

DOODADS™, DOODS™, and GADGETS™

(Whip Guide Bushings & Accessories for Gun Drilling)

by

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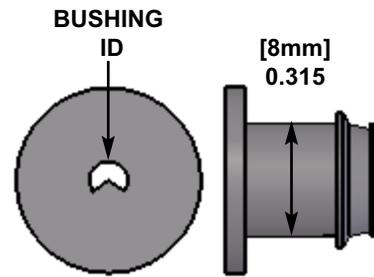
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Doodad™
Whip Guide Bushings
B100 Bearing Series (8mm)



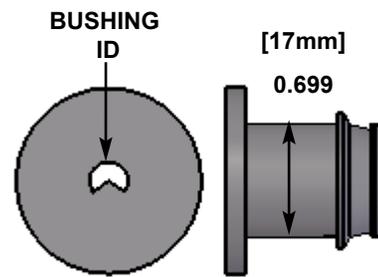
For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.

B100 Bearing (87008) 10.16mm X 24mm X 8mm
(628ZZ) 8mm X 24mm X 8mm
Self centering pilot, pop in design.

B100 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D070		0.070	1.77	0.065	1.65
D075	0.078	0.075	1.90	0.070	1.77
D080		0.080	2.03	0.075	1.90
D085	0.093	0.085	2.15	0.080	2.03
D090		0.090	2.28	0.085	2.15
D095	0.109	0.095	2.41	0.090	2.28
D105		0.105	2.66	0.095	2.41
D110		0.110	2.79	0.100	2.54
D115	0.125	0.115	2.92	0.105	2.66
D120		0.120	3.04	0.110	2.79
D125		0.125	3.17	0.115	2.92
D130	0.140	0.130	3.30	0.120	3.04
D135		0.135	3.42	0.125	3.17
D140	0.156	0.140	3.55	0.130	3.30
D150		0.150	3.81	0.135	3.42
D156	0.171	0.156	3.96	0.140	3.55
D160		0.160	4.06	0.145	3.68
D165		0.165	4.21	0.150	3.81
D171	0.187	0.171	4.43	0.156	3.96
D176		0.176	4.47	0.161	4.08
D181		0.181	4.59	0.166	4.21
D187	0.203	0.187	4.74	0.171	4.43
D192		0.192	4.87	0.176	4.47
D196		0.196	4.97	0.181	4.59
D203-1	0.218	0.203	5.15	0.187	4.74
D211-1		0.211	5.53	0.196	4.97
D218-1	0.234	0.218	5.53	0.203	5.15
PRICING:	\$3.50 each	100 & up: \$2.80 each		Minimum Order \$25.00	

Doodad™
Whip Guide Bushings
17mm Bearing Series

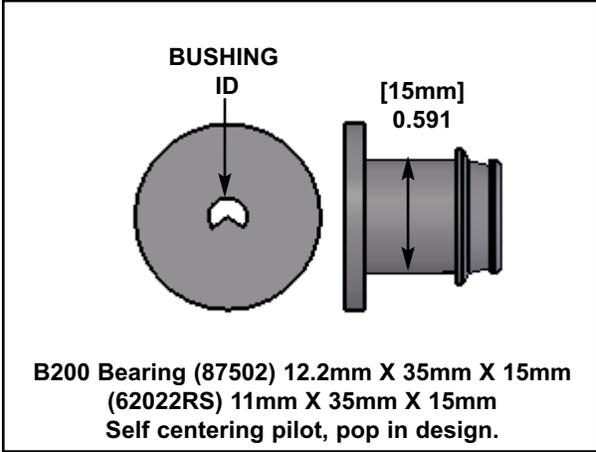
For a proper fit every time, measure the Gun Drill Tube (**Not the Drill**) and pick a part number as close as you can to the tube diameter.



17MM Bearing (6003-2RS) 10mm X 35mm X 17mm
(6003-ZZ) 10mm X 35mm X 17mm steel seal
Self centering pilot, pop in design.

17mm Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D203-17		0.203	5.15	0.187	4.75
D211-17		0.211	5.35	0.196	4.97
D218-17	0.234	0.218	5.53	0.203	5.15
D225-17		0.225	5.71	0.211	5.35
D230-17		0.230	5.84	0.214	5.43
D234-17	0.250	0.234	5.94	0.218	5.53
D240-17		0.240	6.09	0.225	5.71
D245-17		0.245	6.22	0.230	5.84
D250-17	0.265	0.250	6.35	0.234	5.94
D255-17		0.255	6.47	0.240	6.09
D260-17		0.260	6.60	0.245	6.22
D265-17	0.281	0.265	6.73	0.250	6.35
D273-17		0.273	6.93	0.258	6.55
D281-17	0.296	0.281	7.13	0.265	6.73
D288-17		0.288	7.31	0.273	6.93
D296-17	0.312	0.296	7.51	0.281	7.13
D304-17		0.304	7.72	0.288	7.31
D312-17	0.328	0.312	7.92	0.296	7.51
D320-17		0.320	8.12	0.304	7.72
D328-17	0.343	0.328	8.33	0.312	7.92
D336-17		0.336	8.53	0.320	8.12
D343-17	0.359	0.343	8.71	0.328	8.33
D351-17		0.351	8.91	0.336	8.53
D359-17	0.375	0.359	9.11	0.343	8.71
D367-17		0.367	9.32	0.351	8.91
D375-17	0.390	0.375	9.52	0.359	9.11
D383-17		0.383	9.72	0.367	9.32
D390-17	0.406	0.390	9.90	0.375	9.52
D398-17		0.398	10.10	0.383	9.72
D406-17	0.421	0.406	10.31	0.390	9.90
D413-17		0.413	10.49	0.398	10.10
D421-17	0.437	0.421	10.69	0.406	10.31
PRICING:	\$3.75 each	100 & up: \$3.00 each		Minimum Order \$25.00	

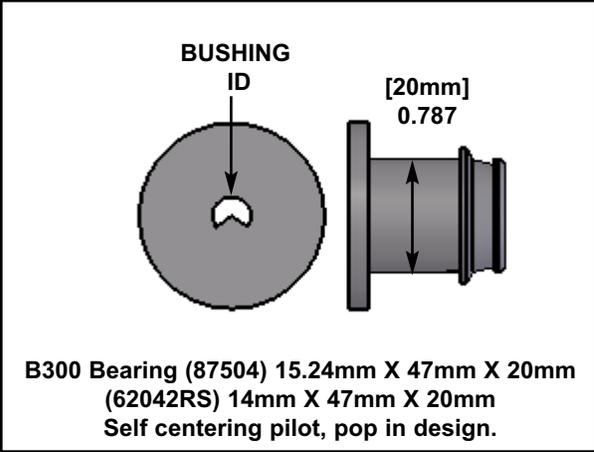
Doodad™
Whip Guide Bushings
B200 Bearing Series (15mm)



For a proper fit every time, measure the Gun Drill Tube (**Not the Drill**) and pick a part number as close as you can to the tube diameter.

B200 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D203-2		0.203	5.15	0.187	4.75
D211-2		0.211	5.35	0.196	4.97
D218-2	0.234	0.218	5.53	0.203	5.15
D225		0.225	5.71	0.211	5.35
D230		0.230	5.84	0.214	5.43
D234	0.250	0.234	5.94	0.218	5.53
D240		0.240	6.09	0.225	5.71
D245		0.245	6.22	0.230	5.84
D250	0.265	0.250	6.35	0.234	5.94
D255		0.255	6.47	0.240	6.09
D260		0.260	6.60	0.245	6.22
D265	0.281	0.265	6.73	0.250	6.35
D273		0.273	6.93	0.258	6.55
D281	0.296	0.281	7.13	0.265	6.73
D288		0.288	7.31	0.273	6.93
D296	0.312	0.296	7.51	0.281	7.13
D304		0.304	7.72	0.288	7.31
D312	0.328	0.312	7.92	0.296	7.51
D320		0.320	8.12	0.304	7.72
D328	0.343	0.328	8.33	0.312	7.92
D336		0.336	8.53	0.320	8.12
D343	0.359	0.343	8.71	0.328	8.33
D351		0.351	8.91	0.336	8.53
D359	0.375	0.359	9.11	0.343	8.71
D367		0.367	9.32	0.351	8.91
D375	0.390	0.375	9.52	0.359	9.11
D383		0.383	9.72	0.367	9.32
D390	0.406	0.390	9.90	0.375	9.52
D398		0.398	10.10	0.383	9.72
D406	0.421	0.406	10.31	0.390	9.90
D413		0.413	10.49	0.398	10.10
D421-2	0.437	0.421	10.69	0.406	10.31
PRICING:	\$3.75 each	100 & up: \$3.00 each		Minimum Order \$25.00	

Doodad™
Whip Guide Bushings
B300 Bearing Series (20mm)



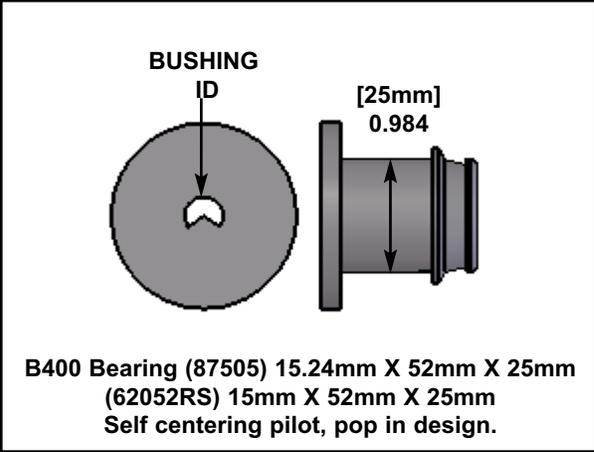
For a proper fit every time, measure the Gun Drill Tube (**Not the Drill**) and pick a part number as close as you can to the tube diameter.

B300 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D421-3	0.437	0.421	10.69	0.406	10.31
D429		0.429	10.89	0.414	10.51
D437	0.453	0.437	11.09	0.421	10.69
D445		0.445	11.30	0.429	10.89
D453	0.468	0.453	11.50	0.437	11.09
D461		0.461	11.70	0.445	11.30
D468	0.484	0.468	11.88	0.453	11.50
D476		0.476	12.09	0.461	11.70
D484	0.500	0.484	12.29	0.468	11.88
D492		0.492	12.49	0.476	12.09
D500	0.515	0.500	12.70	0.484	12.29
D508		0.508	12.90	0.492	12.49
D515	0.531	0.515	13.08	0.500	12.70
D524		0.524	13.30	0.508	12.90
D531	0.546	0.531	13.48	0.515	13.08
D539		0.539	13.69	0.524	13.30
D546	0.562	0.546	13.86	0.531	13.48
D554		0.554	14.07	0.539	13.69
D562	0.578	0.562	14.27	0.546	13.86
D570		0.570	14.47	0.554	14.07
D578	0.593	0.578	14.68	0.562	14.27
D585		0.585	14.85	0.570	14.47
D593-3	0.609	0.593	15.06	0.578	14.68
PRICING:	\$4.00 each		100 & up: \$3.20 each		Minimum Order \$25.00

Q: Why do gun drills whip?
A: There is no way to stop single flute gun drills from whipping, and the faster the RPM the more the tube will whip. The reason is because the tube has been crimped 110-120 degrees. This moves the center of gravity off-center and now the tube is out of balance.
 (see pp. 39-41 for more **Questions and Answers**)

Doodad™
Whip Guide Bushings
B400 Bearing Series (25mm)

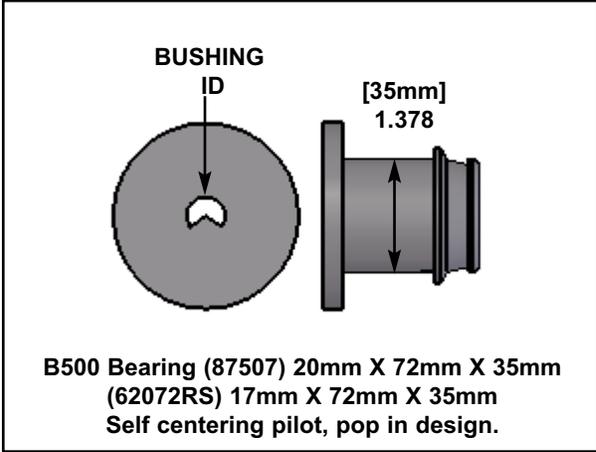
For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.



B400 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D593-4	0.609	0.593	15.06	0.578	14.68
D601		0.601	15.26	0.586	14.88
D609	0.625	0.609	15.46	0.593	15.06
D617		0.617	15.67	0.601	15.26
D625	0.640	0.625	15.87	0.609	15.46
D633		0.633	16.07	0.617	15.67
D640	0.656	0.640	16.25	0.625	15.87
D648		0.648	16.45	0.633	16.07
D656	0.671	0.656	16.66	0.640	16.25
D664		0.664	16.86	0.648	16.45
D671	0.687	0.671	17.04	0.656	16.66
D679		0.679	17.24	0.664	16.86
D687	0.703	0.687	17.44	0.671	17.04
D695		0.695	17.65	0.679	17.24
D703	0.718	0.703	17.85	0.687	17.44
D710		0.710	18.03	0.695	17.65
D718	0.734	0.718	18.23	0.703	17.85
D726		0.726	18.44	0.710	18.03
D734-4	0.750	0.734	18.64	0.718	18.23
D742		0.742	18.84	0.725	18.41
D750-4	0.765	0.750	19.05	0.734	18.64
PRICING:	\$5.50 each		100 & up: \$4.40 each		Minimum Order \$25.00

Q: Why do I order Doodads by the tube size and not the drill size?
A: Since tube sizes for gun drills are not standard in the industry, you could order a 0.125 drill from two different manufacturers and end up with a different tube size from each company. It's also possible to order the same size drill from a company at two different times and end up with different tube sizes depending on which tube sizes the company had in stock when you placed your orders. That's why you might find your whip guide bushings sometimes fits loose on a gun drill size you always work with. If the bushing fits too loose on the tube, you will get more vibration caused from whipping.
(see pp. 39-41 for more **Questions and Answers**)

Doodad™
Whip Guide Bushings
B500 Bearing Series (35mm)

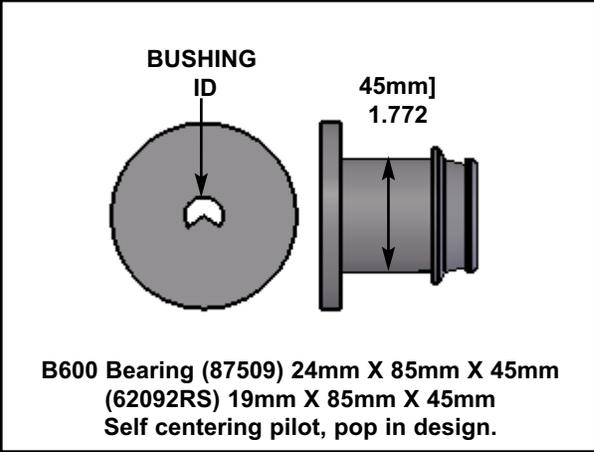


For a proper fit every time, measure the Gun Drill Tube (**Not the Drill**) and pick a part number as close as you can to the tube diameter.

B500 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D734-5	0.750	0.734	18.64	0.718	18.23
D750-5	0.765	0.750	19.05	0.734	18.64
D765	0.781	0.765	19.43	0.750	19.05
D781	0.796	0.781	19.83	0.765	19.43
D796	0.812	0.796	20.21	0.781	19.83
D812	0.828	0.812	20.62	0.796	20.21
D828	0.843	0.828	21.01	0.812	20.62
D843	0.859	0.843	21.41	0.828	21.03
D859	0.875	0.859	21.81	0.843	21.41
D875	0.890	0.875	22.22	0.859	21.81
D890	0.906	0.890	22.60	0.875	22.22
D906	0.921	0.906	23.01	0.890	22.60
D921	0.937	0.921	23.39	0.906	23.01
D937	0.953	0.937	23.79	0.921	23.39
D953	0.968	0.953	24.20	0.937	23.79
D968	0.984	0.968	24.58	0.953	24.20
D984	1.00	0.984	24.99	0.968	24.58
D1.00-5	1.03	1.00	25.40	0.984	24.99
PRICING:	\$6.00 each		100 & up: \$4.80 each		Minimum Order \$25.00

Q: What can you tell me about coolant temperature?
A: We've gun drilled with coolant at 110 degrees Fahrenheit and have seen work hardening of heat sensitive steels such as chrome alloys and tool steels. We believe that such heat sensitive steels need the heat removed as fast as possible and that a coolant temperature of around 80 degrees Fahrenheit does this better. Work hardening can be a problem for some applications.
 (see pp. 39-41 for more **Questions and Answers**)

Doodad™
Whip Guide Bushings
B600 Bearing Series (45mm)



For a proper fit every time, measure the Gun Drill Tube (**Not the Drill**) and pick a part number as close as you can to the tube diameter.

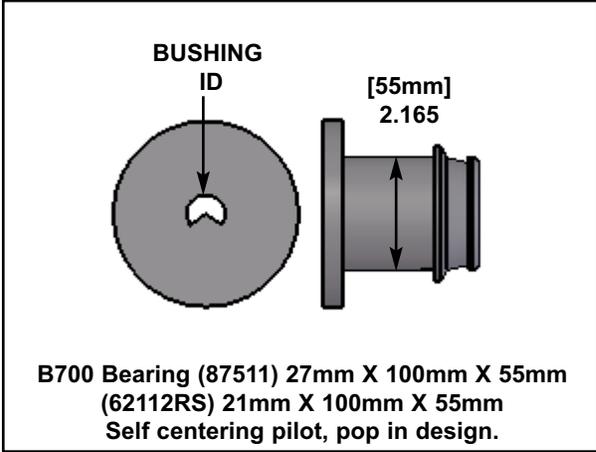
B600 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D1.00-6	1.03	1.00	25.40	0.984	24.99
D1.03	1.06	1.03	26.26	1.01	25.65
D1.06	1.09	1.06	26.92	1.05	26.67
D1.09	1.12	1.09	27.68	1.08	27.43
D1.12	1.15	1.12	28.44	1.11	28.19
D1.15	1.18	1.15	29.21	1.14	28.95
D1.18	1.21	1.18	29.97	1.17	29.71
D1.21	1.25	1.21	30.73	1.20	30.48
D1.25	1.28	1.25	31.75	1.23	31.24
D1.28	1.31	1.28	32.51	1.26	32.00
D1.31	1.34	1.31	33.27	1.30	33.02
D1.34	1.37	1.34	34.03	1.31	33.27
D1.37	1.40	1.37	34.79	1.34	34.03
D1.40	1.43	1.40	35.56	1.37	34.79
PRICING:	\$7.75 each		100 & up: \$6.20 each		Minimum Order \$25.00

Q: When I order my gun drills I am told they don't have a tube 0.007 smaller than the drill. The only tube size available is 0.015 smaller. Is it okay to use a gun drill with the tube 0.015 smaller in size?

A: Yes, It is our opinion that the tube size should never be any smaller than 0.015 than the drill, for up to 1 inch drills, especially if you're drilling deep holes more than 10 inches deep. If you need to keep your runout to a minimum, you may want to see if you can order your tube center-less ground for the tube size you want, before it's crimped. Try to keep your tube size 0.005 to 0.007 smaller than the drill. We have done a lot of testing on 1/2" holes. The drills were 0.490 diameter and the tube size 0.464 (-0.026). The drills caused us a lot of problems. The drills gave us a lot of vibration and drilling problems. We then tested drills 0.491 with tube sizes 0.484 (-0.007). We ran the same test 2000 RPM with a chip load of 0.001. We were able to drill 3500 inches with the same drill. Lots of our problems went away and we drilled 3 times as many parts. The material was 4150, PHT to 32 Rockwell. The temperature of our coolant was 100-110 degrees Fahrenheit, using gun drill C oil. On drill sizes of about 0.150, we order the tubes 0.005 smaller than the drill. This has shown in every case to give us less runout. Different material, different oil, oil pressure, and counter rotation may give different results. Please share your feedback with us, so we can get your ideas and experience.

(see pp. 39-41 for more **Questions and Answers**)

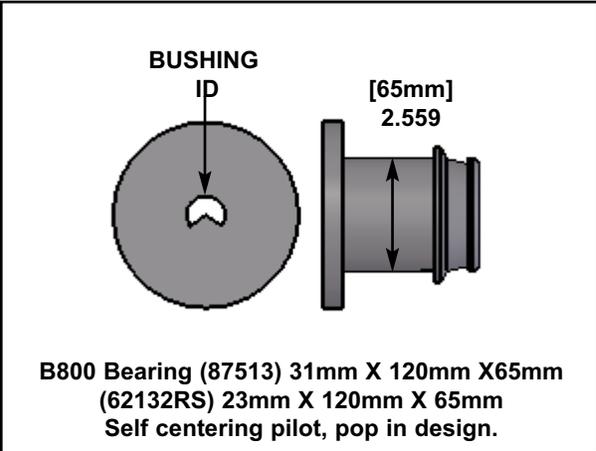
Doodad™
Whip Guide Bushings
B700 Bearing Series (55mm)



For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.

B700 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D1.43	1.46	1.43	36.32	1.41	35.81
D1.46	1.50	1.46	37.08	1.44	36.57
D1.50	1.56	1.50	38.1	1.48	37.59
D1.56	1.62	1.56	39.62	1.55	39.37
D1.62	1.68	1.62	41.14	1.61	40.89
D1.68	1.75	1.68	42.67	1.67	42.41
PRICING:	\$8.75 each		100 & up: \$7.00 each		Minimum Order \$25.00

Doodad™
Whip Guide Bushings
B800 Bearing Series (65mm)

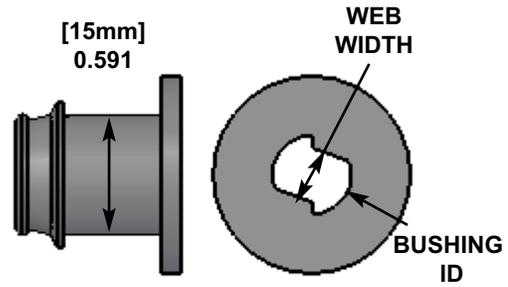


For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.

B800 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
D1.75	1.81	1.75	44.45	1.73	43.94
D1.81	1.87	1.81	45.97	1.80	45.72
D1.87	1.93	1.87	47.49	1.86	47.24
D1.93	2.00	1.93	49.02	1.92	48.76
D2.18	2.25	2.18	55.37	2.18	55.37
PRICING:	\$10.00 each		100 & up: \$8.00 each		Minimum Order \$25.00

Doodad™
2-Flute Whip Guide Bushings
B200 Bearing Series (15mm)

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.

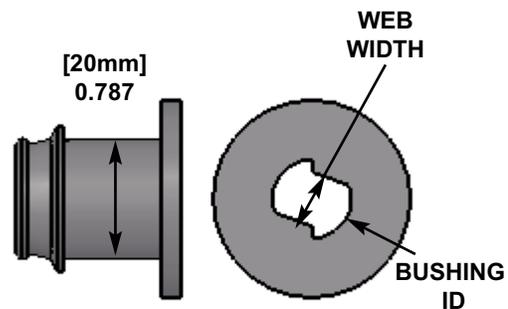


B200 Bearing (87502) 12.2mm X 35mm X 15mm
(62022RS) 11mm X 35mm X 15mm
 Self centering pilot, pop in design.

B200 Bearing Series						
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM	WEB WIDTH
2D218	0.234	0.218	5.53	0.203	5.15	0.140
2D234	0.250	0.234	5.94	0.218	5.53	0.150
2D265	0.281	0.265	6.73	0.250	6.35	0.168
2D296	0.312	0.296	7.51	0.281	7.13	0.187
2D328	0.343	0.328	8.33	0.312	7.92	0.206
2D359	0.375	0.359	9.11	0.343	8.71	0.225
2D375	0.390	0.375	9.52	0.359	9.11	0.234
2D390	0.406	0.390	9.90	0.375	9.52	0.244
2D406	0.421	0.406	10.31	0.390	9.90	0.250
PRICING:	\$4.00 each		100 & up: \$3.00 each		Minimum Order \$25.00	

Doodad™
2-Flute Whip Guide Bushings
B300 Bearing Series (20mm)

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.

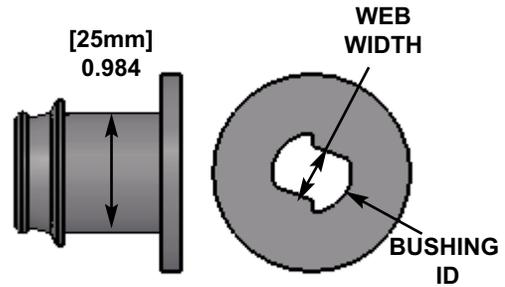


B300 Bearing (87504) 15.24mm X 47mm X 20mm
(62042RS) 14mm X 47mm X 20mm
 Self centering pilot, pop in design.

B300 Bearing Series						
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM	WEB WIDTH
2D421	0.437	0.421	10.69	0.406	10.31	0.206
2D453	0.468	0.453	11.50	0.437	11.09	0.280
2D484	0.500	0.484	12.29	0.468	11.88	0.300
2D531	0.546	0.531	13.48	0.515	13.08	0.328
2D546	0.562	0.546	13.86	0.531	13.48	0.337
2D562	0.578	0.562	14.27	0.546	13.86	0.350
2D578	0.593	0.578	14.68	0.562	14.27	0.355
PRICING:	\$4.25 each		100 & up: \$3.25 each		Minimum Order \$25.00	

Doodad™
2-Flute Whip Guide Bushings
B400 Bearing Series (25mm)

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.

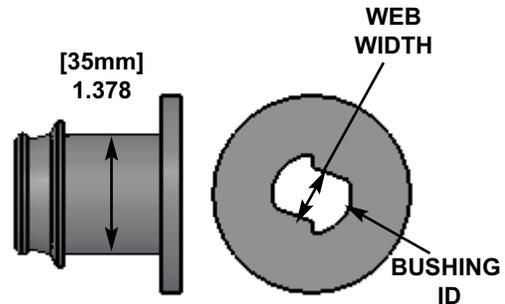


B400 Bearing (87505) 15.24mm X 52mm X 25mm
(62052RS) 15mm X 52mm X 25mm
 Self centering pilot, pop in design.

B400 Bearing Series						
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM	WEB WIDTH
2D593	0.608	0.593	15.06	0.578	14.68	0.365
2D609	0.625	0.609	15.46	0.593	15.06	0.375
2D640	0.656	0.640	16.25	0.625	15.87	0.390
2D671	0.687	0.671	17.04	0.656	16.66	0.412
2D687	0.702	0.687	17.44	0.671	17.04	0.422
2D703	0.718	0.703	17.85	0.687	17.44	0.430
2D718	0.734	0.718	18.23	0.703	17.85	0.440
2D734-4	0.750	0.734	18.64	0.718	18.23	0.450
PRICING:	\$5.75 each		100 & up: \$5.25 each		Minimum Order \$25.00	

Doodad™
2-Flute Whip Guide Bushings
B500 Bearing Series (35mm)

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.

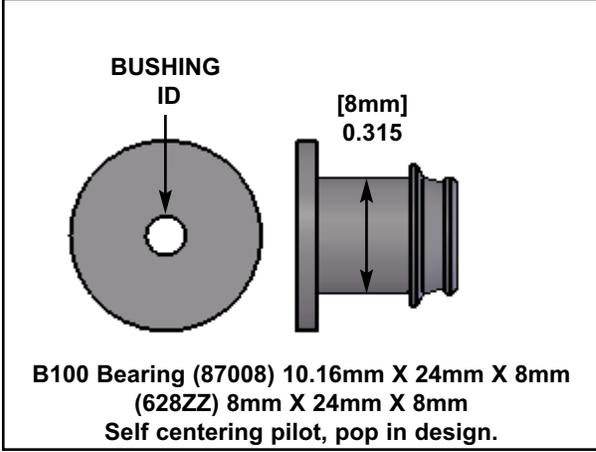


B500 Bearing (87507) 20mm X 72mm X 35mm
(62072RS) 17mm X 72mm X 35mm
 Self centering pilot, pop in design.

B500 Bearing Series						
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM	WEB WIDTH
2D734-5	0.750	0.734	18.64	0.718	18.23	0.450
2D750	0.781	0.750	19.05	0.750	19.05	0.468
2D781	0.812	0.781	19.83	0.781	19.83	0.490
2D843	0.875	0.843	21.41	0.843	21.41	0.525
2D859	0.890	0.859	21.81	0.859	21.81	0.534
2D906	0.937	0.906	23.01	0.906	23.01	0.562
2D921	0.953	0.921	23.39	0.921	23.39	0.572
2D937	0.984	0.953	23.79	0.953	24.20	0.590
2D968	1.00	0.968	24.58	0.968	24.58	0.600
PRICING:	\$6.25 each		100 & up: \$5.75 each		Minimum Order \$25.00	

Dood™
Round Hole Whip Guide Bushings for
Drilling & Reaming and BTA Tools
B100 Bearing Series (8mm)

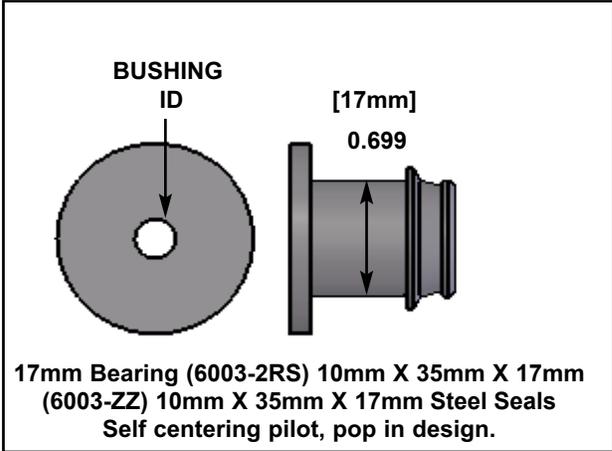
For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
 For Reaming, match the BUSHING ID.



B100 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
R055		0.055	1.39	0.050	1.27
R060		0.060	1.52	0.055	1.39
R065		0.065	1.65	0.060	1.52
R070		0.070	1.77	0.065	1.65
R075	0.078	0.075	1.90	0.070	1.77
R080		0.080	2.03	0.075	1.90
R085	0.093	0.085	2.15	0.080	2.03
R090		0.090	2.28	0.085	2.15
R095	0.109	0.095	2.41	0.090	2.28
R105		0.105	2.66	0.095	2.41
R110		0.110	2.79	0.100	2.54
R115	0.125	0.115	2.92	0.105	2.66
R120		0.120	3.04	0.110	2.79
R125		0.125	3.17	0.115	2.92
R130	0.140	0.130	3.30	0.120	3.04
R135		0.135	3.42	0.125	3.17
R140	0.156	0.140	3.55	0.130	3.30
R150		0.150	3.81	0.135	3.42
R156	0.171	0.156	3.96	0.140	3.55
R160		0.160	4.06	0.145	3.68
R165		0.165	4.21	0.150	3.81
R171	0.187	0.171	4.43	0.156	3.96
R176		0.176	4.47	0.161	4.08
R181		0.181	4.59	0.166	4.21
R187	0.203	0.187	4.74	0.171	4.43
R192		0.192	4.87	0.176	4.47
R196		0.196	4.97	0.181	4.59
R203-1	0.218	0.203	5.15	0.187	4.74
R211-1		0.211	5.53	0.196	4.97
R218-1	0.234	0.218	5.53	0.203	5.15
PRICING:	\$3.50 each	100 & up: \$2.80 each		Minimum Order \$25.00	

Dood™
Round Hole Whip Guide Bushings for
Drilling & Reaming and BTA Tools
17mm Bearing Series

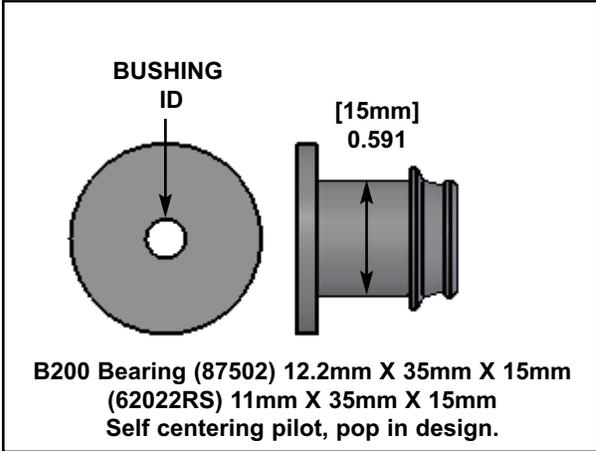
For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
For Reaming, match the BUSHING ID.



17mm Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
R203-17		0.203	5.15	0.187	4.75
R211-17		0.211	5.35	0.196	4.97
R218-17	0.234	0.218	5.53	0.203	5.15
R225-17		0.225	5.71	0.211	5.35
R230-17		0.230	5.84	0.214	5.43
R234-17	0.250	0.234	5.94	0.218	5.53
R240-17		0.240	6.09	0.225	5.71
R245-17		0.245	6.22	0.230	5.84
R250-17	0.265	0.250	6.35	0.234	5.94
R255-17		0.255	6.47	0.240	6.09
R260-17		0.260	6.60	0.245	6.22
R265-17	0.281	0.265	6.73	0.250	6.35
R273-17		0.273	6.93	0.258	6.55
R281-17	0.296	0.281	7.13	0.265	6.73
R288-17		0.288	7.31	0.273	6.93
R296-17	0.312	0.296	7.51	0.281	7.13
R304-17		0.304	7.72	0.288	7.31
R312-17	0.328	0.312	7.92	0.296	7.51
R320-17		0.320	8.12	0.304	7.72
R328-17	0.343	0.328	8.33	0.312	7.92
R336-17		0.336	8.53	0.320	8.12
R343-17	0.359	0.343	8.71	0.328	8.33
R351-17		0.351	8.91	0.336	8.53
R359-17	0.375	0.359	9.11	0.343	8.71
R367-17		0.367	9.32	0.351	8.91
R375-17	0.390	0.375	9.52	0.359	9.11
R383-17		0.383	9.72	0.367	9.32
R390-17	0.406	0.390	9.90	0.375	9.52
R398-17		0.398	10.10	0.383	9.72
R406-17	0.421	0.406	10.31	0.390	9.90
R413-17		0.413	10.49	0.398	10.10
R421-17	0.437	0.421	10.69	0.406	10.31
PRICING:	\$3.75 each	100 & up: \$3.00 each		Minimum Order \$25.00	

Dood™
Round Hole Whip Guide Bushings for
Drilling & Reaming and BTA Tools
B200 Bearing Series (15mm)

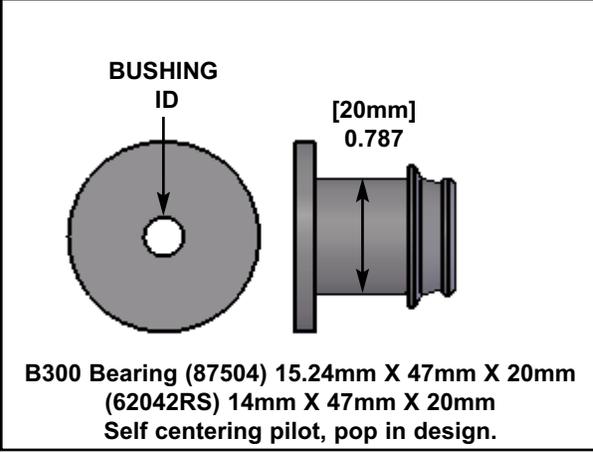
For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
For Reaming, match the BUSHING ID.



B200 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
R203-2		0.203	5.15	0.187	4.75
R211-2		0.211	5.35	0.196	4.97
R218-2	0.234	0.218	5.53	0.203	5.15
R225		0.225	5.71	0.211	5.35
R230		0.230	5.84	0.214	5.43
R234	0.250	0.234	5.94	0.218	5.53
R240		0.240	6.09	0.225	5.71
R245		0.245	6.22	0.230	5.84
R250	0.265	0.250	6.35	0.234	5.94
R255		0.255	6.47	0.240	6.09
R260		0.260	6.60	0.245	6.22
R265	0.281	0.265	6.73	0.250	6.35
R273		0.273	6.93	0.258	6.55
R281	0.296	0.281	7.13	0.265	6.73
R288		0.288	7.31	0.273	6.93
R296	0.312	0.296	7.51	0.281	7.13
R304		0.304	7.72	0.288	7.31
R312	0.328	0.312	7.92	0.296	7.51
R320		0.320	8.12	0.304	7.72
R328	0.343	0.328	8.33	0.312	7.92
R336		0.336	8.53	0.320	8.12
R343	0.359	0.343	8.71	0.328	8.33
R351		0.351	8.91	0.336	8.53
R359	0.375	0.359	9.11	0.343	8.71
R367		0.367	9.32	0.351	8.91
R375	0.390	0.375	9.52	0.359	9.11
R383		0.383	9.72	0.367	9.32
R390	0.406	0.390	9.90	0.375	9.52
R398		0.398	10.10	0.383	9.72
R406	0.421	0.406	10.31	0.390	9.90
R413		0.413	10.49	0.398	10.10
R421-2	0.437	0.421	10.69	0.406	10.31
PRICING:	\$3.75 each	100 & up: \$3.00 each		Minimum Order \$25.00	

Dood™
Round Hole Whip Guide Bushings for
Drilling & Reaming and BTA Tools
B300 Bearing Series (20mm)

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
 For Reaming, match the **BUSHING ID**.

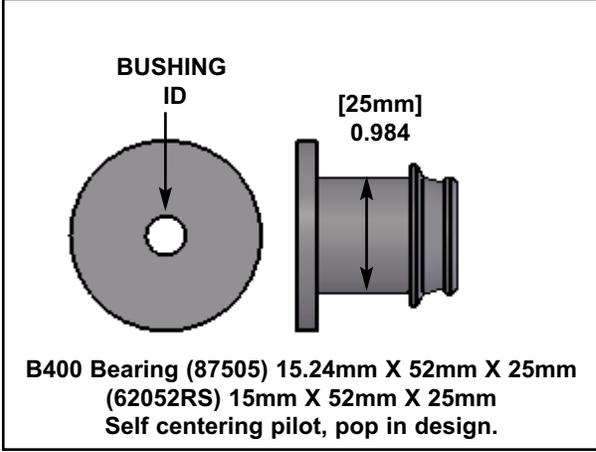


B300 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUB DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
R421-3	0.437	0.421	10.69	0.406	10.31
R429		0.429	10.89	0.414	10.51
R437	0.453	0.437	11.09	0.421	10.69
R445		0.445	11.30	0.429	10.89
R453	0.468	0.453	11.50	0.437	11.09
R461		0.461	11.70	0.445	11.30
R468	0.484	0.468	11.88	0.453	11.50
R476		0.476	12.09	0.461	11.70
R484	0.500	0.484	12.29	0.468	11.88
R492		0.492	12.49	0.476	12.09
R500	0.515	0.500	12.70	0.484	12.29
R508		0.508	12.90	0.492	12.49
R515	0.531	0.515	13.08	0.500	12.70
R524		0.524	13.30	0.508	12.90
R531	0.546	0.531	13.48	0.515	13.08
R539		0.539	13.69	0.524	13.30
R546	0.562	0.546	13.86	0.531	13.48
R554		0.554	14.07	0.539	13.69
R562	0.578	0.562	14.27	0.546	13.86
R570		0.570	14.47	0.554	14.07
R578	0.593	0.578	14.68	0.562	14.27
R585		0.585	14.85	0.570	14.47
R593-3	0.609	0.593	15.06	0.578	14.68
PRICING:	\$4.00 each	100 & up: \$3.20 each		Minimum Order \$25.00	

Q: Have you done any testing on reaming?
A: Yes. Many people who ream prefer pull reaming. We have done tests on both. Pull reaming causes bell mouting to some degree on both the entrance and exit ends. We prefer push reaming because the reamers never have to come out of the machine. We shut the reamer off at the end of the stroke and pull the reamer back, leaving the oil still on. TIN & TIALN coated reamers will help galling problems. The reamers must be sharpened after the coating has been applied. Coolant temperature should be around 85 degrees fahrenheit to remove heat build up caused by friction.
 (see pp. 39-41 for more **Questions and Answers**)

Dood™
Round Hole Whip Guide Bushings for
Drilling & Reaming and BTA Tools
B400 Bearing Series (25mm)

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
For Reaming, match the BUSHING ID.

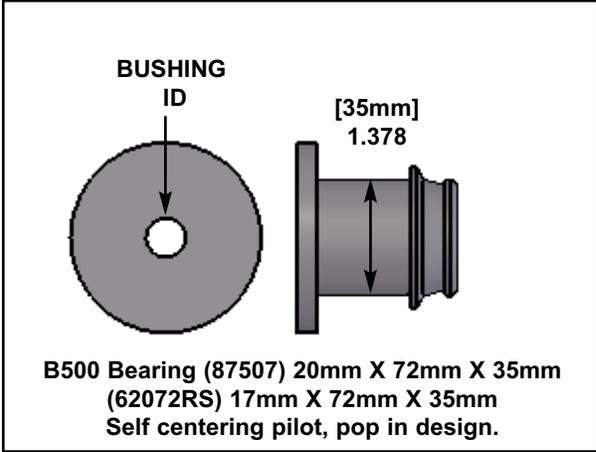


B400 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
R593-4	0.609	0.593	15.06	0.578	14.68
R601		0.601	15.26	0.586	14.88
R609	0.625	0.609	15.46	0.593	15.06
R617		0.617	15.67	0.601	15.26
R625	0.640	0.625	15.87	0.609	15.46
R633		0.633	16.07	0.617	15.67
R640	0.656	0.640	16.25	0.625	15.87
R648		0.648	16.45	0.633	16.07
R656	0.671	0.656	16.66	0.640	16.25
R664		0.664	16.86	0.648	16.45
R671	0.687	0.671	17.04	0.656	16.66
R679		0.679	17.24	0.664	16.86
R687	0.703	0.687	17.44	0.671	17.04
R695		0.695	17.65	0.679	17.24
R703	0.718	0.703	17.85	0.687	17.44
R710		0.710	18.03	0.695	17.65
R718	0.734	0.718	18.23	0.703	17.85
R726		0.726	18.44	0.710	18.03
R734-4	0.750	0.734	18.64	0.718	18.23
R742		0.742	18.84	0.725	18.41
R750-4	0.765	0.750	19.05	0.734	18.64
PRICING:	\$5.50 each		100 & up: \$4.40 each		Minimum Order \$25.00

Q: What size reaming rod should I order with my reamers?
A: The reaming rods should be hardened to above 45-50 Rockwell C. You should have the rods about 0.007 to 0.010 smaller than the reamer. You should use whip guide stabilizers on your whip guide supports, as well as in the chip box. This will keep whipping from transferring forces into the reamer, thus keeping the reamer straight. Drilled holes should be 0.005 to 0.007 smaller than the finished reamed hole. In our testing we learned never to use hardened GDI bushings for reaming.
 (see pp. 39-41 for more **Questions and Answers**)

Dood™
Round Hole Whip Guide Bushings for
Drilling & Reaming and BTA Tools
B500 Bearing Series (35mm)

For a proper fit every time, measure the Gun Drill Tube (**Not the Drill**) and pick a part number as close as you can to the tube diameter.
For Reaming, match the BUSHING ID.



B500 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
R734-5	0.750	0.734	18.64	0.718	18.23
R750-5	0.765	0.750	19.05	0.734	18.64
R765	0.781	0.765	19.43	0.750	19.05
R781	0.796	0.781	19.83	0.765	19.43
R796	0.812	0.796	20.21	0.781	19.83
R812	0.828	0.812	20.62	0.796	20.21
R828	0.843	0.828	21.01	0.812	20.62
R843	0.859	0.843	21.41	0.828	21.03
R859	0.875	0.859	21.81	0.843	21.41
R875	0.890	0.875	22.22	0.859	21.81
R890	0.906	0.890	22.60	0.875	22.22
R906	0.921	0.906	23.01	0.890	22.60
R921	0.937	0.921	23.39	0.906	23.01
R937	0.953	0.937	23.79	0.921	23.39
R953	0.968	0.953	24.20	0.937	23.79
R968	0.984	0.968	24.58	0.953	24.20
R984	1.00	0.984	24.99	0.968	24.58
R1.00-5	1.03	1.00	25.40	0.984	24.99
PRICING:	\$6.00 each		100 & up: \$4.80 each		Minimum Order \$25.00

We don't manufacture just whip guide bushings.

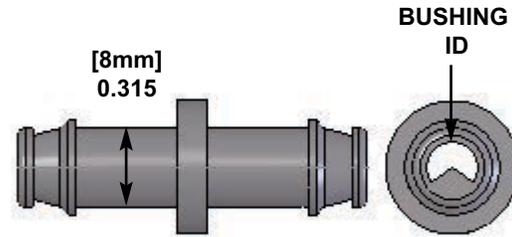
We test them on our own gun-drilling machines. We try to improve vibration control, whipping control, gun drill run-out, and also improve drilling speeds so you can maximize your production. So if you have a special application, like two different size holes meeting each other at some specified depth, a flat bottom section meeting another size hole, special reaming or gun boring, give us a call and we will share with you any information we have.

(see pp. 39-41 for more **Questions and Answers**)

Double Doodad™

Whip Guide Bushings for the Chip Box
B100 Bearing Series (8mm)

Twice the bearing surface, creates a better seal around the tube, helps control whipping. The Double Doodads absorb more vibration in the CHIP BOX. For a proper fit every time, measure the tube NOT the drill.



B100 Bearing (87008) 10.16mm X 24mm X 8mm
(628ZZ) 8mm X 24mm X 8mm
Self centering pilot, pop in design.

B100 Bearing Series

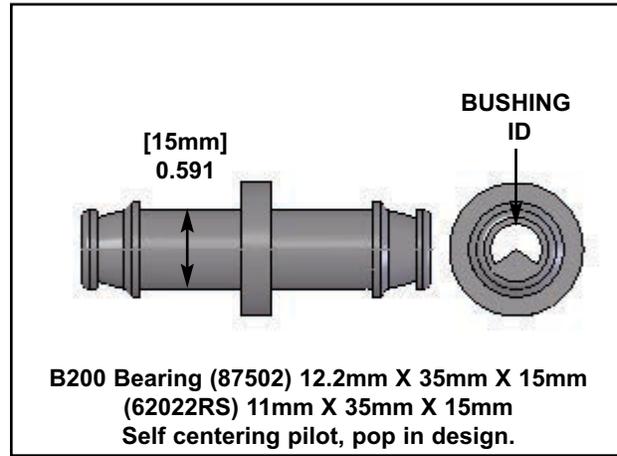
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
DD070		0.070	1.77	0.065	1.65
DD075	0.078	0.075	1.90	0.070	1.77
DD080		0.080	2.03	0.075	1.90
DD085	0.093	0.085	2.15	0.080	2.03
DD090		0.090	2.28	0.085	2.15
DD095	0.109	0.095	2.41	0.090	2.28
DD105		0.105	2.66	0.095	2.41
DD110		0.110	2.79	0.100	2.54
DD115	0.125	0.115	2.92	0.105	2.66
DD120		0.120	3.04	0.110	2.79
DD125		0.125	3.17	0.115	2.92
DD130	0.140	0.130	3.30	0.120	3.04
DD135		0.135	3.42	0.125	3.17
DD140	0.156	0.140	3.55	0.130	3.30
DD150		0.150	3.81	0.135	3.42
DD156	0.171	0.156	3.96	0.140	3.55
DD160		0.160	4.06	0.145	3.68
DD165		0.165	4.21	0.150	3.81
DD171	0.187	0.171	4.43	0.156	3.96
DD176		0.176	4.47	0.161	4.08
DD181		0.181	4.59	0.166	4.21
DD187	0.203	0.187	4.74	0.171	4.43
DD192		0.192	4.87	0.176	4.47
DD196		0.196	4.97	0.181	4.59
DD203-1	0.218	0.203	5.15	0.187	4.74
DD211-1		0.211	5.53	0.196	4.97
DD218-1	0.234	0.218	5.53	0.203	5.15
PRICING:		\$5.60 each	100 & up: \$4.48 each	Minimum Order \$25.00	

The Double Doodad is manufactured by cementing 2 Doodads together using a special bonding.

Double Doodad™

Whip Guide Bushings for the Chip Box
B200 Bearing Series (15mm)

Twice the bearing surface, creates a better seal around the tube, helps control whipping. The Double Doodads absorb more vibration in the CHIP BOX. For a proper fit every time, measure the tube NOT the drill.



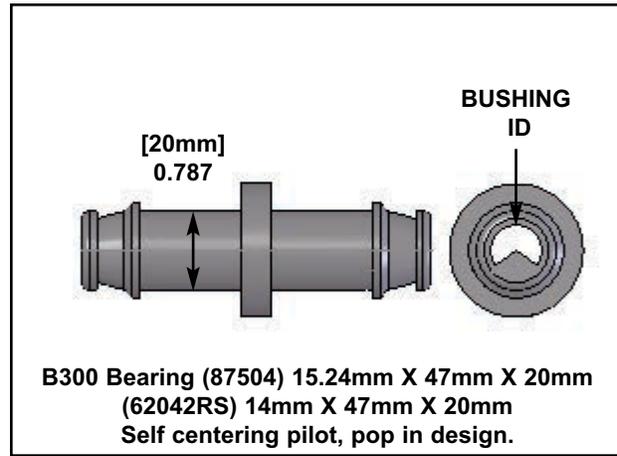
B200 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
DD203-2		0.203	5.15	0.187	4.75
DD211-2		0.211	5.35	0.196	4.97
DD218-2	0.234	0.218	5.53	0.203	5.15
DD225		0.225	5.71	0.211	5.35
DD230		0.230	5.84	0.214	5.43
DD234	0.250	0.234	5.94	0.218	5.53
DD240		0.240	6.09	0.225	5.71
DD245		0.245	6.22	0.230	5.84
DD250	0.265	0.250	6.35	0.234	5.94
DD255		0.255	6.47	0.240	6.09
DD260		0.260	6.60	0.245	6.22
DD265	0.281	0.265	6.73	0.250	6.35
DD273		0.273	6.93	0.258	6.55
DD281	0.296	0.281	7.13	0.265	6.73
DD288		0.288	7.31	0.273	6.93
DD296	0.312	0.296	7.51	0.281	7.13
DD304		0.304	7.72	0.288	7.31
DD312	0.328	0.312	7.92	0.296	7.51
DD320		0.320	8.12	0.304	7.72
DD328	0.343	0.328	8.33	0.312	7.92
DD336		0.336	8.53	0.320	8.12
DD343	0.359	0.343	8.71	0.328	8.33
DD351		0.351	8.91	0.336	8.53
DD359	0.375	0.359	9.11	0.343	8.71
DD367		0.367	9.32	0.351	8.91
DD375	0.390	0.375	9.52	0.359	9.11
DD383		0.383	9.72	0.367	9.32
DD390	0.406	0.390	9.90	0.375	9.52
DD398		0.398	10.10	0.383	9.72
DD406	0.421	0.406	10.31	0.390	9.90
DD413		0.413	10.49	0.398	10.10
DD421-2	0.437	0.421	10.69	0.406	10.31
PRICING:		\$6.00 each	100 & up: \$4.80 each	Minimum Order \$25.00	

The Double Doodad is manufactured by cementing 2 Doodads together using a special bonding.

Double Doodad™

Whip Guide Bushings for the Chip Box
B300 Bearing Series (20mm)

Twice the bearing surface, creates a better seal around the tube, helps control whipping. The Double Doodads absorb more vibration in the CHIP BOX. For a proper fit every time, measure the tube NOT the drill.



B300 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
DD421-3	0.437	0.421	10.69	0.406	10.31
DD429		0.429	10.89	0.414	10.51
DD437	0.453	0.437	11.09	0.421	10.69
DD445		0.445	11.30	0.429	10.89
DD453	0.468	0.453	11.50	0.437	11.09
DD461		0.461	11.70	0.445	11.30
DD468	0.484	0.468	11.88	0.453	11.50
DD476		0.476	12.09	0.461	11.70
DD484	0.500	0.484	12.29	0.468	11.88
DD492		0.492	12.49	0.476	12.09
DD500	0.515	0.500	12.70	0.484	12.29
DD508		0.508	12.90	0.492	12.49
DD515	0.531	0.515	13.08	0.500	12.70
DD524		0.524	13.30	0.508	12.90
DD531	0.546	0.531	13.48	0.515	13.08
DD539		0.539	13.69	0.524	13.30
DD546	0.562	0.546	13.86	0.531	13.48
DD554		0.554	14.07	0.539	13.69
DD562	0.578	0.562	14.27	0.546	13.86
DD570		0.570	14.47	0.554	14.07
DD578	0.593	0.578	14.68	0.562	14.27
DD585		0.585	14.85	0.570	14.47
DD593-3	0.609	0.593	15.06	0.578	14.68
PRICING:	\$6.40 each		100 & up: \$5.12 each		Minimum Order \$25.00

The Double Doodad is manufactured by cementing 2 Doodads together using a special bonding.

Q: What's so good about the DOUBLE Doodad?

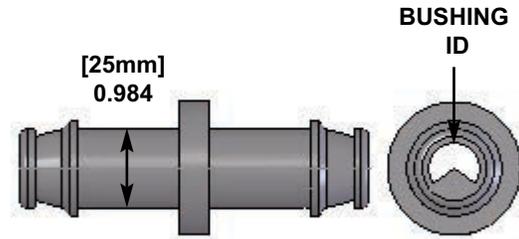
A: The Double Doodad has twice the bearing surface, absorbs more vibration in the chip box caused by whipping, and helps control whipping by shortening the unsupported length, and creates a better seal in the chip box.

(see pp. 39-41 for more **Questions and Answers**)

Double Doodad™

Whip Guide Bushings for the Chip Box
B400 Bearing Series (25mm)

Twice the bearing surface, creates a better seal around the tube, helps control whipping. The Double Doodads absorb more vibration in the CHIP BOX. For a proper fit every time, measure the tube NOT the drill.



B400 Bearing (87505) 15.24mm X 52mm X 25mm
(62052RS) 15mm X 52mm X 25mm
Self centering pilot, pop in design.

B400 Bearing Series

PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
DD593-4	0.609	0.593	15.06	0.578	14.68
DD601		0.601	15.26	0.586	14.88
DD609	0.625	0.609	15.46	0.593	15.06
DD617		0.617	15.67	0.601	15.26
DD625	0.640	0.625	15.87	0.609	15.46
DD633		0.633	16.07	0.617	15.67
DD640	0.656	0.640	16.25	0.625	15.87
DD648		0.648	16.45	0.633	16.07
DD656	0.671	0.656	16.66	0.640	16.25
DD664		0.664	16.86	0.648	16.45
DD671	0.687	0.671	17.04	0.656	16.66
DD679		0.679	17.24	0.664	16.86
DD687	0.703	0.687	17.44	0.671	17.04
DD695		0.695	17.65	0.679	17.24
DD703	0.718	0.703	17.85	0.687	17.44
DD710		0.710	18.03	0.695	17.65
DD718	0.734	0.718	18.23	0.703	17.85
DD726		0.726	18.44	0.710	18.03
DD734-4	0.750	0.734	18.64	0.718	18.23
DD742		0.742	18.84	0.725	18.41
DD750-4	0.765	0.750	19.05	0.734	18.64
PRICING:		\$8.80 each	100 & up: \$7.04 each	Minimum Order \$25.00	

The Double Doodad is manufactured by cementing 2 Doodads together using a special bonding.

Q: Once in a while when I start a drilling cycle, one of my drill tubes gets bent between the whip guide supports. Is that caused from wind-up?

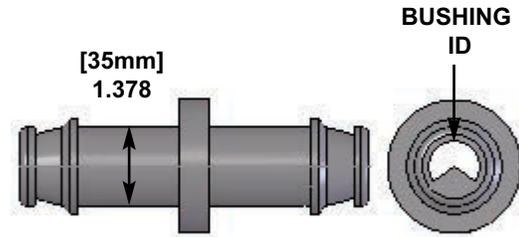
A: No. It's not wind-up if the drill tube is bent. This problem occurs when using Stieber Chucks because you're only supposed to hand-tighten them. What you should do is hand-tighten with a spanner wrench. This should take care of the bending. We have seen a lot of this problem using small drills with high-pressure coolant 1200-1800 PSI. The pressure is hydraulic pressure, which pushes on the driver and moves the driver forward and bends the tube on the gun drill.

(see pp. 39-41 for more **Questions and Answers**)

Double Doodad™

Whip Guide Bushings for the Chip Box
B500 Bearing Series (35mm)

Twice the bearing surface, creates a better seal around the tube, helps control whipping. The Double Doodads absorb more vibration in the CHIP BOX. For a proper fit every time, measure the tube NOT the drill.



B500 Bearing (87507) 20mm X 72mm X 35mm
(62072RS) 17mm X 72mm X 35mm
Self centering pilot, pop in design.

B500 Bearing Series

PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
DD734-5	0.750	0.734	18.64	0.718	18.23
DD750-5	0.765	0.750	19.05	0.734	18.64
DD765	0.781	0.765	19.43	0.750	19.05
DD781	0.796	0.781	19.83	0.765	19.43
DD796	0.812	0.796	20.21	0.781	19.83
DD812	0.828	0.812	20.62	0.796	20.21
DD828	0.843	0.828	21.01	0.812	20.62
DD843	0.859	0.843	21.41	0.828	21.03
DD859	0.875	0.859	21.81	0.843	21.41
DD875	0.890	0.875	22.22	0.859	21.81
DD890	0.906	0.890	22.60	0.875	22.22
DD906	0.921	0.906	23.01	0.890	22.60
DD921	0.937	0.921	23.39	0.906	23.01
DD937	0.953	0.937	23.79	0.921	23.39
DD953	0.968	0.953	24.20	0.937	23.79
DD968	0.984	0.968	24.58	0.953	24.20
DD984	1.00	0.984	24.99	0.968	24.58
DD1.00-5	1.03	1.00	25.40	0.984	24.99
PRICING:	\$9.60 each		100 & up: \$7.68 each		Minimum Order \$25.00

The Double Doodad is manufactured by cementing 2 Doodads together using a special bonding.

Q: I have a 20-inch long part with requirements of a maximum 0.010 runout. Is there any way to control runout?

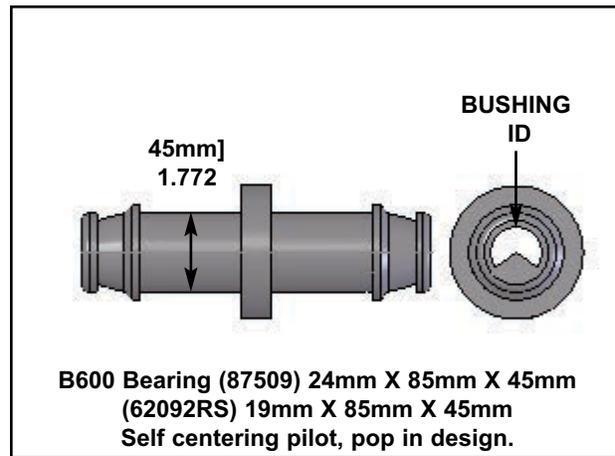
A: To control runout you must use a stabilizer in the chip box and on the steady rest. The most important thing is to order your gun drills with the tube diameter 0.005-0.007 smaller than the gun drill. If your drill is 0.125, then your tube should be 0.120-0.118, even if this means ordering your tubes center-less ground to get the tube size you need. It's necessary to have the unsupported length in the chip box as short as possible. This will keep the tube stiff and help control the whipping. The start hole will be straighter and the exit hole will have less runout. If the tube is not stiff and whips, the bending forces are transferred into the drill tip. Because of the back taper on the gun drill these bending forces will keep the drill from starting straight, and the runout will be greater.

(see pp. 39-41 for more **Questions and Answers**)

Double Doodad™

Whip Guide Bushings for the Chip Box
B600 Bearing Series (45mm)

Twice the bearing surface, creates a better seal around the tube, helps control whipping. The Double Doodads absorb more vibration in the CHIP BOX. For a proper fit every time, measure the tube NOT the drill.



B600 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
DD1.00-6	1.03	1.00	25.40	0.984	24.99
DD1.03	1.06	1.03	26.26	1.01	25.65
DD1.06	1.09	1.06	26.92	1.05	26.67
DD1.09	1.12	1.09	27.68	1.08	27.43
DD1.12	1.15	1.12	28.44	1.11	28.19
DD1.15	1.18	1.15	29.21	1.14	28.95
DD1.18	1.21	1.18	29.97	1.17	29.71
DD1.21	1.25	1.21	30.73	1.20	30.48
DD1.25	1.28	1.25	31.75	1.23	31.24
DD1.28	1.31	1.28	32.51	1.26	32.00
DD1.31	1.34	1.31	33.27	1.30	33.02
DD1.34	1.37	1.34	34.03	1.31	33.27
DD1.37	1.40	1.37	34.79	1.34	34.03
DD1.40	1.43	1.40	35.56	1.37	34.79
PRICING:	\$12.40 each		100 & up: \$9.92 each		Minimum Order \$25.00

The Double Doodad is manufactured by cementing 2 Doodads together using a special bonding.

Q: Why is the Gadget Chip Deflector better than the floating chip deflector?

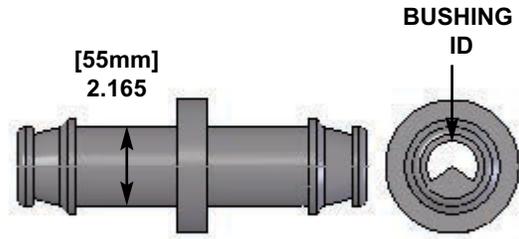
A: Some floating chip deflectors can fit too tight or become damaged and move forward as the gun drill moves, blocking the hole, allowing chips to back up, which often causes the drill tip to break off. Our Gadget Chip Deflector is attached to the Doodad and does not float. The metal Gadget Deflector does not wear out easily. It can be used over and over again. The Gadget Cap is the only part that wears out over time and is easily replaced. We do make a Gadget Cap out of hard coated aluminum for longer life. These Caps are made to order. Our Gadget Chip Deflectors can also be used as a floating chip deflector without the Gadget Cap. Our chip deflectors do not have a plastic backing acting as a seal which can fit too tight and cause problems. Ours fits loose, so if you use it as a floating chip deflector (without the Gadget Cap) it can't get stuck on the tube and move forward with the drill. If you break drill tips or tubing once in a while it could be caused by a stuck chip deflector on the tube with chips stacking up in the drilled part.

(see pp. 39-41 for more **Questions and Answers**)

Double Doodad™

Whip Guide Bushings for the Chip Box
B700 Bearing Series (55mm)

Twice the bearing surface, creates a better seal around the tube, helps control whipping. The Double Doodads absorb more vibration in the CHIP BOX. For a proper fit every time, measure the tube NOT the drill.



B700 Bearing (87511) 27mm X 100mm X 55mm
(62112RS) 21mm X 100mm X 55mm
Self centering pilot, pop in design.

B700 Bearing Series

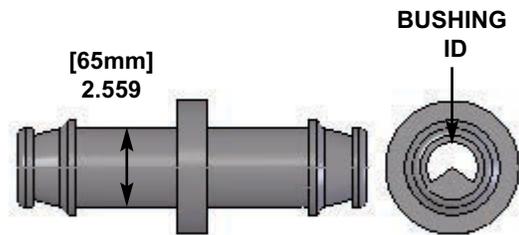
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
DD1.43	1.46	1.43	36.32	1.41	35.81
DD1.46	1.50	1.46	37.08	1.44	36.57
DD1.50	1.56	1.50	38.1	1.48	37.59
DD1.56	1.62	1.56	39.62	1.55	39.37
DD1.62	1.68	1.62	41.14	1.61	40.89
DD1.68	1.75	1.68	42.67	1.67	42.41
PRICING:	\$14.00 each		100 & up: \$11.20 each		Minimum Order \$25.00

The Double Doodad is manufactured by cementing 2 Doodads together using a special bonding.

Double Doodad™

Whip Guide Bushings for the Chip Box
B800 Bearing Series (65mm)

Twice the bearing surface, creates a better seal around the tube, helps control whipping. The Double Doodads absorb more vibration in the CHIP BOX. For a proper fit every time, measure the tube NOT the drill.



B800 Bearing (87513) 31mm X 120mm X 65mm
(62132RS) 23mm X 120mm X 65mm
Self centering pilot, pop in design.

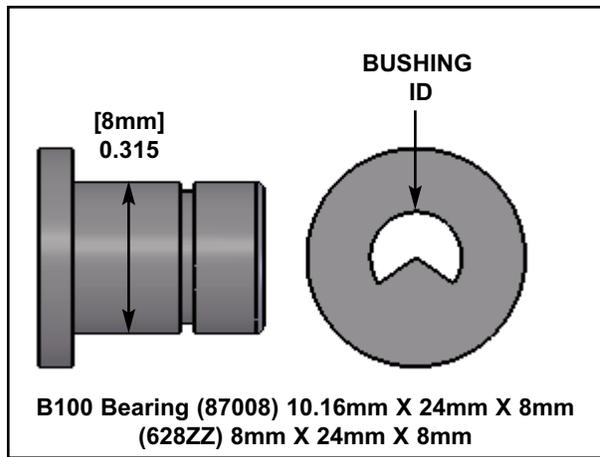
B800 Bearing Series

PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
DD1.75	1.81	1.75	44.45	1.73	43.94
DD1.81	1.87	1.81	45.97	1.80	45.72
DD1.87	1.93	1.87	47.49	1.86	47.24
DD1.93	2.00	1.93	49.02	1.92	48.76
DD2.18	2.25	2.18	55.37	2.18	55.37
PRICING:	\$16.00 each		100 & up: \$12.80 each		Minimum Order \$25.00

**Snap Ring
Whip Guide Bushings
B100 Bearing Series (8mm)**

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.

Snap Ring Part Number. SRB100-31

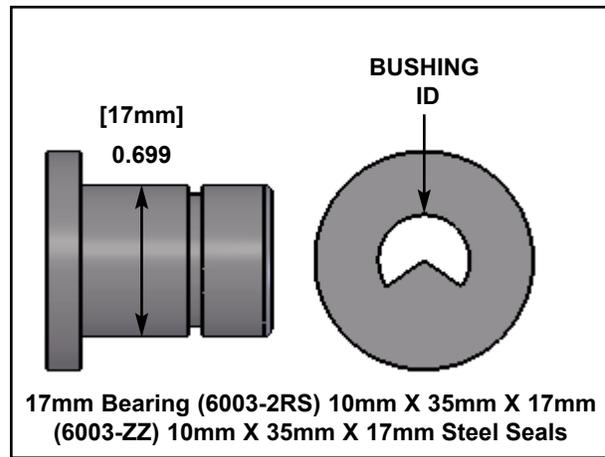


B100 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SW070		0.070	1.77	0.065	1.65
SW075	0.078	0.075	1.90	0.070	1.77
SW080		0.080	2.03	0.075	1.90
SW085	0.093	0.085	2.15	0.080	2.03
SW090		0.090	2.28	0.085	2.15
SW095	0.109	0.095	2.41	0.090	2.28
SW105		0.105	2.66	0.095	2.41
SW110		0.110	2.79	0.100	2.54
SW115	0.125	0.115	2.92	0.105	2.66
SW120		0.120	3.04	0.110	2.79
SW125		0.125	3.17	0.115	2.92
SW130	0.140	0.130	3.30	0.120	3.04
SW135		0.135	3.42	0.125	3.17
SW140	0.156	0.140	3.55	0.130	3.30
SW150		0.150	3.81	0.135	3.42
SW156	0.171	0.156	3.96	0.140	3.55
SW160		0.160	4.06	0.145	3.68
SW165		0.165	4.21	0.150	3.81
SW171	0.187	0.171	4.43	0.156	3.96
SW176		0.176	4.47	0.161	4.08
SW181		0.181	4.59	0.166	4.21
SW187	0.203	0.187	4.74	0.171	4.43
SW192		0.192	4.87	0.176	4.47
SW196		0.196	4.97	0.181	4.59
SW203-1	0.218	0.203	5.15	0.187	4.74
SW211-1		0.211	5.53	0.196	4.97
SW218-1	0.234	0.218	5.53	0.203	5.15
PRICING:	\$3.25 each		100 & up: \$2.60 each		Minimum Order \$25.00
PRICING:	SNAP RING for B100 Series		Part Number SRB100-31		\$0.12 each /\$10.00 per 100

Snap Ring Whip Guide Bushings

17mm Bearing Series

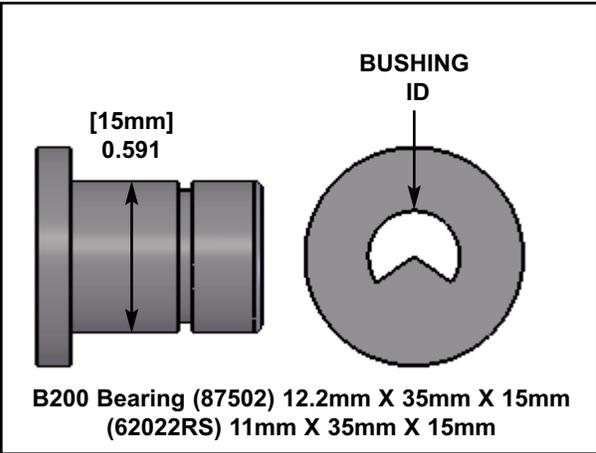
For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
Snap Ring Part Number. SRB17



17mm Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SW203-17		0.203	5.15	0.187	4.75
SW211-17		0.211	5.35	0.196	4.97
SW218-17	0.234	0.218	5.53	0.203	5.15
SW225-17		0.225	5.71	0.211	5.35
SW230-17		0.230	5.84	0.214	5.43
SW234-17	0.250	0.234	5.94	0.218	5.53
SW240-17		0.240	6.09	0.225	5.71
SW245-17		0.245	6.22	0.230	5.84
SW250-17	0.265	0.250	6.35	0.234	5.94
SW255-17		0.255	6.47	0.240	6.09
SW260-17		0.260	6.60	0.245	6.22
SW265-17	0.281	0.265	6.73	0.250	6.35
SW273-17		0.273	6.93	0.258	6.55
SW281-17	0.296	0.281	7.13	0.265	6.73
SW288-17		0.288	7.31	0.273	6.93
SW296-17	0.312	0.296	7.51	0.281	7.13
SW304-17		0.304	7.72	0.288	7.31
SW312-17	0.328	0.312	7.92	0.296	7.51
SW320-17		0.320	8.12	0.304	7.72
SW328-17	0.343	0.328	8.33	0.312	7.92
SW336-17		0.336	8.53	0.320	8.12
SW343-17	0.359	0.343	8.71	0.328	8.33
SW351-17		0.351	8.91	0.336	8.53
SW359-17	0.375	0.359	9.11	0.343	8.71
SW367-17		0.367	9.32	0.351	8.91
SW375-17	0.390	0.375	9.52	0.359	9.11
SW383-17		0.383	9.72	0.367	9.32
SW390-17	0.406	0.390	9.90	0.375	9.52
SW398-17		0.398	10.10	0.383	9.72
SW406-17	0.421	0.406	10.31	0.390	9.90
SW413-17		0.413	10.49	0.398	10.10
SW421-17	0.437	0.421	10.69	0.406	10.31
PRICING:	\$3.50 each	100 & up: \$2.80 each		Minimum Order \$25.00	
PRICING:	SNAP RING for 17mm Series	Part Number SRB17		\$0.15 each /\$12.00 per 100	

**Snap Ring
Whip Guide Bushings
B200 Bearing Series (15mm)**

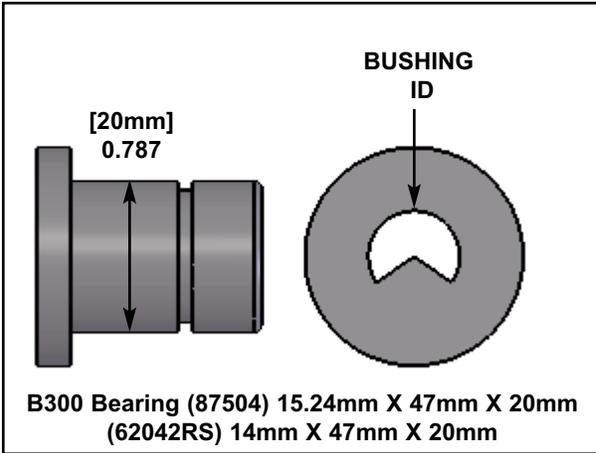
For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
Snap Ring Part Number. SRB200-59



B200 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SW203-2		0.203	5.15	0.187	4.75
SW211-2		0.211	5.35	0.196	4.97
SW218-2	0.234	0.218	5.53	0.203	5.15
SW225		0.225	5.71	0.211	5.35
SW230		0.230	5.84	0.214	5.43
SW234	0.250	0.234	5.94	0.218	5.53
SW240		0.240	6.09	0.225	5.71
SW245		0.245	6.22	0.230	5.84
SW250	0.265	0.250	6.35	0.234	5.94
SW255		0.255	6.47	0.240	6.09
SW260		0.260	6.60	0.245	6.22
SW265	0.281	0.265	6.73	0.250	6.35
SW273		0.273	6.93	0.258	6.55
SW281	0.296	0.281	7.13	0.265	6.73
SW288		0.288	7.31	0.273	6.93
SW296	0.312	0.296	7.51	0.281	7.13
SW304		0.304	7.72	0.288	7.31
SW312	0.328	0.312	7.92	0.296	7.51
SW320		0.320	8.12	0.304	7.72
SW328	0.343	0.328	8.33	0.312	7.92
SW336		0.336	8.53	0.320	8.12
SW343	0.359	0.343	8.71	0.328	8.33
SW351		0.351	8.91	0.336	8.53
SW359	0.375	0.359	9.11	0.343	8.71
SW367		0.367	9.32	0.351	8.91
SW375	0.390	0.375	9.52	0.359	9.11
SW383		0.383	9.72	0.367	9.32
SW390	0.406	0.390	9.90	0.375	9.52
SW398		0.398	10.10	0.383	9.72
SW406	0.421	0.406	10.31	0.390	9.90
SW413		0.413	10.49	0.398	10.10
SW421-2	0.437	0.421	10.69	0.406	10.31
PRICING:	\$3.50 each		100 & up: \$2.80 each		Minimum Order \$25.00
PRICING:	SNAP RING for B200 Series		Part Number SRB200-59		\$0.15 each /\$12.00 per 100

**Snap Ring
Whip Guide Bushings
B300 Bearing Series (20mm)**

For a proper fit every time, measure the Gun Drill Tube (**Not the Drill**) and pick a part number as close as you can to the tube diameter.
Snap Ring Part Number. SRB300-78

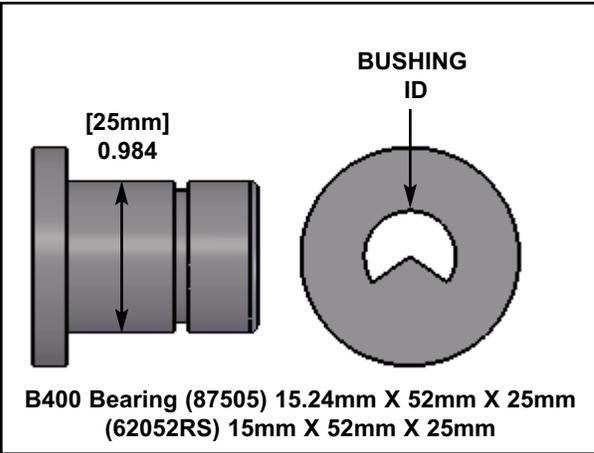


B300 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SW421-3	0.437	0.421	10.69	0.406	10.31
SW429		0.429	10.89	0.414	10.51
SW437	0.453	0.437	11.09	0.421	10.69
SW445		0.445	11.30	0.429	10.89
SW453	0.468	0.453	11.50	0.437	11.09
SW461		0.461	11.70	0.445	11.30
SW468	0.484	0.468	11.88	0.453	11.50
SW476		0.476	12.09	0.461	11.70
SW484	0.500	0.484	12.29	0.468	11.88
SW492		0.492	12.49	0.476	12.09
SW500	0.515	0.500	12.70	0.484	12.29
SW508		0.508	12.90	0.492	12.49
SW515	0.531	0.515	13.08	0.500	12.70
SW524		0.524	13.30	0.508	12.90
SW531	0.546	0.531	13.48	0.515	13.08
SW539		0.539	13.69	0.524	13.30
SW546	0.562	0.546	13.86	0.531	13.48
SW554		0.554	14.07	0.539	13.69
SW562	0.578	0.562	14.27	0.546	13.86
SW570		0.570	14.47	0.554	14.07
SW578	0.593	0.578	14.68	0.562	14.27
SW585		0.585	14.85	0.570	14.47
SW593-3	0.609	0.593	15.06	0.578	14.68
PRICING:	\$3.75 each	100 & up: \$3.00 each		Minimum Order \$25.00	
PRICING:	SNAP RING for B300 Series	Part Number SRB300-78		\$0.20 each /\$15.00 per 100	

2-Flute Whip Guide Bushings, 4-Flute Whip Guide Bushings.
No matter what your looking for, we can get you what you want.
When it comes to specials, we can do the mold design the same day you send in your request. It takes about 4 to 6 weeks to get you the new designed bushing.

**Snap Ring
Whip Guide Bushings
B400 Bearing Series (25mm)**

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
Snap Ring Part Number. SRB400-98



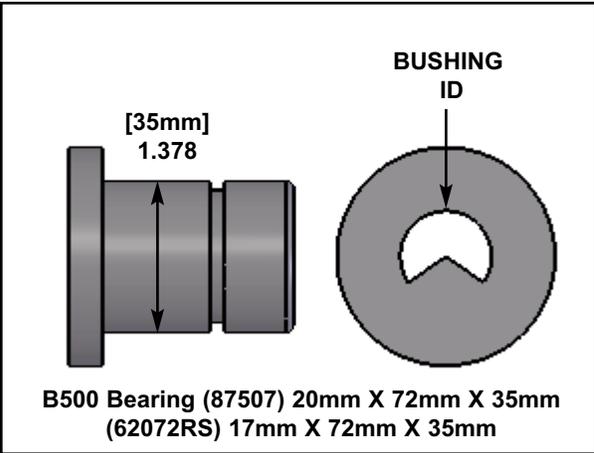
B400 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SW593-4	0.609	0.593	15.06	0.578	14.68
SW601		0.601	15.26	0.586	14.88
SW609	0.625	0.609	15.46	0.593	15.06
SW617		0.617	15.67	0.601	15.26
SW625	0.640	0.625	15.87	0.609	15.46
SW633		0.633	16.07	0.617	15.67
SW640	0.656	0.640	16.25	0.625	15.87
SW648		0.648	16.45	0.633	16.07
SW656	0.671	0.656	16.66	0.640	16.25
SW664		0.664	16.86	0.648	16.45
SW671	0.687	0.671	17.04	0.656	16.66
SW679		0.679	17.24	0.664	16.86
SW687	0.703	0.687	17.44	0.671	17.04
SW695		0.695	17.65	0.679	17.24
SW703	0.718	0.703	17.85	0.687	17.44
SW710		0.710	18.03	0.695	17.65
SW718	0.734	0.718	18.23	0.703	17.85
SW726		0.726	18.44	0.710	18.03
SW734-4	0.750	0.734	18.64	0.718	18.23
SW742		0.742	18.84	0.725	18.41
SW750-4	0.765	0.750	19.05	0.734	18.64
PRICING:	\$5.25 each		100 & up: \$4.20 each		Minimum Order \$25.00
PRICING:	SNAP RING for B400 Series		Part Number SRB400-98		\$0.20 each /\$15.00 per 100

PLEASE NOTE

Our whip guide bushings are manufactured using only Pure Virgin Resin. We do not buy recycled material to make whip guide bushings. We do not reuse our scrap and mix it with our Virgin Resin. If someone tells you that our material is not the same as theirs, ask them for a data sheet showing you the difference so you can see for yourself.

**Snap Ring
Whip Guide Bushings
B500 Bearing Series (35mm)**

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
For Reaming, match the BUSHING ID.
Snap Ring Part Number. SRB500-137



B500 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SW734-5	0.750	0.734	18.64	0.718	18.23
SW750-5	0.765	0.750	19.05	0.734	18.64
SW765	0.781	0.765	19.43	0.750	19.05
SW781	0.796	0.781	19.83	0.765	19.43
SW796	0.812	0.796	20.21	0.781	19.83
SW812	0.828	0.812	20.62	0.796	20.21
SW828	0.843	0.828	21.01	0.812	20.62
SW843	0.859	0.843	21.41	0.828	21.03
SW859	0.875	0.859	21.81	0.843	21.41
SW875	0.890	0.875	22.22	0.859	21.81
SW890	0.906	0.890	22.60	0.875	22.22
SW906	0.921	0.906	23.01	0.890	22.60
SW921	0.937	0.921	23.39	0.906	23.01
SW937	0.953	0.937	23.79	0.921	23.39
SW953	0.968	0.953	24.20	0.937	23.79
SW968	0.984	0.968	24.58	0.953	24.20
SW984	1.00	0.984	24.99	0.968	24.58
SW1.00-5	1.03	1.00	25.40	0.984	24.99
PRICING:	\$5.75 each		100 & up: \$4.60 each		Minimum Order \$25.00
PRICING:	SNAP RING for B500 Series		Part Number SRB500-137		\$0.20 each /\$15.00 per 100

Q: What types of testing have you done on whipping?
A: We built a small device that we could get up to 10,000 RPM. We then took a 1/8 gun drill and had 8 inches between whip guide supports. With standard adaptors, having only one drill bushing installed, we increased RPM until we saw whipping. Around 3,000 RPM the 1/8 diameter tube was whipping about the size of a nickel. We then installed a set of whip guide stabilizers on both guide supports and were able to increase the RPM to 10,000 with very little whip.
 (see pp. 39-41 for more **Questions and Answers**)

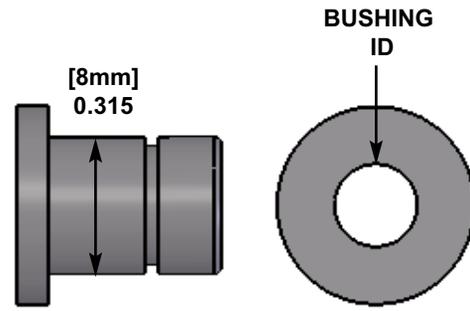
Snap Ring

Round Hole Whip Guide Bushings for
Drilling & Reaming and BTA Tools
B100 Bearing Series (8mm)

For a proper fit every time, measure the Gun Drill
Tube (Not the Drill) and pick a part number as
close as you can to the tube diameter.

For Reaming, match the BUSHING ID.

Snap Ring Part Number. SRB100-31



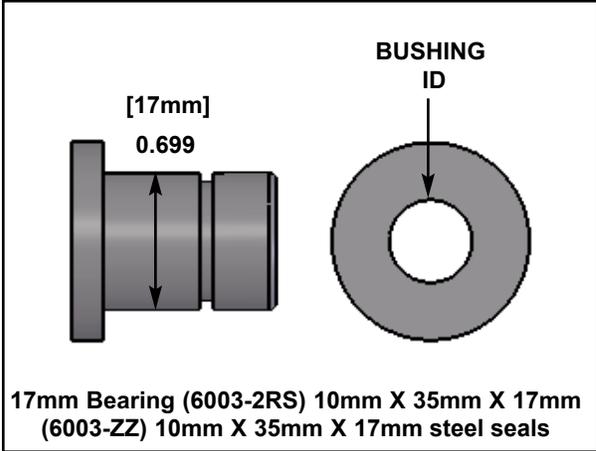
B100 Bearing (87008) 10.16mm X 24mm X 8mm
(628ZZ) 8mm X 24mm X 8mm

B100 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SR070		0.070	1.77	0.065	1.65
SR075	0.078	0.075	1.90	0.070	1.77
SR080		0.080	2.03	0.075	1.90
SR085	0.093	0.085	2.15	0.080	2.03
SR090		0.090	2.28	0.085	2.15
SR095	0.109	0.095	2.41	0.090	2.28
SR105		0.105	2.66	0.095	2.41
SR110		0.110	2.79	0.100	2.54
SR115	0.125	0.115	2.92	0.105	2.66
SR120		0.120	3.04	0.110	2.79
SR125		0.125	3.17	0.115	2.92
SR130	0.140	0.130	3.30	0.120	3.04
SR135		0.135	3.42	0.125	3.17
SR140	0.156	0.140	3.55	0.130	3.30
SR150		0.150	3.81	0.135	3.42
SR156	0.171	0.156	3.96	0.140	3.55
SR160		0.160	4.06	0.145	3.68
SR165		0.165	4.21	0.150	3.81
SR171	0.187	0.171	4.43	0.156	3.96
SR176		0.176	4.47	0.161	4.08
SR181		0.181	4.59	0.166	4.21
SR187	0.203	0.187	4.74	0.171	4.43
SR192		0.192	4.87	0.176	4.47
SR196		0.196	4.97	0.181	4.59
SR203-1	0.218	0.203	5.15	0.187	4.74
SR211-1		0.211	5.53	0.196	4.97
SR218-1	0.234	0.218	5.53	0.203	5.15
PRICING:	\$3.25 each		100 & up: \$2.60 each		Minimum Order \$25.00
PRICING:	SNAP RING for B100 Series		Part Number SRB100-31		\$0.12 each /\$10.00 per 100

Snap Ring

Round Hole Whip Guide Bushings for Drilling & Reaming and BTA Tools 17mm Bearing Series

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
For Reaming, match the BUSHING ID.
Snap Ring Part Number. SRB17



17mm Bearing Series

PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SR203-17		0.203	5.15	0.187	4.75
SR211-17		0.211	5.35	0.196	4.97
SR218-17	0.234	0.218	5.53	0.203	5.15
SR225-17		0.225	5.71	0.211	5.35
SR230-17		0.230	5.84	0.214	5.43
SR234-17	0.250	0.234	5.94	0.218	5.53
SR240-17		0.240	6.09	0.225	5.71
SR245-17		0.245	6.22	0.230	5.84
SR250-17	0.265	0.250	6.35	0.234	5.94
SR255-17		0.255	6.47	0.240	6.09
SR260-17		0.260	6.60	0.245	6.22
SR265-17	0.281	0.265	6.73	0.250	6.35
SR273-17		0.273	6.93	0.258	6.55
SR281-17	0.296	0.281	7.13	0.265	6.73
SR288-17		0.288	7.31	0.273	6.93
SR296-17	0.312	0.296	7.51	0.281	7.13
SR304-17		0.304	7.72	0.288	7.31
SR312-17	0.328	0.312	7.92	0.296	7.51
SR320-17		0.320	8.12	0.304	7.72
SR328-17	0.343	0.328	8.33	0.312	7.92
SR336-17		0.336	8.53	0.320	8.12
SR343-17	0.359	0.343	8.71	0.328	8.33
SR351-17		0.351	8.91	0.336	8.53
SR359-17	0.375	0.359	9.11	0.343	8.71
SR367-17		0.367	9.32	0.351	8.91
SR375-17	0.390	0.375	9.52	0.359	9.11
SR383-17		0.383	9.72	0.367	9.32
SR390-17	0.406	0.390	9.90	0.375	9.52
SR398-17		0.398	10.10	0.383	9.72
SR406-17	0.421	0.406	10.31	0.390	9.90
SR413-17		0.413	10.49	0.398	10.10
SR421-17	0.437	0.421	10.69	0.406	10.31

PRICING:	\$3.50 each	100 & up: \$2.80 each	Minimum Order \$25.00
PRICING:	SNAP RING for 17mm Series	Part Number SRB17	\$0.15 each /\$12.00 per 100

Snap Ring

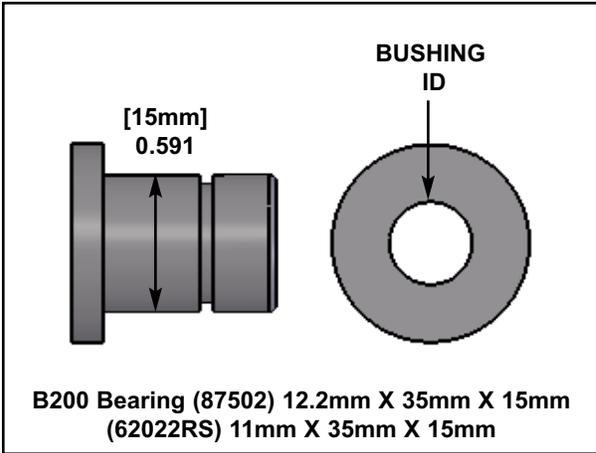
Round Hole Whip Guide Bushings for Drilling & Reaming and BTA Tools

B200 Bearing Series (15mm)

For a proper fit every time, measure the Gun Drill Tube (**Not the Drill**) and pick a part number as close as you can to the tube diameter.

For Reaming, match the BUSHING ID.

Snap Ring Part Number. SRB200-59

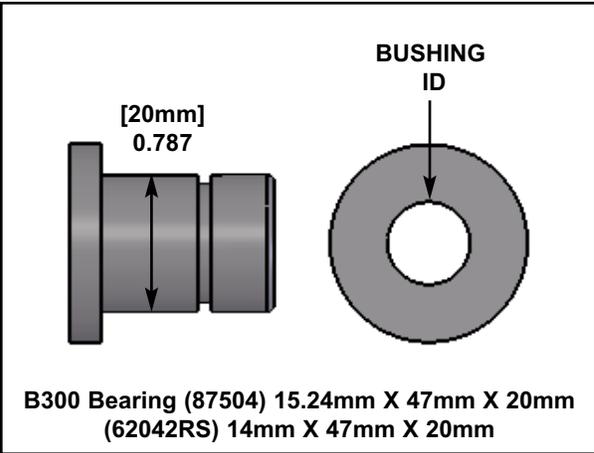


B200 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SR203-2		0.203	5.15	0.187	4.75
SR211-2		0.211	5.35	0.196	4.97
SR218-2	0.234	0.218	5.53	0.203	5.15
SR225		0.225	5.71	0.211	5.35
SR230		0.230	5.84	0.214	5.43
SR234	0.250	0.234	5.94	0.218	5.53
SR240		0.240	6.09	0.225	5.71
SR245		0.245	6.22	0.230	5.84
SR250	0.265	0.250	6.35	0.234	5.94
SR255		0.255	6.47	0.240	6.09
SR260		0.260	6.60	0.245	6.22
SR265	0.281	0.265	6.73	0.250	6.35
SR273		0.273	6.93	0.258	6.55
SR281	0.296	0.281	7.13	0.265	6.73
SR288		0.288	7.31	0.273	6.93
SR296	0.312	0.296	7.51	0.281	7.13
SR304		0.304	7.72	0.288	7.31
SR312	0.328	0.312	7.92	0.296	7.51
SR320		0.320	8.12	0.304	7.72
SR328	0.343	0.328	8.33	0.312	7.92
SR336		0.336	8.53	0.320	8.12
SR343	0.359	0.343	8.71	0.328	8.33
SR351		0.351	8.91	0.336	8.53
SR359	0.375	0.359	9.11	0.343	8.71
SR367		0.367	9.32	0.351	8.91
SR375	0.390	0.375	9.52	0.359	9.11
SR383		0.383	9.72	0.367	9.32
SR390	0.406	0.390	9.90	0.375	9.52
SR398		0.398	10.10	0.383	9.72
SR406	0.421	0.406	10.31	0.390	9.90
SR413		0.413	10.49	0.398	10.10
SR421-2	0.437	0.421	10.69	0.406	10.31
PRICING:	\$3.50 each		100 & up: \$2.80 each		Minimum Order \$25.00
PRICING:	SNAP RING for B200 Series		Part Number SRB200-59		\$0.15 each /\$12.00 per 100

Snap Ring

Round Hole Whip Guide Bushings for Drilling & Reaming and BTA Tools B300 Bearing Series (20mm)

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
 For Reaming, match the BUSHING ID.
 Snap Ring Part Number. SRB300-78



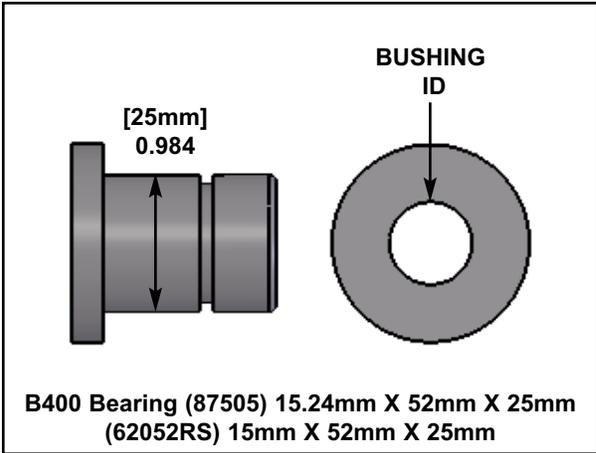
B300 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SR421-3	0.437	0.421	10.69	0.406	10.31
SR429		0.429	10.89	0.414	10.51
SR437	0.453	0.437	11.09	0.421	10.69
SR445		0.445	11.30	0.429	10.89
SR453	0.468	0.453	11.50	0.437	11.09
SR461		0.461	11.70	0.445	11.30
SR468	0.484	0.468	11.88	0.453	11.50
SR476		0.476	12.09	0.461	11.70
SR484	0.500	0.484	12.29	0.468	11.88
SR492		0.492	12.49	0.476	12.09
SR500	0.515	0.500	12.70	0.484	12.29
SR508		0.508	12.90	0.492	12.49
SR515	0.531	0.515	13.08	0.500	12.70
SR524		0.524	13.30	0.508	12.90
SR531	0.546	0.531	13.48	0.515	13.08
SR539		0.539	13.69	0.524	13.30
SR546	0.562	0.546	13.86	0.531	13.48
SR554		0.554	14.07	0.539	13.69
SR562	0.578	0.562	14.27	0.546	13.86
SR570		0.570	14.47	0.554	14.07
SR578	0.593	0.578	14.68	0.562	14.27
SR585		0.585	14.85	0.570	14.47
SR593-3	0.609	0.593	15.06	0.578	14.68
PRICING:	\$3.75 each	100 & up: \$3.00 each		Minimum Order \$25.00	
PRICING:	SNAP RING for B300 Series	Part Number SRB300-78		\$0.20 each /\$15.00 per 100	

Q: Is there any way we can get a better discount based on quantity, and take delivery at different times during the year?
A: Yes, we do offer bigger discounts based on yearly quantities. We can offer 1 year blanket orders, and we will ship your orders depending on the delivery schedule that is set up at the time we take your order.
 (see pp. 39-41 for more **Questions and Answers**)

Snap Ring

Round Hole Whip Guide Bushings for Drilling & Reaming and BTA Tools B400 Bearing Series (25mm)

For a proper fit every time, measure the Gun Drill Tube (Not the Drill) and pick a part number as close as you can to the tube diameter.
 For Reaming, match the BUSHING ID.
 Snap Ring Part Number. SRB400-98



B400 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SR593-4	0.609	0.593	15.06	0.578	14.68
SR601		0.601	15.26	0.586	14.88
SR609	0.625	0.609	15.46	0.593	15.06
SR617		0.617	15.67	0.601	15.26
SR625	0.640	0.625	15.87	0.609	15.46
SR633		0.633	16.07	0.617	15.67
SR640	0.656	0.640	16.25	0.625	15.87
SR648		0.648	16.45	0.633	16.07
SR656	0.671	0.656	16.66	0.640	16.25
SR664		0.664	16.86	0.648	16.45
SR671	0.687	0.671	17.04	0.656	16.66
SR679		0.679	17.24	0.664	16.86
SR687	0.703	0.687	17.44	0.671	17.04
SR695		0.695	17.65	0.679	17.24
SR703	0.718	0.703	17.85	0.687	17.44
SR710		0.710	18.03	0.695	17.65
SR718	0.734	0.718	18.23	0.703	17.85
SR726		0.726	18.44	0.710	18.03
SR734-4	0.750	0.734	18.64	0.718	18.23
SR742		0.742	18.84	0.725	18.41
SR750-4	0.765	0.750	19.05	0.734	18.64
PRICING:	\$5.25 each		100 & up: \$4.20 each		Minimum Order \$25.00
PRICING:	SNAP RING for B400 Series		Part Number SRB400-98		\$0.20 each /\$15.00 per 100

PLEASE NOTE
Snap Ring vs Doodad

We have tested the snap ring style bushing for over 3 years. They work just fine in most cases, but sometimes the snap ring pliers seem to find feet and walk away. The Doodad was designed with a self-aligning pilot for ease of installation. 16 Doodads can be installed in the bearings in under 1 minute. We use a small No.1 Arbor Press to push the Doodads into and out of the bearings. The No. 1 Arbor Press is less than \$75.00 (MSC catalog # 03891207). It's a great tool to have on your bench to install and remove the Doodads. The No. 1 Arbor Press is also perfect for replacing worn out bearings in the adaptors.

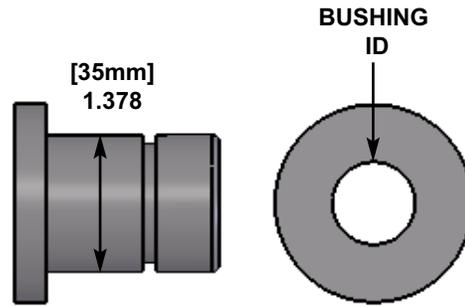
Snap Ring

Round Hole Whip Guide Bushings for
Drilling & Reaming and BTA Tools
B500 Bearing Series (35mm)

For a proper fit every time, measure the Gun Drill
Tube (Not the Drill) and pick a part number as
close as you can to the tube diameter.

For Reaming, match the BUSHING ID.

Snap Ring Part Number. SRB500-137



B500 Bearing (87507) 20mm X 72mm X 35mm
(62072RS) 17mm X 72mm X 35mm

B500 Bearing Series					
PART NUMBER	GUN DRILL SIZE	TUBE DIAMETER	TUBE DIA. MM	BUSHING ID	BUSHING ID MM
SR734-5	0.750	0.734	18.64	0.718	18.23
SR750-5	0.765	0.750	19.05	0.734	18.64
SR765	0.781	0.765	19.43	0.750	19.05
SR781	0.796	0.781	19.83	0.765	19.43
SR796	0.812	0.796	20.21	0.781	19.83
SR812	0.828	0.812	20.62	0.796	20.21
SR828	0.843	0.828	21.01	0.812	20.62
SR843	0.859	0.843	21.41	0.828	21.03
SR859	0.875	0.859	21.81	0.843	21.41
SR875	0.890	0.875	22.22	0.859	21.81
SR890	0.906	0.890	22.60	0.875	22.22
SR906	0.921	0.906	23.01	0.890	22.60
SR921	0.937	0.921	23.39	0.906	23.01
SR937	0.953	0.937	23.79	0.921	23.39
SR953	0.968	0.953	24.20	0.937	23.79
SR968	0.984	0.968	24.58	0.953	24.20
SR984	1.00	0.984	24.99	0.968	24.58
SR1.00-5	1.03	1.00	25.40	0.984	24.99
PRICING:	\$5.75 each		100 & up: \$4.60 each		Minimum Order \$25.00
PRICING:	SNAP RING for B500 Series		Part Number SRB500-137		\$0.20 each /\$15.00 per 100

Gun Drills will not give you a perfect diameter hole through the whole part. To get a perfect diameter hole through the whole part (+-0.0002) you must consider reaming the hole, if you need to maintain a close tolerance.

Using special bore gages we have checked drilled holes using gun drills with a 0.5000 diameter by 35 inches deep to see how perfect the holes were. There were sections that were up to 0.503 to 0.504 diameter using a new drill. We believe the problems to be chip weld causing the drill to move off center and drilling larger. We also believe that chips could get caught behind the back taper of the drill, moving the drill off center causing the same problems. Please share your feed back with us.

GADGET™

Chip Deflector

B100 thru B300 Doodads

The GADGET Chip Deflector Fits under the GADGET Cap. Then snaps onto the Doodad. The chip deflector is reusable over and over again. Can also be used without the Gadget Cap.



for B100 DOODAD Series (to be used with GADGET Cap #GCAP-B100)

PART NUMBER	GUNDRILL SIZE	GUNDRILL SIZE MM	CHIP DEFLECTOR ID MM
GCD078	0.078	2.0	2.23 (0.088)
GCD093	0.093	2.4	2.61 (0.103)
GCD109	0.109	2.8	3.02 (0.119)
GCD125	0.125	3.2	3.43 (0.135)
GCD140	0.140	3.6	3.81 (0.150)
GCD156	0.156	4.0	4.21 (0.166)
GCD171	0.171	4.4	4.60 (0.181)
GCD187	0.187	4.7	5.00 (0.197)
GCD203	0.203	5.2	5.41 (0.213)
GCD218-100	0.218	5.6	5.53 (0.218)

ANY SIZE \$2.75

for B200 DOODAD Series (to be used with GADGET Cap #GCAP-B200)

PART NUMBER	GUNDRILL SIZE	GUNDRILL SIZE MM	CHIP DEFLECTOR ID MM
GCD218-200	0.218	5.5	5.79 (0.228)
GCD234	0.234	5.9	6.19 (0.244)
GCD250	0.250	6.4	6.60 (0.260)
GCD265	0.265	6.7	6.98 (0.275)
GCD281	0.281	7.1	7.39 (0.291)
GCD296	0.296	7.5	7.77 (0.306)
GCD312	0.312	7.9	7.92 (0.312)
GCD328	0.328	8.3	8.58 (0.338)
GCD343	0.343	8.7	8.96 (0.353)
GCD359	0.359	9.1	9.37 (0.369)
GCD375	0.375	9.5	9.77 (0.385)
GCD390	0.390	9.9	10.16 (0.400)
GCD406	0.406	10.3	10.56 (0.416)
GCD421	0.421	10.7	10.97 (0.431)

ANY SIZE \$3.25

for B300 DOODAD Series (to be used with GADGET Cap #GCAP-B300)

PART NUMBER	GUNDRILL SIZE	GUNDRILL SIZE MM	CHIP DEFLECTOR ID MM
GCD437	0.437	11.1	11.35 (0.447)
GCD453	0.453	11.4	11.76 (0.463)
GCD468	0.468	11.9	12.14 (0.478)
GCD484	0.484	12.3	12.54 (0.494)
GCD500	0.500	12.6	12.95 (0.510)
GCD515	0.515	13.1	13.33 (0.525)
GCD531	0.531	13.4	13.74 (0.541)
GCD546	0.546	13.9	14.02 (0.552)
GCD562	0.562	14.3	14.52 (0.572)
GCD578	0.578	14.6	14.93 (0.588)
GCD593	0.593	15.1	15.31 (0.603)

ANY SIZE \$3.75

GADGET™
Chip Deflector
 B400 Doodads



The **GADGET Chip Deflector** Fits under the **GADGET Cap**. Then snaps onto the **Doodad**. The chip deflector is reusable over and over again. Can also be used without the Gadget Cap.

for B400 DOODAD Series (to be used with GADGET Cap #GCAP-B400)

PART NUMBER	GUNDRILL SIZE	GUNDRILL SIZE MM	CHIP DEFLECTOR ID MM
GCD609	0.609	15.5	15.72 (0.619)
GCD625	0.625	15.9	16.12 (0.635)
GCD640	0.640	16.3	16.51 (0.650)
GCD656	0.656	16.7	16.91 (0.666)
GCD671	0.671	17.1	17.29 (0.681)
GCD687	0.687	17.5	17.70 (0.697)
GCD703	0.703	17.9	18.11 (0.713)
GCD718	0.718	18.2	18.49 (0.728)
GCD734	0.734	18.7	18.89 (0.744)
GCD750	0.750	19.1	19.30 (0.760)

ANY SIZE \$4.75

You may just love our Gadget Chip Deflector design. Our Gadget Chip Deflector is attached to the Doodad and does not float. The metal Gadget Deflector does not wear out easily. It can be used over and over again. The Gadget Cap is the only part that wears out over time and is easily replaced. We do make a Gadget Cap out of hard-coated aluminum for longer life. These Caps are made to order.

Doodad with **GADGET Chip Deflector** installed.

GADGET™ CAP
 Chip Deflector Cap



Use this cap with the Chip Deflector.

DOODAD SERIES	PART NUMBER		PRICE EACH
D100	GCAP-B100		\$2.50
D200	GCAP-B200		\$3.00
D300	GCAP-B300		\$3.50
D400	GCAP-B400		\$4.00

GADGET™

Chip Deflector

B500 thru B800 Doodads

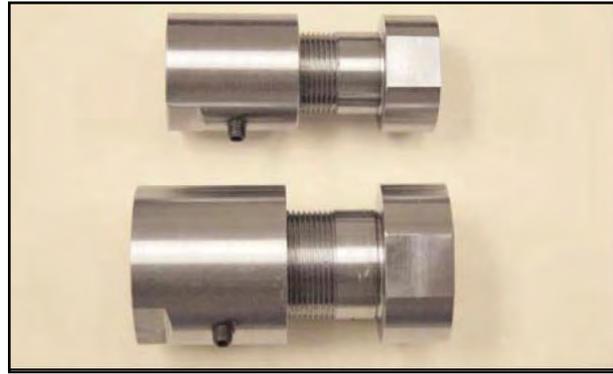
Loose fit design so they won't get stuck on the drill tube, when using without the Gadget Cap.



for B500 DOODAD Series (2.00 Outside Diameter)			
PART NUMBER	GUNDRILL SIZE	GUNDRILL SIZE MM	CHIP DEFLECTOR ID MM
GCD750-5	0.750	19.05	19.43 (0.765)
GCD765	0.765	19.43	19.83 (0.781)
GCD781	0.781	19.83	20.21 (0.796)
GCD796	0.796	20.21	20.62 (0.812)
GCD812	0.812	20.62	21.03 (0.828)
GCD828	0.828	21.03	21.41 (0.843)
GCD843	0.843	21.41	21.81 (0.859)
GCD859	0.859	21.81	22.22 (0.875)
GCD875	0.875	22.22	22.60 (0.890)
GCD890	0.890	22.60	23.01 (0.906)
GCD903	0.903	22.93	23.39 (0.921)
GCD921	0.921	23.39	23.79 (0.937)
GCD937	0.937	23.79	24.20 (0.953)
GCD953	0.953	24.20	24.58 (0.968)
GCD968	0.968	24.58	24.99 (0.984)
GCD984	0.984	24.99	25.40 (1.000)
GCD1.00	1.000	25.40	25.78 (1.015)
GCD1.03-5	1.030	26.16	26.54 (1.045)
ANY SIZE \$6.50			
for B600 DOODAD Series (2.50 Outside Diameter)			
PART NUMBER	GUNDRILL SIZE	GUNDRILL SIZE MM	CHIP DEFLECTOR ID MM
GCD1.03-6	1.03	26.16	26.54 (1.045)
GCD1.06	1.06	26.92	27.30 (1.075)
GCD1.09	1.09	27.68	28.06 (1.105)
GCD1.12	1.12	28.44	28.82 (1.135)
GCD1.15	1.15	29.21	29.59 (1.165)
GCD1.18	1.18	29.97	30.35 (1.195)
GCD1.21	1.21	30.73	31.11 (1.225)
GCD1.25	1.25	31.75	32.13 (1.265)
GCD1.28	1.28	32.51	32.89 (1.295)
GCD1.31	1.31	33.27	33.65 (1.325)
GCD1.34	1.34	34.03	34.41 (1.355)
GCD1.37	1.37	34.78	35.17 (1.385)
GCD1.40	1.40	35.56	35.94 (1.415)
GCD1.43	1.43	36.32	36.70 (1.445)
ANY SIZE \$7.50			
for B700 DOODAD Series (2.75 Outside Diameter)			
PART NUMBER	GUNDRILL SIZE	GUNDRILL SIZE MM	CHIP DEFLECTOR ID MM
GCD1.46	1.46	37.08	37.46 (1.475)
GCD1.50	1.50	38.10	38.48 (1.515)
GCD1.56	1.56	39.62	40.00 (1.575)
GCD1.62	1.62	41.14	41.52 (1.635)
GCD1.68	1.68	42.67	43.05 (1.695)
GCD1.75	1.75	44.45	44.83 (1.765)
ANY SIZE \$8.50			
for B800 DOODAD Series (3.00 Outside Diameter)			
PART NUMBER	GUNDRILL SIZE	GUNDRILL SIZE MM	CHIP DEFLECTOR ID MM
GCD1.81	1.81	45.97	46.35 (1.825)
GCD1.87	1.87	47.49	47.87 (1.885)
GCD1.93	1.93	49.02	49.40 (1.945)
GCD2.00	2.00	50.08	51.18 (2.015)
GCD2.25	2.25	57.15	57.53 (2.265)
ANY SIZE \$9.50			

Whip Guide Stabilizer™ B100 & B200 Doodads

For small drills (0.070-0.421), to increase your drilling feed rates you must control the whip of the drill shank. You can control whipping with the Whip Guide Stabilizer and Stabilizer adaptor.



PART NUMBER	B100 Doodad Whip Guide Stabilizer for Gundrill size .070-.218	PRICE EACH
ST100-DBSA	Stabilizer Assembly for the B100 Stabilizer Adaptor. Includes (1) Each ST100-DBSB & (1) Each ST100-DBSN (2) Each B100-1	\$120.00 Each
ST100-DBSB	Stabilizer Bolt	\$60.00 Each
ST100-DBSN	Stabilizer Nut	\$60.00 Each
ST100-DBSS	Pointed Set Screw	\$0.20 Each
B100-1	Stabilizer Bearing (628ZZ) 8mm x 24mm x 8mm	\$4.00 Each
PART NUMBER	B200 Doodad Whip Guide Stabilizer for Gundrill size .218-.421	PRICE EACH
ST200-DBSA	Stabilizer Assembly for the B200 Stabilizer Adaptor. Includes (1) Each ST200-DBSB & (1) Each ST200-DBSN (2) each B200-1	\$120.00 Each
ST200-DBSB	Stabilizer Bolt	\$60.00 Each
ST200-DBSN	Stabilizer Nut	\$60.00 Each
ST200-DBSS	Pointed Set Screw	\$0.20 Each
B200-1	Stabilizer Bearing (62022RS) 11mm x 35mm x 15mm	\$5.00 Each

Stabilizer™ Adaptor B100 & B200 Doodads

For small drills (0.070-0.421), to increase your drilling feed rates you must control the whip of the drill shank. You can control whipping with the Whip Guide Stabilizer and Stabilizer adaptor.



Stabilizer Adaptors (B100 Series)							
PART NUMBER	Adaptor Series	Adaptor ID	Adaptor Width	Adaptor OD	Adaptor Flange	Lock Screw	Price Each
SA1-1	A-1	0.875	0.500	1.249	1.750	1.093	\$80.00
SA1-2	A-2	0.875	0.500	1.624	2.125	1.281	\$80.00
SA1-3	A-3	0.875	0.500	2.124	2.625	1.531	\$80.00
SA1-4	A-4	0.875	0.500	2.374	2.875	1.656	\$80.00
SA1-5	A-5	0.875	0.500	3.124	3.625	2.032	\$80.00
Stabilizer Adaptors (B200 Series)							
SA2-1	A-1	1.125	0.500	1.249	1.750	1.093	\$80.00
SA2-2	A-2	1.125	0.500	1.624	2.125	1.281	\$80.00
SA2-3	A-3	1.125	0.500	2.124	2.625	1.531	\$80.00
SA2-4	A-4	1.125	0.500	2.374	2.875	1.656	\$80.00
SA2-5	A-5	1.125	0.500	3.124	3.625	2.032	\$80.00

Standard Adaptors & Standard Bearings



(Stabilizer Adaptors made to order)

If you want to make your own because of delivery,
we can email you the file in DXF or DWG format.
We have CNC lathes and CNC machining centers
so we can turn them out quick.

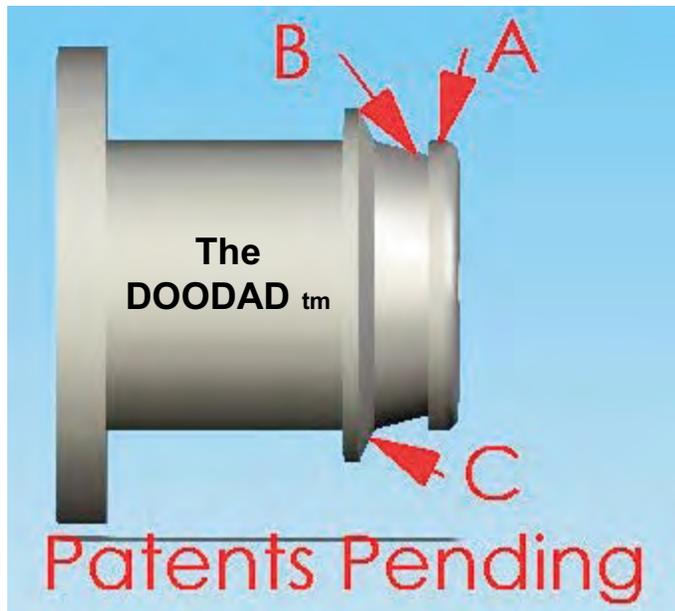
Standard Adaptors										
PART NUMBER	Bearing Adaptor	Bearing OD	Bearing ID	Old Bearing Width	New Bearing Width	Adaptor Width	Adaptor OD	Adaptor Flange	Lock Screw	Price Each
A-1	B100	.9449	.315	.400	.315	.750	1.249	1.750	1.093	\$80.00
A-2	B200	1.3780	.590	.480	.433	.750	1.624	2.125	1.281	\$80.00
A-3	B300	1.8504	.787	.600	.551	.875	2.124	2.625	1.531	\$80.00
A-4	B400	2.0472	.984	.600	.591	.875	2.374	2.875	1.656	\$80.00
A-5	B500	2.8346	1.378	.787	.669	1.125	3.124	3.625	2.032	\$85.00
A-6	B600	3.3465	1.771	.945	.748	1.250	3.624	4.125	2.281	\$85.00
A-7	B700	3.9370	2.165	1.063	.827	1.375	4.249	4.750	2.592	\$85.00
A-8	B800	4.7244	2.559	1.221	.906	1.500	4.999	5.500	2.967	\$85.00

Standard Bearings						
PART NUMBER	Bearing	Style	Width Inner Ring mm	Bearing OD mm	Bearing ID mm	Price Each
B100	87008	Old Style	10.16 (0.400)	24 (0.9448)	8 (0.3149)	\$6.00
B100-1	628ZZ	New Style	8 (0.3149)	24 (0.9448)	8 (0.3149)	\$4.00
B200	87502	Old Style	12.2 (0.480)	35 (1.3779)	15 (0.5905)	\$7.00
B200-1	62022RS	New Style	11 (0.4330)	35 (1.3779)	15 (0.5905)	\$5.00
B300	87504	Old Style	15.24 (0.600)	47 (1.8503)	20 (0.7874)	\$9.00
B300-1	62042RS	New Style	14 (0.5511)	47 (1.8503)	20 (0.7874)	\$5.00
B400	87505	Old Style	15.24 (0.600)	52 (2.0472)	25 (0.9842)	\$9.00
B400-1	62052RS	New Style	15 (0.5905)	52 (2.0472)	25 (0.9842)	\$5.50
B500	87507	Old Style	20 (0.7874)	72 (2.8346)	35 (1.3779)	\$16.00
B500-1	62072RS	New Style	17 (0.6692)	72 (2.8346)	35 (1.3779)	\$9.50
B600	87509	Old Style	24 (0.945)	85 (3.3464)	45 (1.7716)	\$24.00
B600-1	62092RS	New Style	19 (0.748)	85 (3.3464)	45 (1.7716)	\$17.00
B700	87511	Old Style	27 (1.063)	100 (3.9370)	55 (2.1653)	\$35.00
B700-1	62112RS	New Style	21 (0.8267)	100 (3.9370)	55 (2.1653)	\$30.00
B800	87513	Old Style	31 (1.221)	120 (4.7244)	65 (2.5590)	\$150.00
B800-1	62132RS	New Style	23 (0.9055)	120 (4.7244)	65 (2.5590)	\$40.00

We have been buying our bearings from the same place for over 30 years. We get the lowest prices anywhere. Call us before you buy. Prices subject to change based on availability. Need other bearings not listed? Give us a call.



Chip box with Gadget Snap On Chip Deflector and Whip Guide Stabilizer. Drill straighter and faster with the whip guide Stabilizers and Adaptors.



"A" Self-Centering Pilot for the bearing.
 "B" Hub for the snap-on Chip Deflector.
 "C" Reinforcement angle, keeps the Doodad bushing from popping out of the bearing.



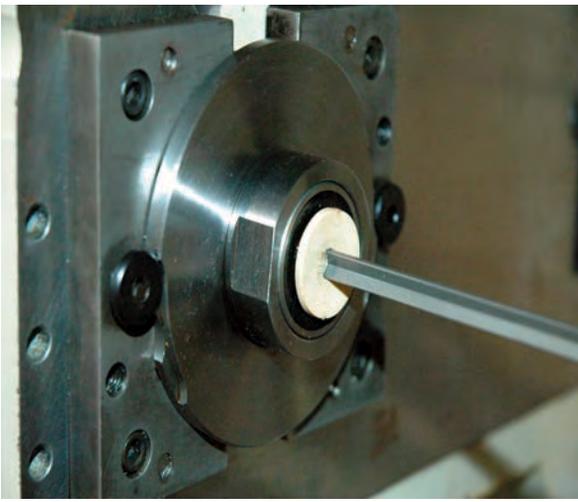
Whip Guide Stabilizers mounted on whip guide supports.
 This is the only way to control whipping. You can drill faster and get less runout.



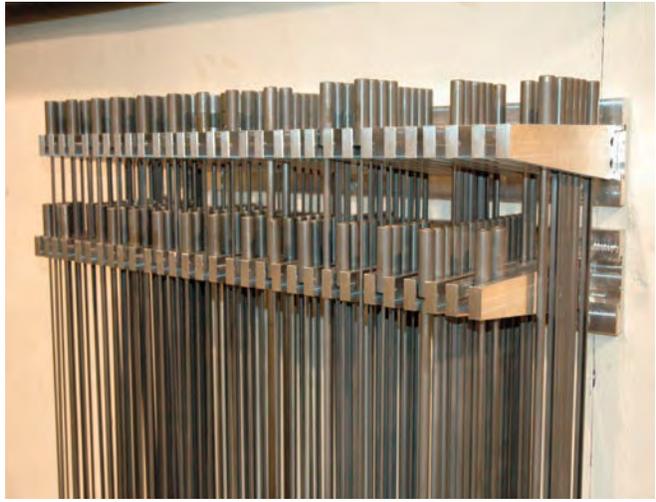
Bearings with Doodads installed.



Doodads are self-centering.
 They are easy to POP IN and OUT.



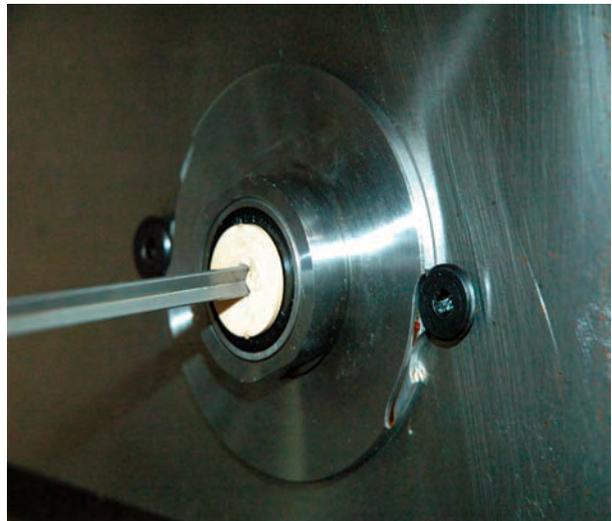
Stabilizer and Stabilizer adaptor for drilling, mounted on the whip guide support. There is only one way to control whipping. The Stabilizer is the only way.



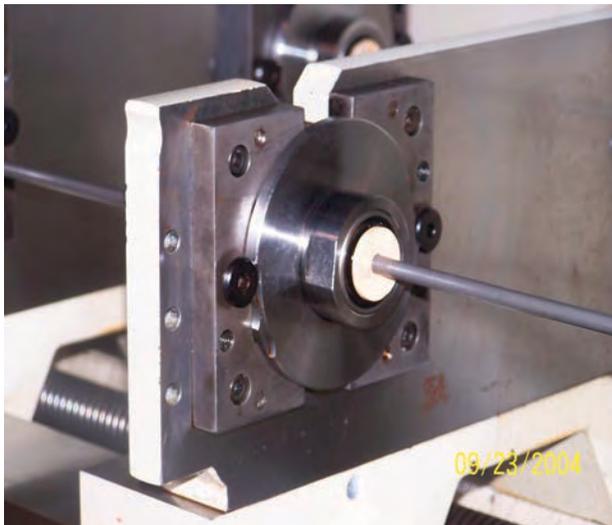
**Gun Drill Bracket (DOUBLE)
Hang your gun drills and keep them straight. 36 inches wide, 14 inches deep, 30 brackets, 15 drills each, HOLDS 450 Drills (3/4 inch driver)**



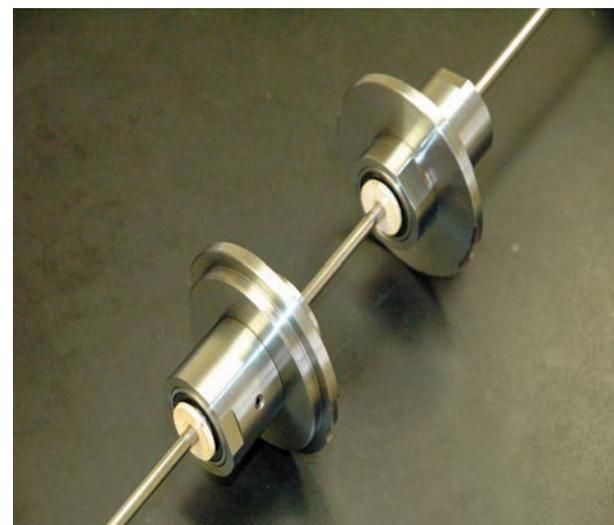
Double Doodad with snap on chip deflector, and the Whip Guide Stabilizer mounted on an Eldorado Adaptor. (This is sweet!)



Whip Guide Stabilizer and adaptor, mounted on the chip box. The long end of the stabilizer is in the chip box to control whipping.



Whip Guide Stabilizer and Adaptor mounted on a whip guide support used for Push and Pull Reaming.



Stabilizers for Reaming. The one on the left fits in the chip box. This shortens the unsupported length and helps bell mousing problems.

Questions & Answers

(Troubleshooting & Info)

(We submit the following as opinions only, based on our experience and judgment. Presented in Question & Answer format, this information is offered as possible guidelines and/or solutions to problems you may be having and is not intended to discredit or criticize gun drilling procedures currently being used in the industry.)

Q: Why do gun drills whip?

A: There is no way to stop single flute gun drills from whipping, and the faster the RPM the more the tube will whip. The reason is because the tube has been crimped 110-120 degrees. This moves the center of gravity off-center and now the tube is out of balance.

Q: My plastic whip guide bushings get hard after a while, can you tell me why?

A: The chemicals in the oil, sulfur and chlorine and many other chemicals attack the plastic, and over time the plastic gets very hard. Some people like the bushings harder.

Q: What types of testing have you done on whipping?

A: We built a small device that we could get up to 10,000 RPM. We then took a 1/8 gun drill and had 8 inches between whip guide supports. With standard adaptors, having only one drill bushing installed, we increased RPM until we saw whipping. Around 3,000 RPM the 1/8 diameter tube was whipping about the size of a nickel. We then installed a set of whip guide stabilizers on both guide supports and were able to increase the RPM to 10,000 with very little whip.

Q: What's so good about the DOUBLE Doodad?

A: The Double Doodad has twice the bearing surface, absorbs more vibration in the chip box caused by whipping, and helps control whipping by shortening the unsupported length. It also creates a better seal in the chip box.

Q: Why do I order Doodads by the tube size and not the drill size?

A: Since tube sizes for gun drills are not standard in the industry, you could order a 0.125 drill from two different manufacturers and end up with a different tube size from each company. It's also possible to order the same size drill from a company at two different times and end up with different tube sizes depending on which tube sizes the company had in stock when you placed your order. That's why you might find your whip guide bushings sometimes fit loose on a gun drill size you always work with. If the bushing fits too loose on the tube, it will generate more vibration caused from whipping.

Q: Once in a while when I start a drilling cycle, one of my drill tubes gets bent between the whip guide supports. Is that caused from wind-up?

A: No. It's not wind-up if the drill tube is bent. This problem occurs when using Stieber Chucks because you're only supposed to hand-tighten them. What you should do is hand-tighten with a spanner wrench. This should take care of the bending. We have seen a lot of this problem using small drills with high-pressure coolant 1200-1800 PSI. The pressure is hydraulic pressure, which pushes on the driver and moves the driver forward and bends the tube on the gun drill. When using 3/4 inch Stieber Chucks, you should use plain drivers without the milled section for a set screw and the driver should not measure any smaller than 0.7494.

Q: I have a 20-inch long part with requirements of a maximum 0.010 runout. Is there any way to control runout?

A: To control runout you must use a stabilizer in the chip box and on the steady rest. The most important thing is to order your gun drills with the tube diameter 0.005-0.007 smaller than the gun drill. If your drill is 0.125, then your tube should be 0.120-0.118, even if this means ordering your tubes center-less ground to get the tube size you need. It's necessary to have the unsupported length in the chip box as short as possible. This will keep the tube stiff and help control the whipping. The start hole will be straighter and the exit hole will have less runout. If the tube is not stiff and whips, the bending forces are transferred into the drill tip. Because of the back taper on the gun drill, these bending forces will keep the drill from starting straight and the runout will be greater.

Q: Do you make any special whip guide bushings?

A: Yes. No matter what your looking for, 2-Flute Whip Guide bushings or 4-Flute Whip Guide bushings, we can get you what you want. When it comes to specials, we can do the mold designs the same day you send in your request. It takes about 4 to 6 weeks to get you the new designed bushing.

Questions & Answers

(Troubleshooting & Info)

Q: When I order my gun drills I am told they don't have a tube 0.007 smaller than the drill. The only tube size available is 0.015 smaller. Is it okay to use a Gun Drill with a tube 0.015 smaller in size?

A: Yes. It is our opinion that the tube size should never be any smaller than 0.015 than the drill, for up to 1 inch drills, especially if you're drilling deep holes more than 10 inches deep. If you need to keep your runout to a minimum, you may want to see if you can order your tube center-less ground for the tube size you want before it's crimped. Try to keep your tube size 0.005 to 0.007 smaller than the drill. We have done a lot of testing on 1/2" holes. The drills were 0.490 diameter, tube size 0.464 (-0.026). The drills caused us a lot of problems. The drills gave us a lot of vibrating problems. We then tested drills 0.491 with tube sizes 0.484 (-0.007). We ran the same test 2000 RPM with a chip load of 0.001. We were able to drill 3500 inches with the same drill. Lots of our problems went away and we drilled 3 times as many parts. The material was 4150, PHT to 32 Rockwell. The temperature of our coolant was 100-110 degrees Fahrenheit, using gun drill C oil. On drill sizes of about 0.150 we order the tubes 0.005 smaller than the drill. This has shown in every case to give us less runout. Different material, different oil, oil pressure, and counter rotation may give different results. Please share your feedback with us, so we can get your ideas and experience.

Q: Do you make Whip Guide Stabilizers for larger adaptors?

A: Yes. We have designs for the B300 and B400. These are made to order.

Q: What can you tell me about coolant temperature?

A: We've gun drilled with coolant at 100 to 110 degrees Fahrenheit and have seen work hardening of heat sensitive steels such as chrome alloys and tool steels. We believe that such heat sensitive steels need the heat removed as fast as possible and that a coolant temperature of around 80 degrees Fahrenheit does this better. Work hardening can be a problem for some applications. Faster feed rates, will generate more friction, which will generate more heat, and can cause you a lot of problems. If your coolant is not cold enough, the drill can start binding and vibrate due to excessive heat build up in the work piece and gun drill tip.

Q: Have you done any testing on reaming?

A: Yes. Many people who ream prefer pull reaming. We have done tests on both. Pull reaming can cause bell mouthing to some degree on both the entrance and exit ends. We prefer push reaming because the reamers never have to come out of the machine. We shut the reamer off at the end of the stroke and pull the reamer back, leaving the oil still on. TIN & TIALN coated reamers will help galling problems. The reamers must be resharpened after the coating has been applied. Coolant temperature should be below 85 degrees Fahrenheit to remove heat build up caused by friction.

Q: What size reaming rod should I order with my reamers?

A: The reaming rods should be hardened to above 45-50 Rockwell C. You should have the rods about 0.007 to 0.010 smaller than the reamer. You should use whip guide stabilizers on your whip guide supports, as well as in the chip box. This will keep whipping from transferring forces into the reamer, thus keeping the reamer straight. Drilled holes should be 0.005 to 0.007 smaller than the finished reamed hole. If you need reaming information, give us a call.

Q: I use Pratt & Whitney gun drill machines. I don't spin the drills. I spin the part. Can I use the stabilizers, and what will they do for me?

A: The stabilizers will keep the tube from whipping when the drill is spinning at high RPM. On a Pratt & Whitney the stabilizers will help keep the tube from bending as much. By controlling the bending you will be able to increase your feed rate and drill faster. It is known, that the faster you drill, the higher the coolant pressure should be in order to get the chips out.

Q: What can you tell me about vibration?

A: Vibration is caused by many things. The major vibration is caused from whipping. **This type of vibration you will not hear**, but you will be able to feel the vibration by touching the part that is being drilled. Another vibration that you will hear, will be when the drill starts to get dull, or a chip welding problem. Another type of vibration that you will also hear is when the chips get stacked up in the drilled part and the drill and tube start to bind up. Chips backing up in the drilled part can be caused by a stuck chip deflector or chips getting too long and wrapping around the tube in the chip box. Another type of vibration you will also hear, is when the part gets too hot. This causes the carbide and the workpiece to expand and the drill starts to bind up and sometimes breaks. Another type of vibration you will hear is when the roller bearing in the chip box gets a lot of slop in it. A worn out roller bearing will confuse you at times and you will change out a drill, thinking that the drill is dull.

Questions & Answers

(Troubleshooting & Info)

Q: I have some DeHoff gun drilling machines. If I use tight whip guide bushings my whip guide supports pull back, and this winds up my gun drills. Do you have a fix for that?

A: If you use whip guide stabilizers with a larger bushing, this will help a lot. The real fix is to reprogram the machine to stop the drill at the end of the cycle. Now the drill is not spinning when the drill returns to home. We leave the coolant on while the drill is returning home. We notified Kay's Engineering and told them that we reprogrammed our PLC to stop the drill at the end of the drilling cycle. Kay's can modify your program for you so you can have an option to turn the spindle off at the end of the drilling cycle.

Q: Do you do any testing on your whip guide bushings?

A: Yes: We test them on our own gun-drilling machines. We try to improve vibration control, whipping control, gun drill run-out and also improve drilling speeds so you can maximize your production. So if you have a special application, like two different size holes meeting each other at some specified depth, a flat bottom section meeting another size hole, special reaming or gun boring, give us a call and we will give you any information we have.

Q: Why is the Gadget Chip Deflector better than the floating chip deflector?

A: Some floating chip deflectors can fit too tight or become damaged and move forward as the gun drill moves, blocking the hole, allowing chips to back up, which often causes the drill tip to break off. Our Gadget Chip Deflector is attached to the Doodad and does not float. The metal Gadget Deflector does not wear out easily. It can be used over and over again. The Gadget Cap is the only part that wears out over time and is easily replaced. We do make a Gadget Cap out of hard-coated aluminum for longer life. These Caps are made to order. Our Gadget Chip deflectors can also be used as a floating chip deflector without the Gadget Cap. Our chip deflectors do not have a plastic backing acting as a seal because they can fit too tight and cause problems. Ours fits loose, so it can't get stuck on the tube and move forward with the drill. If you break drill tips or break your tubing once in a while, it could be caused by a stuck chip deflector on the tube and chips are stacking up in the drilled part.

Q: Is there any way we can get a better discount based on quantity and take delivery at different times during the year?

A: Yes, we do give bigger discounts based on yearly quantities. We do offer 1 year blanket orders, and we will ship your orders depending on the delivery schedule that is set up at the time we take your order.

Q: How can I tell if I may have overheating caused by drilling?

A: Look at the exit hole. Easily seen discoloration or blue rings means that overheating has been caused by the drilling. If work hardening is an issue, lower temperature coolant may be needed. In some cases it doesn't matter what the hole looks like and drilling time is the only issue.

NOTE: Snap Ring vs Doodad

We have tested the snap ring style bushings for over 3 years. They work just fine in most cases, but sometimes the snap ring pliers seem to find feet and walk away. The Doodad was designed with a self-aligning pilot for ease of installation. 16 Doodads can be installed in the bearings in under 1 minute. We use a small No.1 Arbor Press to push the Doodads into and out of the bearings. The No. 1 Arbor Press is less than \$75.00 (MSC catalog # 03891207). It's a great tool to have on your bench to install and remove the Doodads. The No. 1 Arbor Press is also perfect for replacing worn out bearings in the adaptors.

NOTE: Gun Drills will not give you a perfect diameter hole through the whole part. To get a perfect diameter hole through the whole part (+-0.0002) or better, you must consider reaming the hole if you need to maintain a close tolerance.

Using special bore gages we have checked drilled holes using gun drills with a 0.5000 diameter by 35 inches deep to see how perfect the holes were. There were sections that were up to 0.503 to 0.504 diameter using a new drill. We believe the problems to be chip weld causing the drill to move off center and drilling larger. We also believe that chips could get caught behind the back taper of the drill, moving the drill off center, causing the same problems. Please share your feed back with us.

NOTE: Our whip guide bushings are manufactured using only Pure Virgin Resin.

We do not buy recycled material to make whip guide bushings. We do not reuse our scrap and mix it with our Virgin Resin. If someone tells you that our material is not the same as theirs, ask them for a data sheet showing you the difference so you can see for yourself.