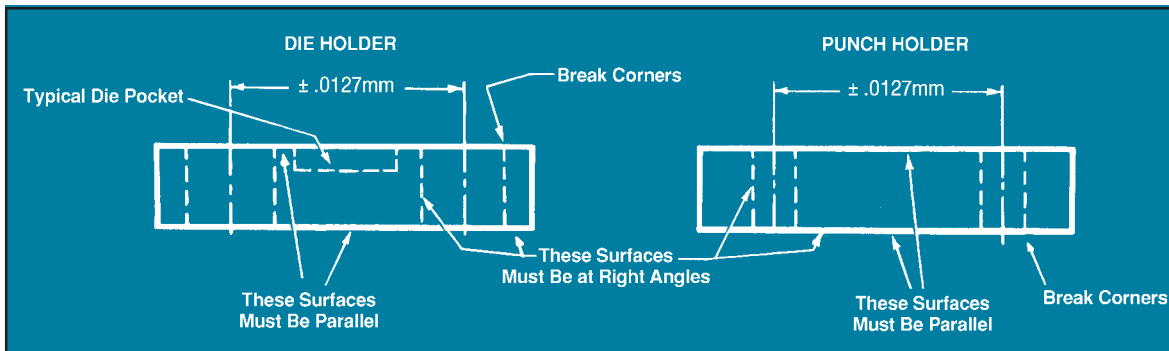
Boring Procedures and Dimensions

Holes for LEMPCO Ball Bearing Guide Posts and Bushings should be jig bored for best results. The punch holder and dieholder should be clamped together and bored in one setup in order to maintain dead center alignment between the upper and lower bores. If it is not possible to bore in this manner, a tolerance of $\pm .0127\text{mm}$ between centers (see illustration) must be held. Bores should be smooth and free from tool marks to provide proper bearing area for the guide post and bushing.

Dieholder bores must be perpendicular to that surface of the dieholder which will back up the die. The bottom surface of the dieholder must be parallel to the die backup surface. The same holds true for the punch holder: the bores must be perpendicular to that surface which will back up the punches, and the top surface parallel to the punch backup surface.

Break the corners of the bored holes to a generous chamfer. On sets with a symmetrical profile one pin and bushing should be offset to prevent accidental reversing of the punch holder during assembly.

All LEMPCO Ball Bearing Guide Posts, Bushings Retainers and Rotainers are completely interchangeable without any necessity whatsoever for select fitting of any kind, and if mounted in accordance with boring and assembly instructions given on this and the following page do not require any grinding, honing, lapping, or any other modifications of any kind. Please note the dimensions given in the following table. Our experience over many years proves that these are optimum dimensions. Variations must be avoided.



BORE CHART BALL BEARING COMPONENTS (METRIC)

Nominal Guide Post Diameter	#957-SERIES STRAIGHT GUIDE PIN	#958-SERIES DEMOUNTABLE GUIDE PIN	#967-SERIES STRAIGHT SLEEVE BUSHING	#966-SERIES DEMOUNTABLE SHOULDER BUSHING
	(PRESS FIT)	(TAP FIT)	(PRESS FIT)	(TAP FIT)
	BORE SIZE	BORE SIZE	BORE SIZE	BORE SIZE
19mm	18.9683 $\begin{matrix} +.000 \\ -.025 \end{matrix}$	N/A	35.9685	N/A $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$
25mm	24.9705 $\begin{matrix} +.000 \\ -.025 \end{matrix}$	24.9633 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	43.9695 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	43.9695 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$
32mm	31.9708 $\begin{matrix} +.000 \\ -.025 \end{matrix}$	31.9632 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	53.9703 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	53.9703 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$
40mm	39.9692 $\begin{matrix} +.000 \\ -.025 \end{matrix}$	39.9616 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	64.9709 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	64.9709 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$
44mm	43.9695 $\begin{matrix} +.000 \\ -.025 \end{matrix}$	43.9623 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	73.9701 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	73.9701 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$
50mm	49.9696 $\begin{matrix} +.000 \\ -.025 \end{matrix}$	49.9620 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	80.9703 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	80.9703 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$
63mm	62.9695 $\begin{matrix} +.000 \\ -.025 \end{matrix}$	62.9613 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	94.9710 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	94.9710 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$
80mm	79.9692 $\begin{matrix} +.000 \\ -.025 \end{matrix}$	79.9615 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	111.9706 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$	111.9706 $\begin{matrix} +.0000 \\ -.0127 \end{matrix}$

(UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS)

Installation and Assembly Instructions

In order to maintain the die and punch alignment, it is essential that the guide posts and bushings be at absolute right angles with the punch and die backup surfaces.

FIGURE 1 represents a typical guide post and ROTAINER®. Please note that the end of the guide post with the *small* radius is press fit into the punch shoe, and that the ROTAINER® is assembled with the ROTAINER® slide assembly toward the same end of the guide post. On the bushing, however, the end with the *large* outside diameter radius is press fit into the die shoe.

NOTE: LEMPCO Demountable Bushings and Flanged Demountable Guide Posts are tap fitted. Bores should be to specifications, and both bushings and guide posts should be seated flush to ground surface of support shoe and held securely by clamps and cap screws. These bushings and guide posts are removable; on installation the die will register accurately.

Check the squareness of the guide post or bushing with a precision square. Tap the sides slightly with a soft hammer until the guide post or bushing is perpendicular.

Press fit about 6.35mm and check with the precision square again, tapping the sides with a soft hammer as necessary, to ensure squareness. A bronze, babbitt or fiber hammer is recommended.

NOTE: With Demountable Boss Bushings, be sure to press against the hardened liner and not against the casting.

Press fit by small increments (not over 12.70mm each) checking with the precision square after each press. Do not allow guide post or bushing to protrude through the lower side of the plate. It is advisable to place a .3968mm shim under the guide post or bushing as a stop.

For Demountable Boss Bushings and Demountable Bushings, after the bushing is tap fit to the shoulder, the shoe may be drilled with the bushing in place. Tighten screws gradually, moving from one to another until all are tight.

After complete assembly of the bushings, check the ID top and bottom for taper. Should taper be found, hone the ID until original size is obtained.

Note: This should not be necessary if boring instructions were strictly adhered to.

Assemble ROTAINER® to guide post (FIGURE 1) by screwing the set screw in until flush with special ROTAINER® slide. Vertical and rotational movement should now be tested to insure freedom of movement. After testing is completed, stake set screw. Lubricate only with a light spindle oil.

Note: The only tool necessary to assemble the ROTAINER® is a screw driver.

Assemble punch and die holder. Be sure to allow ROTAINERS® to hang free (see FIGURE 2) supported by the special ROTAINER® slide when assembling die set. Work the punch holder up and down a few times to assure there is no binding.

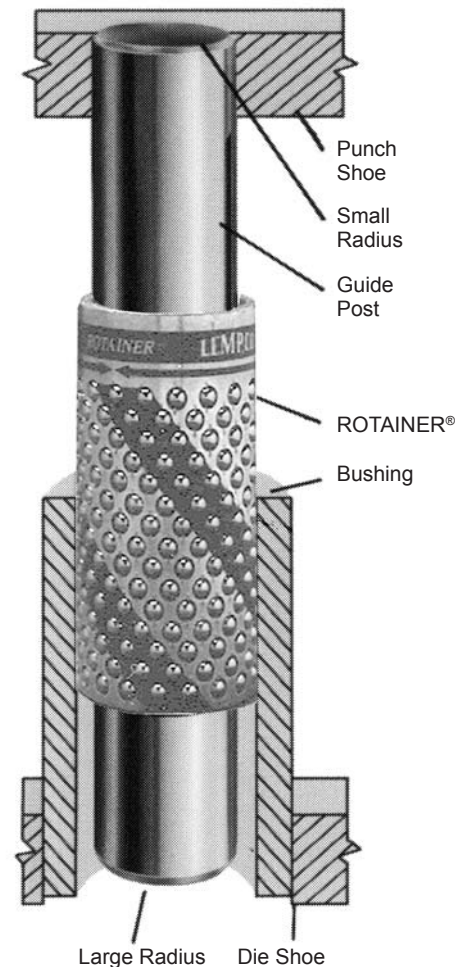


FIGURE 1

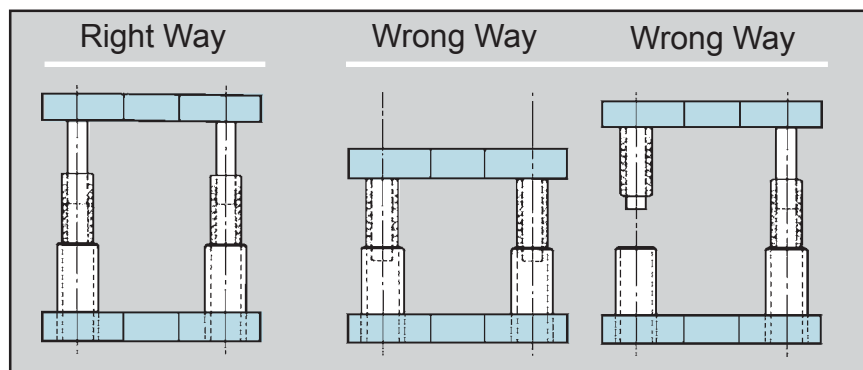


FIGURE 2

The LEMPCO Value Proposition

- **LEMPCO** is a recognized leader in providing quality ball bearing components:
 1. Rotainer® designed ball cage that minimizes tracking.
 2. Precision Rotainer® and retainer that provides accuracy and repeatability in high speed applications.
 3. Quality pins and bushings are made from 52100 tool steel and are precision ground.
- **LEMPCO** offers high quality die sets with either ball bearing or plain bearing components. Pins and bushings are manufactured using high quality steel and are precision ground.
- **LEMPCO** has a strong distribution network with over 250 distributors located around the world to service our valued customers.
- **LEMPCO's** manufacturing capabilities allow larger size die sets to be offered (240 in. by 120 in.) and complex machining to be available with exceptional deliveries.



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Quality, precision and dependability
are the requirements of today's production processes—
from ultra-high-speed stamping technology
to computer-driven CNC manufacturing.

LEMPCO designs its components in order to provide you with precision and cost-effective performance... run after run. We have the proven experience in the selection of metals, developing designs and understanding the details of your needs.

**LEMPCO KNOWS WHAT IT TAKES TO KEEP YOUR DIES RUNNING
AND WE KNOW HOW TO DELIVER IT.**

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