



JEWEL BEARINGS

These miniature bearings are unsurpassed for low breakaway friction, long life, and resistance to harsh environments

Jewel bearings earned their reputation as reliable, low-friction devices by keeping watches and timepieces working accurately, some for over a century. In low-load and low-speed applications, they remain unequalled as maintenance free bearings in precision analog movements such as altimeters and guidance systems. Furthermore, advances in crystal growing and manufacturing now make the bearings cost-effective alternatives to conventional bearings in selected applications.

Ruby, sapphire, and hard glass make the best bearings because they are hard and take a near-perfect polish, down to 1 or 2 μm . While diamond holds promise as the ultimate jewel bearing material because of its extreme hardness and low friction, its high cost makes it unacceptable.

Jewel bearings perform best when loads are less than 500g and when constant speeds are low or momentary at higher rates but high loads and speed are possible.

Bird Precision sapphire and jewel bearings feature:

- **Low friction coefficient**
For steel-on-sapphire, Cf is 0.1 to 0.15.
- **High Hardness**
Sapphire has a compressive strength of 3000,000 psi (2,200 Knoop).
- **High temperature stability**
Melting point is about 2,050°C
- **Low relative cost**
Typically, a jewel bearing costs 20% as much as a ball bearing and 10% as much as a flexural pivot.
- **Tight concentricities**
To 0.0002" in most cases.

Standard Stock - Ruby and/or Sapphire Vee Jewels

(Specials Made to Order)

Partial List

RB Number	Radius	Thickness	Vee Depth	O.D.	Angle	MMØ
RB21001	.003	.027"	.009"	.0318"	85°	.80
	.004	.029"	.010"	.0322"	95°	
RB21002	.003	.032"	.010"	.0394"	80°	1.00
	.004	.033"	.015"	.0404"	85°	
RB21008	.003	.038"	.015"	.0488"	80°	1.25
	.004	.040"	.020"	.0493"	85°	
RB21009	.004	.040"	.015"	.0487"	75°	1.25
	.005	.041"	.020"	.0492"	85°	
RB21011	.005	.040"	.015"	.0487"	80°	1.25
	.006	.041"	.020"	.0492"	85°	
RB21014	.004	.045"	.018"	.0590"	80°	1.50
	.005	.046"	.023"	.0600"	90°	
RB21019	.007	.045"	.018"	.059"	75°	1.50
	.009	.046"	.023"	.060"	85°	
RB21021	.004	.055"	.022"	.0788"	75°	2.00
	.006	.060"	.025"	.0788"	85°	
RB21027	.006	.055"	.022"	.0788"	75°	2.00
	.009	.056"	.025"	.0798"	85°	

Standard Stock Olive - Hole Ring Jewels

Partial List

Part Number	I.D.	O.D.	Thickness
22386	.0125"/.0127"	.0621"/.0625"	.009"/.0110"
22193	.0200"/.0203"	.0796"/.0800"	.0177"/.0197"
22561	.0300"/.0302"	.0895"/.0900"	.019"/.021"
22271	.03177"/.03193"	.088"/.092"	.0236"/.0256"
22141	.0412"/.0414"	.0980"/.0984"	.0295"/.0305"
22122	.0500"/.0502"	.1195"/.1200"	.035"/.036"
22032	.0632"/.0634"	.1199"/.1201"	.0345"/.0355"
22002	.0657"/.0663"	.1199"/.1201"	.0340"/.0350"
22422	.0781"/.0783"	.148"/.150"	.040"/.042"
22087	.0938"/.0941"	.1876"/.1879"	.059"/.061"
22589	.1249"/.1251"	.2497"/.2503"	.039"/.041"



Standard Stock - Glass Vee Jewel Listing by Jewel Number

Jewel Number	Radius	Vee Depth	Angle	O.D.	Ground Thickness
<i>UNGROUND</i>					
4001	0.0040"-0.0050"	0.0150"-0.0180"	80° 90°	0.0490"-0.0500"	0.0520"
5001	0.0030"-0.0040"	0.0150"-0.0180"	75° 80°	0.0485"-0.0495"	0.0400"-0.0410"
5002	0.0030"-0.0040"	0.0180"-0.0220"	75° 85°	0.0485"-0.0495"	0.0390"-0.0400"
5003	0.0040"-0.0050"	0.0170"-0.0230"	75° 85°	0.0485"-0.0495"	0.0400"-0.0410"
5007	0.0040"-0.0060"	0.0100"-0.0120"	75° 85°	0.0485"-0.0495"	0.0400"-0.0410"
5032	0.0040"-0.0060"	0.0240"-0.0300"	50° & 75°	0.0520"-0.0530"	0.0400"
5092	0.0040"-0.0060"	0.0150"-0.0180"	75° 85°	0.0485"-0.0495"	0.0400"-0.0410"
5101	0.0030"-0.0040"	0.0150"-0.0180"	75° 80°	0.0485"-0.0495"	0.0350"-0.0360"
5117	0.0020"-0.0030"	0.0150"-0.0200"	70° 80°	0.0485"-0.0495"	0.0370"-0.0380"
5301	0.0030"-0.0040"	0.0150"-0.0180"	75° 80°	0.0485"-0.0495"	0.0320"-0.0330"
5701	0.0030"-0.0040"	0.0150"-0.0180"	75° 80°	0.0485"-0.0495"	0.0400"-0.0410"
5703	0.0040"-0.0050"	0.0170"-0.0230"	75° 85°	0.0485"-0.0495"	0.0350"-0.0360"
7002	0.0030"-0.0040"	0.0150"-0.0180"	75° 80°	0.0660"-0.0670"	0.0410"-0.0420"
7015	0.0040"-0.0050"	0.0200"-0.0250"	75° 85°	0.0660"-0.0670"	0.0450"-0.0460"
7017	0.0020"-0.0030"	0.0080"-0.0120"	85° 90°	0.0650"-0.0660"	
7022	0.0030"-0.0050"	0.0140"-0.0180"	70° 80°	0.0660"-0.0670"	0.0450"-0.0460"
7030	0.0020"-0.0030"	0.0180"-0.0230"	75° 80°	0.0660"-0.0670"	0.0450"-0.0460"
7135	0.0020"-0.0030"	0.0120"-0.0150"	75° 85°	0.0660"-0.0670"	0.0350"-0.0360"
7503	0.0050"-0.0060"	0.0250"-0.0280"	75° 85°	0.0740"-0.0750"	0.0500"-0.0510"
<i>UNGROUND</i>					
7506	0.0040"-0.0050"	0.0250"-0.0300"	80° 90°	0.0740"-0.0750"	0.0620"-0.0650"
<i>UNGROUND</i>					
7507	0.0030"-0.0040"	0.0100"-0.0160"	70° 90°	0.0740"-0.0780"	0.0550"-0.0900"
7801	0.0060"-0.0090"	0.0210"-0.0256"	75° 85°	0.0767"-0.0787"	0.0578"-0.0590"
8002	0.0063"-0.0094"	0.0216"-0.0256"	90° 100°	0.0795"-0.0805"	0.0500"-0.0510"
8004	0.0070"-0.0080"	0.0216"-0.0256"	90° 100°	0.0795"-0.0805"	0.0500"-0.0510"
9004	0.0060"-0.0090"	0.0280"-0.032"	85° 95°	0.0890"-0.0910"	0.0500"-0.0510"
10503	0.0060"-0.0080"	0.0280"-0.0330"	80° & 95°	0.1040"-0.1070"	0.0530"-0.0550"
11502	0.0060"-0.0090"	0.0290"-0.0350"	100° 105°	0.1125"-0.1175"	0.0700"-0.0750"

Standard Stock - Sapphire/Ruby Endstones

Partial List

RB Number	Ø	Thickness	Comments
RB23003	.0290-.0310	.0140-.0160	
RB23074	.0488-.0492	.0290-.0310	
RB23048	.0495-.0500	.0090-.0100	
RB23004	.0595-.0605	.0210-.0190	
RB23140	.0795-.0791	.0200-.0198	
RB23032	.0885-.0895	.0145-.0155	
RB23055	.1380-.1400	.0330-.0370	
RB23011	.2460-.2480	.0630-.0650	Blended Edges
RB23020	.1195-.1205	.0295-.0305	