



TABLE OF CONTENTS

Pictorial Index	ii
Introduction	vi
Part Number Index	ix
ABEC Tolerances	xi
Lubricants	1
Ball Bearings	2
Thrust Bearings & Washers	56
Needle Roller Bearings	67
Shell-Type Roller Clutches	74
Standard Duty Pillow & Mounting Blocks	76
Shafting	84
Linear Bearings	91
Frelon® Lined Sleeve Bearings	112
Pillow Blocks	117
Linear Guide Blocks & Rails	121
“V” Groove Guide Wheels & Track	123
Cam Followers	130
Sleeve Bearings	134
Nonmetallic	134
Self-Lubricating/Split-Type	140
Ultraprecision	160
Sintered Bronze	166
Bar Stock	186
Pressbearings	189
Rod Ends	219
Spherical Bearings	236
Bearing Spacers	243
Rosa Sistemi Linear Systems	251
Technical Section	T-1
Alphabetical Index	A-1



Miniature Instrument
Ball Bearings
p. 2 thru 18



Precision Ball Bearings
p. 19 thru 21



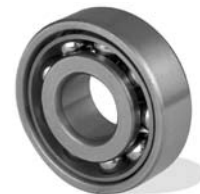
Commercial Plain Ball Bearings
p. 22



Single Row
Plain Ball Bearings
p. 23 thru 27



Double Row
Angular Contact Ball Bearings
p. 28 thru 29



Double Row
Self-Aligning Ball Bearings
p. 30



Single Row
Angular Contact Ball Bearings
p. 31 thru 34



Corrosion-Resistant, Stainless
Plain Ball Bearings
p. 35 thru 36



Thin Section Ball Bearings
p. 37 thru 45



Clamp type
Collar Bearings
p. 46



Flangette Unit
p. 47



Plastic Raceways Ball Bearings
p. 48 thru 52



Plastic Mounting & Pillow Blocks
p. 53 thru 55



Assorted
Thrust Bearings & Washers
p. 56 thru 66



Shell-Type
Needle Roller Bearings
p. 67 thru 71



Inner Races
For Needle Bearings
p. 72 thru 73



Shell-Type
Needle Roller Clutches
p. 74 thru 75



Standard Duty
Mounting & Pillow Blocks
p. 76 thru 81



Standard Duty
Ball Bearing Inserts
p. 82 thru 83



303 Stainless Steel
Solid Precision Shafting
p. 84 thru 88



Ceramic Coated Aluminum
Solid & Predrilled Shafting
p. 89



Ceramic Coated, Predrilled
One-piece Support Rail
p. 90



Linear Ball Bearings
p. 91 thru 99



Frelon® Lined
Linear & Sleeve Bearings
p.100 thru 116



Frelon® Lined
Pillow Blocks
p. 117 thru 120



Standard Type
Linear Guide Block
p. 121



Standard Type
Linear Guide Rail
p. 122



"V" Groove
Guide Wheels
p. 123 thru 125



Guide Wheel
Journals
p. 126



"V" Groove
Support Bushings
p. 127



"V" Groove
Track
p. 128 thru 129



Needle Bearing
Cam Followers
p. 130 thru 132



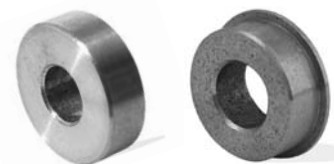
Needle Bearing
Cam Yoke Rollers
p. 133



Nonmetallic
Sleeve Bearings
p. 134 thru 139



Self-Lubricating | Split-Type
Sleeve Bearings
p. 140 thru 159



Ultraprecision
Sleeve Bearings
p. 160 thru 165



Small Series, Sintered Bronze
Sleeve Bearings
p. 166 thru 169



Standard Series, Sintered Bronze
Sleeve Bearings
p. 170 thru 185



Sintered Bronze
Cored Bar Stock
p. 186 thru 187



Sintered Bronze
Solid Bar Stock
p. 188



Sintered Bronze & Delrin
Pressbearings
p. 189 thru 200



Needle Roller Bearing & Clutch
Pressbearings
p. 201 thru 210



Sintered Bronze & Delrin
Flange Mounted Pressbearings
p. 211 thru 214



Needle Roller
Flange Mounted Pressbearings
p. 215 thru 218



Precision, Commercial & Extra Strength
Rod Ends
p. 219 thru 235



Precision & Commercial
Spherical Bearings
p. 236 thru 242



Inner Ring
Bearing Spacers
p. 243 thru 246



Outer Ring
Bearing Spacers
p. 247 thru 249



ABOUT THE COMPANY

- **Quality Bearings & Components (QBC)** is a division of the Designatronics, Inc. family.
- Established to serve the ever-increasing list of miniature bearing users, we have committed ourselves to increased levels of product knowledge and inventory.

Together with our extensive lubrication capabilities, housed in a certified class 1000 clean room environment, we believe our responsiveness to be second to none.

- Established in 1961, **Designatronics, Inc.** has throughout the years grown to be the largest manufacturer and distributor of small drive components in the industry.

This is due, in no small way, to a firm corporate commitment to customer service and quality – a heritage passed on to **Quality Bearings & Components**.

QBC CORPORATE QUALITY POLICY

IT IS OUR POLICY TO PRODUCE AND DELIVER QUALITY PRODUCTS, ON TIME, AT COMPETITIVE PRICES.

A handwritten signature in black ink, appearing to read 'Rich Imbro', written over a horizontal line.

Rich Imbro
Product Manager

A handwritten signature in black ink, appearing to read 'Martin Hoffman', written over a horizontal line.

Martin Hoffman
President



TERMS OF SALE

- Payment Terms:** Net 30 Days
- Credit:** New accounts having a satisfactory rating will receive open credit terms; otherwise, initial order may be on a C.O.D. basis pending credit approval. C.O.D. orders are subject to an additional handling charge.
- Shipments:** F.O.B. Garden City Park, New York. Merchandise will be shipped via U.P.S., Parcel Post or Federal Express, at our option, unless other arrangements have been made in advance.
- Returns and Exchanges:** All returns and exchanges must have prior written approval. Returns must be made within 15 days after receipt of material. Returned merchandise will be inspected and a charge made for restocking. No credit will be allowed on used or modified parts, or catalog parts purchased on a quantity basis. Notification of any shortages must be reported within 10 days after receipt of goods.
- Unforeseen Circumstances:** **Quality Bearings & Components** is not liable for delay or failure to perform any obligations hereunder by reason of circumstances beyond its reasonable control. These circumstances include, but are not limited to, accidents, acts of God, strikes or labor disputes, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials, and any other event beyond the control of **Quality Bearings & Components**.

NOTE: We reserve the right to make changes and corrections to both price and technical data without notice. Every effort has been made to provide accurate technical and product information. **Quality Bearings & Components** disclaims responsibility for any error or omission regarding technical and product information published.

All rights reserved herein and no portion of this catalog may be reproduced without the prior written consent of the company.



TERMS AND CONDITIONS OF LIMITED WARRANTY

WARRANTY

All mechanical items sold by **Quality Bearings & Components** are warranted against manufacturer's defects in material and workmanship for a period of 6 months from the time of shipment.

Quality Bearings & Components' sole obligation under this warranty is limited to repairing the product or, at **Quality Bearings & Component's** option, replacing the product, without additional charge. The provisions of this warranty shall not apply to any product which has been subjected to tampering, abuse, improper operating conditions, misuse, or lack of proper maintenance or lubrication. **Quality Bearings & Components** makes no warranty that its products are fit for any use or purpose to which they may be put by the customer, whether or not such use or purpose has been disclosed to **Quality Bearings & Components** via specifications, drawings or verbal communication.

This warranty is in lieu of all other warranties expressed or implied. **ALL OTHER WARRANTIES,**

INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER EXPRESSED, IMPLIED OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING, ARE HEREBY DISCLAIMED. There are no warranties that extend beyond the description contained on this page.

Limitation of remedy: In no event shall **Quality Bearings & Components** be liable for any incidental, consequential or special damages of any kind or nature whatsoever. **Quality Bearings & Components** is in no way liable for any lost profits arising from or connected to this agreement or items sold under this agreement, whether alleged to arise from breach of contract, expressed or implied warranty, or in tort, including, without limitation, negligence, failure to warn, or strict liability.



PART NUMBER INDEX

Part Number	pg.	Part Number	pg.	Part Number	pg.
BADCOM-BA..	127	BBXBLK-HFL...	81	BDBRSS-BLK...	211
BADCOM-BC..	127	BBXBLKMHSR...	121	BDBRSS-K...	191
BASCOM-B...	126	BBXBLK-UCF...	78	BDBRSSMBLK..	212
BASCOM-BA..	127	BBXBLK-UCP...	76	BDBRSSMK..	193
BASCOM-BC..	127	BBXBLK-UFL...	80	BDBRSSMS..	194
BBDFLG-S.PP...	47	BBXCAM-CF..	130	BDBRSS-S...	190
BBPBLD-...	54	BBXCAM-CN...	131	BDCRSSMNAK...	210
BBPBLF-...	53	BBXCAM-YN...	133	BDCRSS-NAK...	208
BBPBLK-...	55	BBXCOM-...	22	BDNRSSMNABLK..	218
BBPRIF-...	51	BBXCRC-K...	40	BDNRSSMNAK..	205
BBPRIX-I...	52	BBXFLG-S.PP..	46	BDNRSSMSABLK..	217
BBPRIXM..DR	50	BBXFLT-F...	8	BDNRSSMSAK..	205
BBPRIXM...	49	BBXFOR-K...	37	BDNRSSMSAS..	206
BBPRIX-R..ADR.	50	BBXINS-HC...	83	BDNRSS-NABLK...	216
BBPRIX-R..BDR.	50	BBXINS-UC...	82	BDNRSS-NAK...	202
BBPRIX-R..DR.	50	BBXLFXM...	15	BDNRSS-SABLK...	215
BBPRIX-R...	48	BBXLXXM...	11	BDNRSS-SAK...	202
BBRAILMHSR..	122	BBXRFX-...	21	BDNRSS-SAS...	203
BBSFLT-F...	8	BBXRIF-...	4	BESRFX-...	9
BBSHAF-...	84	BBXRIF-...	2	BESRIF-...	9
BBSHAF-CC...	89	BBXRXX-...	19	BESRIX-...	6
BBSHAF-CPDL...	89	BBXRXXM6...	26	BESRXX-...	6
BBSLFXM...	15	BBXRXXM60..	23	BEXRFX-...	9
BBSLXXM...	11	BBXRXXM62..	24	BEXRIF-...	9
BBSRFX-...	21	BBXRXXM63..	25	BEXRIX-...	6
BBSRIF-...	4	BBXRXXM69..	27	BEXRXX-...	6
BBSRIX-...	2	BBXSALM...	30	BGSCOM-...	123
BBSRIXMSS...	36	BCDFLZ-...	74	BGXCOM-...	123
BBSRIX-SSR..	35	BCDHFZ-..	74	BGXCOMMBW...	124
BBSRXX-...	19	BCDHFZM...	75	BGXCOMMSW...	125
BBSSUP-CCR...	90	BDARSS-BLK...	213	BHAINR-...	246
BBXANG-K...	43	BDARSS-K...	196	BHAOTR-...	249
BBXANGM...	28	BDARSSM..	200	BHSINR-...	243
BBXANGM7...	31	BDARSSMBLK..	214	BHSINRM...	245
BBXBLK-HCF...	79	BDARSSMK..	198	BHSOTR-...	247
BBXBLK-HCP...	77	BDARSS-S...	199	BHSOTRM...	248



PART NUMBER INDEX | Continued

Part Number	pg.	Part Number	pg.	Part Number	pg.
BKDCOM-T...D	129	BNDSCE-...	67	BSNFLN-..FTH..	157
BKDCOM-T...X	128	BPFCOM-...	242	BSNFLN-...U	163
BKHCOT-T...D	129	BPFFKS-...	241	BSNFLN-F...	183
BKHCOT-T...X	128	BPFLHA-...	239	BSNFLN-G...	168
BKSCOM-T...D	129	BPFLSS-...	236	BSNFLNMB...U	165
BKSCOM-T...X	128	BPFLSX-...	237	BSNFLNMF...	169
BKYCOM-T...D	129	BPFWSS-...	238	BSNFLNMMB...	158
BKYCOM-T...X	128	BPSLHS-...	240	BSNPLN-..TH..	140
BLAABX-FLA...	102	BRCFCR-...	234	BSNPLN-...U	160
BLAABX-FLAC...	103	BRCHFC-...	226	BSNPLNMB...U	162
BLAABX-FLC...	101	BRCHMC-...	225	BSNPLNMMB...	151
BLAABX-FLN...	106	BRCMCR-...	233	BSNPLNMP...	182
BLAABX-FLX...	100	BRFHFP-...	220	BSNPLN-P...	170
BLAABX-LCN...	107	BRFHFX-...	224	BSNPLN-Q...	166
BLAABX-PN...	119	BRFHMP-...	219	BSPFLN-...E	134
BLAABX-PX...	117	BRFHMx-...	223	BSPFLN-...T	138
BLAFMT-...	116	BRFSFGM...	222	BSPFLNM...E	135
BLAUBXMFMC..CP	104	BRFSMGm...	221	BSPFLNM...T	139
BLAUBXMFMC..CS	105	BRRCOF-SCF...	232	BSPPLN-...E	134
BLAUBXMFmN..OP	108	BRRCOM-SCM...	231	BSPPLN-...T	136
BLAUBXMFmN..OS	109	BRREXM-...	235	BSPPLNM...E	135
BLAUBXMFMT..CP	110	BRRODF-CM..	228	BSPPLNM...T	137
BLAUBXMMTC..CS	111	BRRODFMCF...	230	BTDASY-TB...	58
BLAUBXMPMN...	120	BRRODM-CM..	227	BTHASY-...	60
BLAUBXMPMX...	118	BRRODMCM...	229	BTHASYM...	61
BLSABX-SW...	93	BSARSS-K...	196	BTHBNGMAS...	57
BLSABX-SWS..OS	98	BSARSSMK..	198	BTHBNGMAXK...	56
BLXABXMSM..GOP..	99	BSBRSSMK..	193	BTNWAS-...	64
BLXABXMSM...	95	BSDRSS-K...	191	BTNWASM...	66
BLXABX-SW..GOS	96	BSLFLN-...	114	BTNWASMTW...	63
BLXABX-SW..OS	97	BSLFLNMS...	115	BTNWAS-TW...	62
BLXABX-SW...	91	BSLPLNMM...	113	BTYASY-...	60
BNDHKXM...	70	BSLPLN-P...	112	BTYASYM...	61
BNDIRX-...	73	BSNBAR-SSB..	188		
BNDIRXM...	72	BSNCOR-SCB...	186		



ABEC TOLERANCES-INNER RING

The following expresses bearing tolerances as established by the: "Annular Bearing Engineers Committee" (ABEC) of the: "Antifriction Bearing Manufacturers Association Inc." (AFBMA)

These standards are also recognized by the "American National Standards Institute Inc." (ANSI) and, by international agreement, they are accepted by the "International Organization of Standardization." (ISO)

ABEC 1 & ABEC 3

Bore Diameter				Bore Tolerances +.0000		Radial Runout		Width Tolerances +.0000	
mm		Inch		ABEC 1	ABEC 3	ABEC 1	ABEC 3	ABEC 1	ABEC 3
Over	Incl.	Over	Incl.						
0	10	0	.3937	-0.0003	-0.0002	±.0003	±.0002	-0.0050	-0.0050
10	18	.3937	.7087	-0.0003	-0.0002	±.0004	±.0003	-0.0050	-0.0050
18	30	.7087	1.1811	-0.0004	-0.0002	±.0005	±.0003	-0.0050	-0.0050
30	50	1.1811	1.9685	-0.0005	-0.0003	±.0006	±.0004	-0.0050	-0.0050
50	80	1.9685	3.1496	-0.0006	-0.0004	±.0008	±.0004	-0.0060	-0.0060
80	120	3.1496	4.7244	-0.0008	-0.0005	±.0010	±.0005	-0.0080	-0.0080

ABEC 5P, ABEC 7P & ABEC 9P

Bore Diameter				Bore Tolerances +.0000			Radial Runout Maximum			Width Variation Maximum			Ref. Runout with Bore Maximum		
mm		Inch		ABEC 5P	ABEC 7P	ABEC 9P	ABEC 5P	ABEC 7P	ABEC 9P	ABEC 5P	ABEC 7P	ABEC 9P	ABEC 5P	ABEC 7P	ABEC 9P
Over	Incl.	Over	Incl.												
0	10	0	.3937	-0.0002	-0.0002	-0.0001	±.00015	±.0001	±.00005	±.0002	±.0001	±.00005	±.0003	±.0001	±.00005
10	18	.3937	.7087	-0.0002	-0.0002	-0.0001	±.00015	±.0001	±.00005	±.0002	±.0001	±.00005	±.0003	±.0001	±.00005
18	30	.7087	1.1811	-0.0002	-0.0002	-0.0001	±.00015	±.00015	±.0001	±.0002	±.0001	±.00005	±.0003	±.00015	±.00005
30	50	1.1811	1.9685	-0.0002	-0.0002	-0.0001	±.0002	±.00015	—	±.0002	±.0001	—	±.0003	±.00015	—
50	80	1.9685	3.1496	-0.0003	-0.0002	-0.0001	±.0002	±.0002	—	±.0002	±.00015	—	±.0003	±.0002	—
80	120	3.1496	4.7244	-0.0003	-0.0025	-0.0001	±.0025	±.0002	—	±.0003	±.00015	—	±.0004	±.0002	—

ABEC 5P & ABEC 7P

Bore Diameter				Groove Runout with Reference Side Maximum		Width Tolerance +.0000		Bore 2-Point Out-of-Round Maximum		Bore Taper Maximum	
mm		Inch		ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P
Over	Incl.	Over	Incl.								
0	10	0	.3937	±.0003	±.0001	-0.0010	-0.0010	±.0001	±.0001	±.0001	±.0001
10	18	.3937	.7087	±.0003	±.0001	-0.0010	-0.0010	±.0001	±.0001	±.0001	±.0001
18	30	.7087	1.1811	±.0003	±.00015	-0.0010	-0.0010	±.0001	±.0001	±.0001	±.0001
30	50	1.1811	1.9685	±.0003	±.00015	-0.0010	-0.0010	—	—	—	—
50	80	1.9685	3.1496	±.0003	±.00015	-0.0010	-0.0015	—	—	—	—
80	120	3.1496	4.7244	±.0004	±.0002	-0.0015	-0.0015	—	—	—	—



ABEC TOLERANCES-OUTER RING

ABEC 1 & ABEC 3

Bore Diameter			Outer Dia. Tolerance Limit +.0000		Radial Runout		Width Tolerance +.0000		Flange Tolerances				
									Width Limits +.0000		Diameter Limits +.0050		
mm Over	Inch Incl.		ABEC 1	ABEC 3	ABEC 1	ABEC 3	ABEC 1	ABEC 3	ABEC 1	ABEC 3	ABEC 1	ABEC 3	
0	18	0	.7087	-0.0003	-0.0003	±.0006	±.0004	-0.0050	-0.0050	-0.0020	-0.0020	-0.0020	-0.0020
18	30	.7087	1.1811	-0.0004	-0.0003	±.0006	±.0004	-0.0050	-0.0050	-0.0020	-0.0020	-0.0020	-0.0020
30	50	1.1811	1.9685	-0.0005	-0.0003	±.0008	±.0004	-0.0050	-0.0050	-0.0020	-0.0020	-0.0020	-0.0020
50	80	1.9685	3.1496	-0.0005	-0.0004	±.0010	±.0005	-0.0050	-0.0050	—	—	—	—
80	120	3.1496	4.7244	-0.0006	-0.0004	±.0014	±.0007	-0.0050	-0.0050	—	—	—	—
120	150	4.7244	5.9055	-0.0008	-0.0005	±.0016	±.0008	-0.0050	-0.0050	—	—	—	—

ABEC 5P, ABEC 7P & ABEC 9P

Bore Diameter			Outer Dia. Tolerance Limit +.0000			Radial Runout Maximum			Width Variation Maximum			Outside Cylindrical Surface Runout with Reference Side Maximum			
												ABEC 5P	ABEC 7P	ABEC 9P	
mm Over	Inch Incl.		ABEC 5P	ABEC 7P	ABEC 9P	ABEC 5P	ABEC 7P	ABEC 9P	ABEC 5P	ABEC 7P	ABEC 9P	ABEC 5P	ABEC 7P	ABEC 9P	
0	18	0	.7087	-0.0002	-0.0002	-0.0001	±.0002	±.00015	±.00005	±.0002	±.0001	±.00005	±.0003	±.00015	±.00005
18	30	.7087	1.1811	-0.0002	-0.0002	-0.00015	±.0002	±.00015	±.0001	±.0002	±.0001	±.00005	±.0003	±.00015	±.00005
30	50	1.1811	1.9685	-0.0002	-0.0002	-0.00015	±.0002	±.00015	±.0001	±.0002	±.0001	±.00005	±.0003	±.00015	±.00005
50	80	1.9685	3.1496	-0.0003	-0.0003	-0.00015	±.0003	±.0002	±.0001	±.0002	±.00015	—	±.0003	±.00015	—
80	120	3.1496	4.7244	-0.0003	-0.0003	-0.00015	±.0004	±.0002	±.0001	±.0003	±.0002	—	±.0003	±.0002	—
120	150	4.7244	5.9055	-0.0004	-0.0004	-0.00015	±.0005	±.0003	±.0001	±.0003	±.0003	—	±.0004	±.0002	—

ABEC 5P & ABEC 7P

Bore Diameter			Flange Width Tolerance Limits Maximum +.0000		Flange Dia. Tolerance Limits Maximum +.0000		Outer Diameter 2-Point Out-of-Round Maximum		Groove Runout with Reference Side Maximum		
									ABEC 5P	ABEC 7P	
mm Over	Inch Incl.		ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	
0	18	0	.7087	-0.0020	-0.0020	-0.0010	-0.0010	±.0001	±.0001	±.0003	±.0002
18	30	.7087	1.1811	-0.0020	-0.0020	-0.0010	-0.0010	±.0001	±.0001	±.0003	±.0002
30	50	1.1811	1.9685	-0.0020	-0.0020	-0.0010	-0.0010	±.0001	±.0001	±.0003	±.0002
50	80	1.9685	3.1496	—	—	—	—	—	—	±.0004	±.0002
80	120	3.1496	4.7244	—	—	—	—	—	—	±.0005	±.0002
120	150	4.7244	5.9055	—	—	—	—	—	—	±.0005	±.0003

ABEC 5P & ABEC 7P

Bore Diameter			Width Tolerances +.0000		Outer Diameter Taper Maximum		
							ABEC 5P
mm Over	Inch Incl.		ABEC 5P	ABEC 7P	ABEC 5P	ABEC 7P	
0	18	0	.7087	-0.0010	-0.0010	±.0001	±.0001
18	30	.7087	1.1811	-0.0010	-0.0010	±.0001	±.0001
30	50	1.1811	1.9685	-0.0010	-0.0010	±.0001	±.0001
50	80	1.9685	3.1496	-0.0010	-0.0010	—	—
80	120	3.1496	4.7244	-0.0015	-0.0015	—	—
120	150	4.7244	5.9055	-0.0015	-0.0015	—	—



LUBRICANTS

Lubricant Code	Brand Name	Basic Type Oil	Operating Temp. °F	Uses
01	*Windsor L245X (MIL-L-6085A)	Synthetic oil	-65 to +300	Light general purpose instrument oil
15	DuPont Krytox 143 AC	Fluorinated oil	-30 to +550	High temperature stability with good lubricity properties
49	AeroShell #7 (MIL-G-23827A)	Diester	-100 to +300	Wide temperature range, good general purpose grease
54	Texaco Low Temp EP (MIL-G-23827A)	Synthetic Ester	-65 to +250	Low torque at cold temperature
20	*Exxon Beacon 325	Synthetic grease	-65 to +250	General purpose grease
39	*Exxon Andok C	Channeling petroleum grease	-20 to +250	Smooth running, long life with minimum migration
13	Toray SH44M	Silicone grease	-25 to +350	Higher temperature stability
48	*Mobil 28 (MIL-G-81322)	Synthetic hydrocarbon	-65 to +350	Wide temperature range, good low temperature torque, general purpose
72	Multemp PS No. 2	Petroleum grease	-60 to +250	Low torque, general purpose grease
75	Chevron SRI-2	Mineral grease	-20 to +350	High speed, high load grease
83	*Shell Alvania X2	Mineral grease	-30 to +250	Long life
10	DuPont Krytox 240AC (MIL-G-27617)	Fluorinated grease	-30 to +550	High temperature stability with good lubricity properties
12	KYODO SRL	Synthetic grease	-40 to +300	Low noise and low torque applications
25	NIG-ACE W	Synthetic grease	0 to +300	Low noise and low torque applications
40	Isoflex JL 032R	Synthetic grease	-60 to +250	High speed, low torque grease
04	U-1494	Synthetic grease	-40 to +350	High speed, high load applications

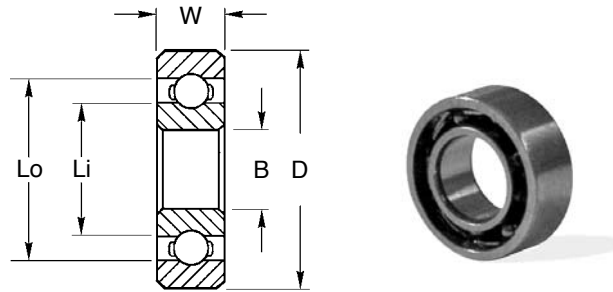
*Most popular and readily available lubrication.

If no lubrication is called out, QBC will ship bearings with one of these general purpose lubricants.



Miniature Instrument RADIAL BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel



NO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W Width	Land Dia. (Ref.)		Load Rating lbs.	
				Li Inner	Lo Outer	Dynamic	Static
BB □ RIX-2AXXX □ □ □	.0400	.1250	.0469	.064	.100	9	3
BB □ RIX-21/2XX □ □ □	.0469	.1562	.0625	.081	.124	16	5.3
BB □ RIX-3XXXX □ □ □	.0550	.1875	.0781	.093	.159	28	9.6
BB □ RIX-4XXXX □ □ □	.0781	.2500	.0937	.122	.193	35	12.1
BB □ RIX-3332XX □ □ □	.0937	.1875	.0625	.118	.161	19	6.5
BB □ RIX-5XXXX □ □ □		.3125	.1094	.173	.270	60	22
BB □ RIX-418XXX □ □ □		.2500	.0937	.161	.216	33	12.2
BB □ RIX-518XXX □ □ □	.1250	.3125	.1094	.173	.270	60	22
BB □ RIX-618XXX □ □ □		.3750	.1094	.173	.270	60	22
BB □ RIX-1218XX □ □ □		.7500	.1250	.225	.317	76	30
BB □ RIX-5532XX □ □ □	.1562	.3125	.1094	.221	.279	45	17
BB □ RIX-5632XX □ □ □	.1875	.3125	.1094	.221	.279	45	17
BB □ RIX-6632XX □ □ □		.3750	.1250	.235	.325	76	31
BB □ RIX-614XXX □ □ □	.2500	.3750	.1250	.285	.341	43	21
BB □ RIX-814XXX □ □ □		.5000	.1250	.330	.431	88	40
BB □ RIX-8516XX □ □ □	.3125	.5000	.1562	.362	.450	93	43
BB □ RIX-1038XX □ □ □	.3750	.6250	.1562	.457	.556	95	49
BB □ RIX-1212XX □ □ □	.5000	.7500	.1562	.587	.687	111	66
BB □ RIX-1412XX □ □ □		.8750	.2188	.622	.750	198	110
BB □ RIX-1458XX □ □ □	.6250	.8750	.1562	.713	.813	114	75
BB □ RIX-1634XX □ □ □	.7500	1.0000	.1562	.837	.937	126	92

LUBRICANT: See page 1 for available lubricants

MATERIAL:

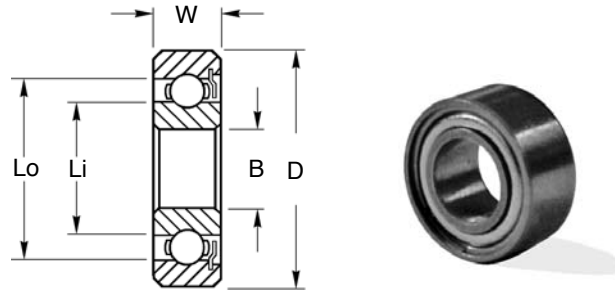
- S Stainless Steel
- X Chrome Steel

ABEC Tolerance: 1,3,5,7



Miniature Instrument RADIAL BALL BEARINGS-SHIELDED TYPE

• Stainless Steel • Chrome Steel



ONE AND TWO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W Width	Land Dia. (Ref.)		Load Rating lbs.	
				Li Inner	Lo Outer	Dynamic	Static
BB □ RIX-21/2 □ □ □ □ □	.0469	.1562	.0937	.081	.134	16	5.3
BB □ RIX-3XXX □ □ □ □ □	.0550	.1875	.0937	.093	.167	28	9.6
BB □ RIX-4XXX □ □ □ □ □	.0781	.2500	.1094	.122	.205	35	12.1
BB □ RIX-3332 □ □ □ □ □	.0937	.1875	.0937	.118	.167	19	6.5
BB □ RIX-5XXX □ □ □ □ □		.3125	.1094	.173	.282	60	22
BB □ RIX-418X □ □ □ □ □	.1250	.2500	.0937	.161	.228	33	12.2
BB □ RIX-518X □ □ □ □ □		.3125	.1094	.173	.282	60	22
BB □ RIX-618X □ □ □ □ □		.3750	.1094	.173	.282	60	22
BB □ RIX-1218 □ □ □ □ □		.7500	.1250	.225	.341	76	30
BB □ RIX-5532 □ □ □ □ □	.1562	.3125	.1094	.221	.285	45	17
BB □ RIX-5632 □ □ □ □ □	.1875	.3125	.1094	.221	.285	45	17
BB □ RIX-6632 □ □ □ □ □		.3750	.1250	.235	.341	76	31
BB □ RIX-614X □ □ □ □ □	.2500	.3750	.1250	.285	.348	43	21
BB □ RIX-814X □ □ □ □ □		.5000		.330	.452	88	40
BB □ RIX-8516 □ □ □ □ □	.3125	.5000	.1562	.362	.460	93	43
BB □ RIX-1038 □ □ □ □ □	.3750	.6250	.1562	.457	.556	95	49
BB □ RIX-1212 □ □ □ □ □	.5000	.7500	.1562	.587	.687	111	66
BB □ RIX-1412 □ □ □ □ □		.8750	.2812	.622	.783	198	110
BB □ RIX-1458 □ □ □ □ □	.6250	.8750	.1562	.713	.813	114	75
BB □ RIX-1634 □ □ □ □ □	.7500	1.0000		.837	.937	126	92

MATERIAL:
S Stainless Steel
X Chrome Steel

LUBRICANT: See page 1 for available lubricants

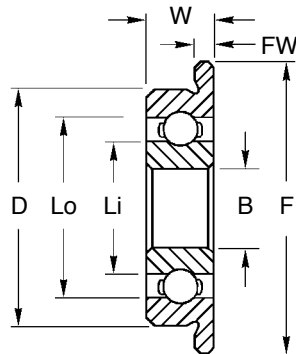
ABEC Tolerance: 1,3,5,7

TYPE:
ZX One Shield
ZZ Two Shields
LX One Teflon Seal
LL Two Teflon Seals



Miniature Instrument FLANGED BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel



NO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W Width	FW Flange Width	F Flange Dia.	Land Dia. (Ref.)		Load Rating lbs.	
						Li Inner	Lo Outer	Dynamic	Static
BB□RIF-21/2XX□□□	.0469	.1562	.0625	.013	.203	.081	.124	12.8	4.25
BB□RIF-3XXXXX□□□	.0550	.1875	.0781	.023	.234	.093	.159	22.4	7.68
BB□RIF-4XXXXX□□□	.0781	.2500	.0937	.023	.296	.122	.193	28.0	9.68
BB□RIF-3332XX□□□	.0937	.1875	.0625	.018	.234	.118	.161	15.2	5.20
BB□RIF-5XXXXX□□□	.0937	.3125	.1094	.023	.359	.173	.270	48.0	17.6
BB□RIF-418XXX□□□		.2500	.0937		.296	.161	.216	26.4	9.76
BB□RIF-518XXX□□□	.1250	.3125	.1094	.023	.359	.173	.270	48.0	17.6
BB□RIF-618XXX□□□		.3750	.1094		.422	.173	.270	48.0	17.6
BB□RIF-5532XX□□□	.1562	.3125	.1094		.359	.221	.279	36.0	13.6
BB□RIF-5632XX□□□	.1875	.3125	.1094	.023	.359	.221	.279	36.0	13.6
BB□RIF-6632XX□□□	.1875	.3750	.1250		.422	.235	.325	60.8	24.8
BB□RIF-614XXX□□□	.2500	.3750	.1250	.023	.422	.285	.341	34.4	16.0
BB□RIF-814XXX□□□	.2500	.5000	.1250	.023	.547	.330	.431	70.4	32.0
BB□RIF-8516XX□□□	.3125	.5000	.1562	.031	.547	.362	.450	74.4	34.4

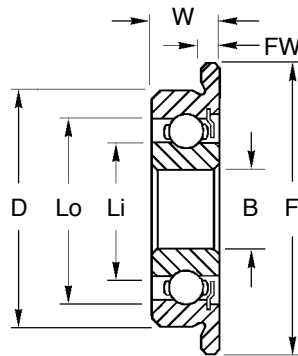
LUBRICANT: See page 1 for available lubricants

MATERIAL: **ABEC Tolerance: 1,3,5,7**
S Stainless Steel
X Chrome Steel



Miniature Instrument FLANGED BALL BEARINGS-SHIELDED TYPE

• Stainless Steel • Chrome Steel



ONE AND TWO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W Width	FW Flange Width	F Flange Dia.	Land Dia. (Ref.)		Load Rating lbs.	
						Li Inner	Lo Outer	Dynamic	Static
BB□RIF-21/2 □□□□□□	.0469	.1562	.0937		.203	.081	.134	12.8	4.25
BB□RIF-3XXX□□□□□□	.0550	.1875	.1094	.031	.234	.093	.167	22.4	7.68
BB□RIF-4XXX□□□□□□	.0781	.2500	.1406		.296	.122	.205	28.0	9.68
BB□RIF-3332□□□□□□	.0937	.1875	.0937	.031	.234	.118	.167	15.2	5.20
BB□RIF-5XXX□□□□□□	.0937	.3125	.1406		.359	.173	.282	48.0	17.6
BB□RIF-418X□□□□□□		.2500	.1094		.296	.161	.228	26.4	9.76
BB□RIF-518X□□□□□□	.1250	.3125	.1406	.031	.359	.173	.282	48.0	17.6
BB□RIF-618X□□□□□□		.3750	.1406		.422	.173	.282	48.0	17.6
BB□RIF-5532□□□□□□	.1562	.3125		.036	.359	.221	.285	36.0	13.6
BB□RIF-5632□□□□□□	.1875	.3125	.1250	.036	.359	.221	.285	36.0	13.6
BB□RIF-6632□□□□□□	.1875	.3750		.031	.422	.235	.341	60.8	24.8
BB□RIF-614X□□□□□□	.2500	.3750	.1250	.036	.422	.285	.348	34.4	16.0
BB□RIF-814X□□□□□□	.2500	.5000	.1875	.045	.547	.330	.452	70.4	32.0
BB□RIF-8516□□□□□□	.3125	.5000	.1562	.031	.547	.362	.460	74.4	34.4

MATERIAL:
S Stainless Steel
X Chrome Steel

LUBRICANT: See page 1 for available lubricants

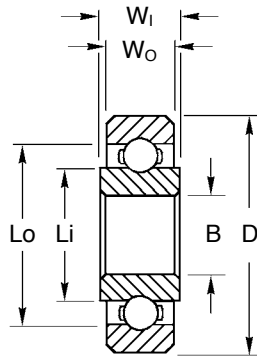
ABEC Tolerance: 1,3,5,7

TYPE:
ZX One Shield
ZZ Two Shields
LX One Teflon Seal
LL Two Teflon Seals



Miniature Instrument | Extended Inner Ring PLAIN BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel



NO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W ₁ inner Width	W ₀ Outer Width	Land Dia. (Ref.)		Load Rating lbs.	
					Li Inner	Lo Outer	Dynamic	Static
BE □ RIX-2XXXXX □ □ □	.0400	.1250	.0781	.0469	.059	.098	9	3
BE □ RIX-2 1/2 XX □ □ □	.0469	.1562	.0937	.0625	.077	.123	16	5.3
BE □ RIX-3XXXXX □ □ □	.0550	.1875	.1094	.0781	.091	.150	28	9.6
BE □ RIX-4XXXXX □ □ □	.0781	.2500	.1250	.0937	.122	.193	35	12.1
BE □ RIX-3332XX □ □ □	.0937	.1875	.0937	.0625	.117	.163	19	6.5
BE □ RIX-5XXXXX □ □ □		.3125	.1406	.1094	.176	.269	60	22
BE □ RIX-418XXX □ □ □	.1250	.2500	.1250	.0937	.157	.217	33	12.2
BE □ RIX-518XXX □ □ □		.3125	.1406	.1094	.176	.269	60	22
BE □ RIX-618XXX □ □ □		.3750	.1406	.1094	.204	.297	60	22
BE □ RXX-2XXXXX □ □ □	.1562	.1875	.1406	.1094	.200	.321	73	29
BE □ RIX-5532XX □ □ □		.3125	.1406	.1094	.220	.279	45	17
BE □ RIX-5632XX □ □ □	.1875	.3125	.1406	.1094	.220	.279	45	17
BE □ RIX-6632XX □ □ □		.3750	.1562	.1250	.232	.329	76	31
BE □ RXX-3XXXXX □ □ □		.5000	.1875	.1562	.276	.433	148	64
BE □ RIX-614XXX □ □ □	.2500	.3750	.1562	.1250	.283	.342	43	21
BE □ RIX-814XXX □ □ □		.5000	.1562	.1250	.330	.429	88	40
BE □ RXX-4XXXXX □ □ □		.6250	.2272	.1960	.364	.544	168	77
BE □ RIX-8516XX □ □ □		.3125	.5000	.2272	.1562	.362	.449	43

LUBRICANT: See page 1 for available lubricants

MATERIAL:

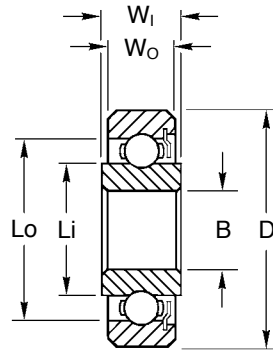
- S Stainless Steel
- X Chrome Steel

ABEC Tolerance: 1,3,5,7



Miniature Instrument | Extended Inner Ring PLAIN BALL BEARINGS-SHIELDED TYPE

• Stainless Steel • Chrome Steel



ONE AND TWO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W _i inner Width	W _o Outer Width	Land Dia. (Ref.)		Load Rating lbs.	
					Li Inner	Lo Outer	Dynamic	Static
BE □ RIX-2 1/2 □ □ □ □ □ □	.0469	.1562	.1250	.0937	.077	.123	16	5.3
BE □ RIX-3XXX □ □ □ □ □ □	.0550	.1875	.1406	.1094	.091	.150	28	9.6
BE □ RIX-4XXX □ □ □ □ □ □	.0781	.2500	.1719	.1406	.122	.193	35	12.1
BE □ RIX-3 3 3 2 □ □ □ □ □ □	.0937	.1875	.1250	.0937	.117	.163	19	6.5
BE □ RIX-5XXX □ □ □ □ □ □		.3125	.1719	.1406	.176	.269	60	22
BE □ RIX-4 1 8 X □ □ □ □ □ □	.1250	.2500	.1406	.1094	.157	.217	33	12.2
BE □ RIX-518XX □ □ □ □ □ □		.3125	.1719	.1406	.176	.269	60	22
BE □ RIX-618X □ □ □ □ □ □		.3750	.1719	.1406	.204	.297	60	22
BE □ RXX-2XXX □ □ □ □ □ □			.1875	.1562	.200	.321	73	29
BE □ RIX-5 5 3 2 □ □ □ □ □ □	.1562	.3125	.1562	.1250	.220	.279	45	17
BE □ RIX-5632 □ □ □ □ □ □	.1875	.3125	.1562	.1250	.220	.279	45	17
BE □ RIX-6632 □ □ □ □ □ □		.3750	.1562	.1250	.232	.329	76	31
BE □ RXX-3XXX □ □ □ □ □ □		.5000	.2272	.1960	.276	.433	148	64
BE □ RIX-6 1 4 X □ □ □ □ □ □	.2500	.3750	.1562	.1250	.283	.342	43	21
BE □ RIX-814X □ □ □ □ □ □		.5000	.2188	.1875	.330	.429	88	40
BE □ RXX-4XXX □ □ □ □ □ □		.6250	.2260	.1960	.364	.544	168	77
BE □ RIX-8 5 1 6 □ □ □ □ □ □	.3125	.5000	.1875	.1562	.362	.449	43	43

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3,5,7

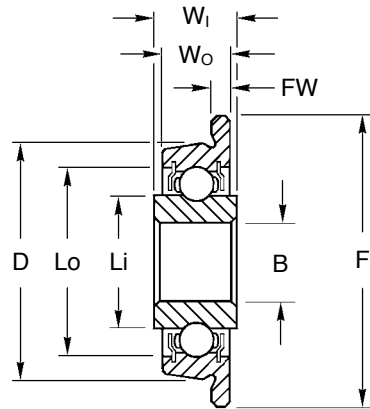
MATERIAL:
 S Stainless Steel
 X Chrome Steel

TYPE:
 ZX One Shield
 ZZ Two Shields
 LX One Teflon Seal
 LL Two Teflon Seals



Miniature Instrument | Extended Inner Ring FLANGED BALL BEARINGS-TAPERED O.D.

• Stainless Steel • Chrome Steel



ONE AND TWO SHIELDS

Catalog Number	B Bore	D Outside* Dia.	W _I Inner Width	W _O Outer Width	F Flange Dia.	FW Flange Width	Land Diameter		Load Rating lbs.	
							Li Inner	Lo Outer	Dynamic	Static
BB□FLT-F2XX□□□□□□	.1250	.3757	.188	.163	.438	.037	.204	.299	54.4	22.4
BB□FLT-F3XX□□□□□□	.1875	.5632	.251	.226	.625	.042	.276	.413	112.80	53.6
BB□FLT-F4XX□□□□□□	.2500	.6257	.250	.226	.687	.042	.365	.510	126.40	62.4
BB□FLT-F5XX□□□□□□	.3125	.6882			.750		.418	.608	301.60	111.20

MATERIAL:
S Stainless Steel
X Chrome Steel

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3,5,7

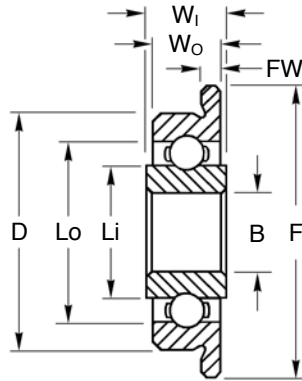
TYPE:
XX No Shields
ZX One Shield
ZZ Two Shields
RS One Rubber Seal
RR Two Rubber Seals
LX One Teflon Seal
LL Two Teflon Seals

*Outer Ring Tapered .075 per foot – F2XX only
Outer Ring Tapered .068 per foot – F3XX - F5XX



Miniature Instrument | Extended Inner Ring FLANGED BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel



NO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W _i Inner Width	W _o Outer Width	FW Flange Width	F Flange Dia.	Land Dia. (Ref.)		Load Rating lbs.	
							Li Inner	Lo Outer	Dynamic	Static
BE□RIF-2 1/2 XX□□□□	.0469	.1562	.0937	.0625	.013	.203	.081	.134	12.8	4.24
BE□RIF-3XXXXX□□□□	.0550	.1875	.1094	.0781	.023	.234	.093	.167	22.4	7.68
BE□RIF-4XXXXX□□□□	.0781	.2500	.1250	.0937	.023	.296	.122	.205	28.0	9.68
BE□RIF-3332XX□□□□	.0937	.1875	.0937	.0625	.018	.234	.118	.167	15.2	5.20
BE□RIF-5XXXXX□□□□		.3125	.1406	.1094	.023	.359	.173	.282	48.0	17.6
BE□RIF-418XXX□□□□	.1250	.2500	.1250	.0937	.023	.296	.161	.228	26.4	9.76
BE□RIF-518XXX□□□□		.3125	.1406	.1094	.023	.359	.173	.282	48.0	17.6
BE□RIF-618XXX□□□□		.3750	.1406	.1094	.023	.422	.173	.282	48.0	17.6
BE□RFX-2XXXXX□□□□		.3750	.1875	.1562	.030	.440	.200	.321	52.8	20.8
BE□RIF-5532XX□□□□	.1562	.3125	.1406	.1094	.023	.359	.221	.285	36.0	13.6
BE□RIF-5632XX□□□□	.1875									
BE□RIF-6632XX□□□□	.1875	.3750	.1562	.1250	.023	.422	.235	.341	60.8	24.8
BE□RFX-3XXXXX□□□□		.5000								
BE□RIF-614XXX□□□□	.2500	.3750	.1562	.1250	.023	.422	.285	.348	34.4	16.8
BE□RIF-814XXX□□□□		.5000	.1562	.1250	.023	.547	.330	.452	70.4	32.0
BE□RFX-4XXXXX□□□□		.6250	.2272	.1960	.042	.690	.364	.544	127.2	56.0
BE□RIF-8516XX□□□□		.3125	.5000	.1875	.1562	.031	.547	.362	.460	74.4

LUBRICANT: See page 1 for available lubricants

MATERIAL:

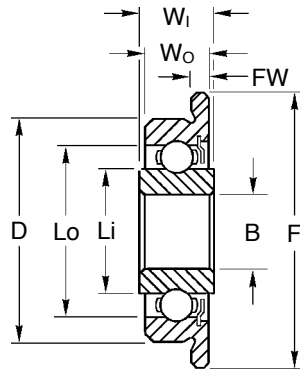
- S Stainless Steel
- X Chrome Steel

ABEC Tolerance: 1,3,5,7



Miniature Instrument | Extended Inner Ring FLANGED BALL BEARINGS-SHIELDED TYPE

• Stainless Steel • Chrome Steel



ONE AND TWO SHIELDS

Catalog Number	B Bore	D Outside Dia.	Wi Inner Width	Wo Outer Width	FW Flange Width	F Flange Dia.	Land Dia. (Ref.)		Load Rating lbs.	
							Li Inner	Lo Outer	Dynamic	Static
BE□RIF-21/2□□□□□	.0469	.1562	.1250	.0937	.031	.203	.081	.134	12.8	4.24
BE□RIF-3XXX□□□□□	.0550	.1875	.1406	.1094	.031	.234	.093	.167	22.4	7.68
BE□RIF-4XXX□□□□□	.0781	.2500	.1719	.1406	.031	.296	.122	.205	28.0	9.68
BE□RIF-3332□□□□□	.0937	.1875	.1250	.0937	.031	.234	.118	.167	15.2	5.20
BE□RIF-5XXX□□□□□		.3125	.1719	.1406		.359	.173	.282	48.0	17.6
BE□RIF-418X□□□□□	.1250	.2500	.1406	.1094	.031	.296	.161	.228	26.4	9.76
BE□RIF-518X□□□□□		.3125	.1719	.1406	.031	.359	.173	.282	48.0	17.6
BE□RIF-618X□□□□□		.3750	.1719	.1406	.031	.422	.173	.282	48.0	17.6
BE□RFX-2XXX□□□□□		.3750	.1875	.1562	.030	.440	.200	.321	52.8	20.8
BE□RIF-5532□□□□□	.1562	.3125	.1562	.1250	.036	.359	.221	.285	36.0	13.6
BE□RIF-5632□□□□□	.1875		.1250	.036	.359	.221	.285	36.0	13.6	
BE□RIF-6632□□□□□	.1875	.3750	.1562	.1250	.031	.422	.235	.341	60.8	24.8
BE□RFX-3XXX□□□□□		.5000	.2272	.1960	.042	.565	.276	.433	112.0	47.2
BE□RIF-614X□□□□□	.2500	.3750	.1562	.1250	.036	.422	.285	.348	34.4	16.8
BE□RIF-814X□□□□□		.5000	.2188	.1250	.045	.547	.330	.452	70.4	32.0
BE□RFX-4XXX□□□□□		.6250	.2272	.1960	.042	.690	.364	.544	127.2	56.0
BE□RIF-8516□□□□□	.3125	.5000	.1875	.1562	.031	.547	.362	.460	74.4	34.4

MATERIAL:
S Stainless Steel
X Chrome Steel

LUBRICANT: See page 1 for available lubricants

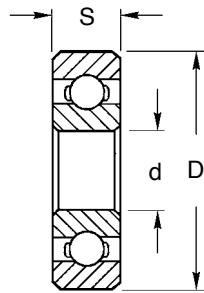
ABEC Tolerance: 1,3,5,7

TYPE:
ZX One Shield
ZZ Two Shields
LX One Teflon Seal
LL Two Teflon Seals



Miniature Instrument RADIAL BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel • (L) Series



NO SHIELDS

Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lbs.)	
				Dynamic	Static
BB□LXXML310XX□□□	1	3	1	49 (11)	14 (3)
BB□LXXM310WXX□□□		3	1.5	49 (11)	14 (3)
BB□LXXM691XXX□□□		4	1.6	85 (19)	32 (7)
BB□LXXML415XX□□□	1.5	4	1.2	71 (16)	24 (5)
BB□LXXMR515XX□□□		5	2	149 (33)	53 (12)
BB□LXXMR615XX□□□		6	2.5	203 (45)	78 (17)
BB□LXXML520XX□□□	2	5	1.5	103 (23)	39 (8)
BB□LXXM520WXX□□□		5	2	103 (23)	39 (8)
BB□LXXMR620XX□□□		6	2.3	203 (45)	78 (17)
BB□LXXM720YXX□□□		7	2.5	156 (35)	64 (14)
BB□LXXMR720XX□□□		7	2.8	235 (52)	103 (23)
BB□LXXML625XX□□□	2.5	6	1.8	124 (28)	49 (11)
BB□LXXMR725XX□□□		7	2.5	235 (52)	103 (23)
BB□LXXM825YXX□□□		8	2.5	235 (52)	85 (19)
BB□LXXMR825XX□□□		8	2.8	344 (77)	142 (32)
BB□LXXML630XX□□□	3	6	2	124 (28)	49 (11)
BB□LXXML730XX□□□		7			
BB□LXXM830YXX□□□		8	2.5	235 (52)	85 (19)
BB□LXXMR830XX□□□			3		
BB□LXXM930YXX□□□		9	2.5	235 (52)	85 (19)
BB□LXXMR930XX□□□			3		
BB□LXXM1030XX□□□			10		
BB□LXXMR633XX□□□	13	5	800 (180)	384 (86)	
BB□LXXML740XX□□□	4	7	2	124 (28)	46 (10)
BB□LXXML840XX□□□		8	2	156 (35)	64 (14)
BB□LXXML940XX□□□		9	2.5	292 (65)	135 (30)
BB□LXXM1040XX□□□		10	3	235 (52)	92 (20)
BB□LXXM1140XX□□□		11	4	442 (99)	299 (67)
BB□LXXM1240XX□□□		12		854 (192)	274 (62)
BB□LXXM1340XX□□□		13	5	801 (180)	384 (86)
BB□LXXM1640XX□□□		16		1086 (244)	538 (121)

Continued on the next page

LUBRICANT: See page 1 for available lubricants

MATERIAL:

S Stainless Steel

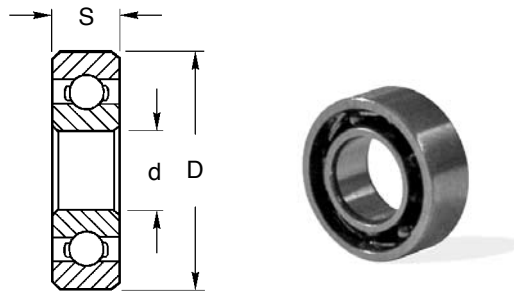
X Chrome Steel

ABEC Tolerance: 1,3,5,7



Miniature Instrument RADIAL BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel • (L) Series



NO SHIELDS

Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lbs.)		
				Dynamic	Static	
BB□LXXML850XX□□□	5	8	2	132 (30)	54 (12)	
BB□LXXML950XX□□□		9	2.5	174 (39)	71 (16)	
BB□LXXM1050XX□□□		10	3	174 (39)	71 (16)	
BB□LXXM1150XX□□□		11	3	442 (99)	206 (46)	
BB□LXXM1350XX□□□		13	4	666 (150)	320 (72)	
BB□LXXM1450XX□□□		14	5	826 (186)	391 (88)	
BB□LXXM1650XX□□□		16	5	1067 (240)	708 (159)	
BB□LXXM1950XX□□□		19	6	1442 (324)	722 (162)	
BB□LXXM1060XX□□□		6	10	2.5	203 (46)	93 (21)
BB□LXXM1260XX□□□			12	3	292 (66)	125 (28)
BB□LXXM1360XX□□□	13		3.5	669 (150)	320 (72)	
BB□LXXM1560XX□□□	15		5	826 (186)	391 (88)	
BB□LXXM1760XX□□□	17		6	1210 (272)	580 (130)	
BB□LXXM1960XX□□□	19		6	1442 (324)	722 (162)	
BB□LXXM1170XX□□□	7	11	2.5	189 (42)	78 (18)	
BB□LXXM1370XX□□□		13	3	221 (50)	110 (25)	
BB□LXXM1470XX□□□		14	3.5	722 (162)	370 (83)	
BB□LXXM697XXX□□□		17	5	1086 (244)	555 (125)	
BB□LXXM1970XX□□□		19	6	1388 (312)	694 (156)	
BB□LXXM2270XX□□□		22	7	2028 (456)	1086 (244)	
BB□LXXM1280XX□□□	8	12	2.5	221 (50)	110 (25)	
BB□LXXM1480XX□□□		14	3.5	331 (74)	157 (35)	
BB□LXXM1680XX□□□		16	4	769 (173)	416 (94)	
BB□LXXM608XXX□□□		19	6	1157 (260)	555 (125)	
BB□LXXM608AXX□□□		22	7	2028 (456)	1086 (244)	
BB□LXXM628XXX□□□		24	8	1538 (346)	779 (175)	
BB□LXXM1790XX□□□	9	17	4	815 (183)	455 (102)	
BB□LXXM2090XX□□□		20	6	1167 (262)	616 (138)	
BB□LXXM609XXX□□□		24	7	2071 (466)	1086 (244)	
BB□LXXM2690XX□□□		26	8	2811 (632)	1744 (392)	
BB□LXXM1910XX□□□	10	19	5	1167 (262)	616 (138)	
BB□LXXM1020XX□□□		22	6	1538 (346)	794 (178)	

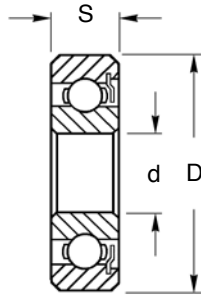
MATERIAL:
S Stainless Steel
X Chrome Steel

LUBRICANT: See page 1 for available lubricants
ABEC Tolerance: 1,3,5,7



Miniature Instrument RADIAL BALL BEARINGS-SHIELDED TYPE

• Stainless Steel • Chrome Steel • (L) Series



ONE AND TWO SHIELDS

Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lbs.)	
				Dynamic	Static
BB□LXXML415□□□□□□	1.5	4	2	71 (16)	24 (5)
BB□LXXMR515□□□□□□		5	2.6	149 (33)	53 (12)
BB□LXXMR615□□□□□□		6	3	203 (45)	78 (17)
BB□LXXML520□□□□□□	2	5	2.3	103 (23)	39 (8)
BB□LXXM520W□□□□□□		5	2.5		
BB□LXXMR620□□□□□□		6	3	203 (45)	78 (17)
BB□LXXM720Y□□□□□□		7	3	156 (35)	64 (14)
BB□LXXMR720□□□□□□	7	3.5	235 (52)	103 (23)	
BB□LXXML625□□□□□□	2.5	6	2.6	124 (28)	49 (11)
BB□LXXMR725□□□□□□		7	3.5	235 (52)	103 (23)
BB□LXXMR825□□□□□□		8	4	344 (77)	142 (32)
BB□LXXML630□□□□□□	3	6	2.5	124 (28)	49 (11)
BB□LXXML730□□□□□□		7	3	124 (28)	49 (11)
BB□LXXMR830□□□□□□		8	4	235 (52)	85 (19)
BB□LXXM930Y□□□□□□		9	4	235 (52)	85 (19)
BB□LXXM1030□□□□□□		10	4	391 (88)	174 (39)
BB□LXXMR633□□□□□□		13	5	800 (180)	384 (86)
BB□LXXML740□□□□□□	4	7	2.5	124 (28)	46 (10)
BB□LXXML840□□□□□□		8	3	156 (35)	64 (14)
BB□LXXML940□□□□□□		9	4	292 (65)	135 (30)
BB□LXXM1040□□□□□□		10	4	235 (52)	92 (20)
BB□LXXM1140□□□□□□		11	4	442 (99)	299 (67)
BB□LXXM1240□□□□□□		12	4	854 (192)	274 (62)
BB□LXXM1340□□□□□□	13	5	801 (180)	384 (86)	
BB□LXXM1640□□□□□□	16	5	1086 (244)	538 (121)	

Continued on the next page

MATERIAL:
S Stainless Steel
X Chrome Steel

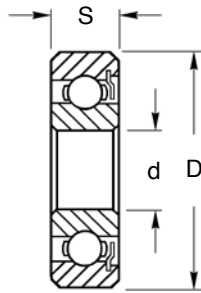
LUBRICANT: See page 1 for available lubricants
ABEC Tolerance: 1,3,5,7

TYPE:
ZX One Shield
ZZ Two Shields
LX One Teflon Seal
LL Two Teflon Seals



Miniature Instrument RADIAL BALL BEARINGS-SHIELDED TYPE

• Stainless Steel • Chrome Steel • (L) Series



ONE AND TWO SHIELDS

Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lbs.)	
				Dynamic	Static
BB□LXXML850□□□□□	5	8	2.5	132 (30)	54 (12)
BB□LXXML950□□□□□		9	3	174 (39)	71 (16)
BB□LXXM1050□□□□□		10	4	174 (39)	71 (16)
BB□LXXM1150□□□□□		11	5	442 (99)	206 (46)
BB□LXXM1350□□□□□		13	4	666 (150)	320 (72)
BB□LXXM1450□□□□□		14	5	826 (186)	391 (88)
BB□LXXM1650□□□□□		16	5	1067 (240)	708 (159)
BB□LXXM1950□□□□□		19	6	1442 (324)	722 (162)
BB□LXXM1060□□□□□	6	10	3	203 (46)	93 (21)
BB□LXXM1260□□□□□		12	4	292 (66)	125 (28)
BB□LXXM1360□□□□□		13	5	669 (150)	320 (72)
BB□LXXM1560□□□□□		15	5	826 (186)	391 (88)
BB□LXXM1760□□□□□		17	6	1210 (272)	580 (130)
BB□LXXM1960□□□□□		19	6	1442 (324)	722 (162)
BB□LXXM1170□□□□□	7	11	3	189 (42)	78 (18)
BB□LXXM1370□□□□□		13	4	221 (50)	110 (25)
BB□LXXM1470□□□□□		14	5	722 (162)	370 (83)
BB□LXXM697X□□□□□		17	5	1086 (244)	555 (125)
BB□LXXM1970□□□□□		19	6	1388 (312)	694 (156)
BB□LXXM2270□□□□□		22	7	2028 (456)	1086 (244)
BB□LXXM1280□□□□□	8	12	3.5	221 (50)	110 (25)
BB□LXXM1480□□□□□		14	4	331 (74)	157 (35)
BB□LXXM1680□□□□□		16	5	769 (173)	416 (94)
BB□LXXM608X□□□□□		19	6	1157 (260)	555 (125)
BB□LXXM608A□□□□□		22	7	2028 (456)	1086 (244)
BB□LXXM628X□□□□□		24	8	1538 (346)	779 (175)
BB□LXXM1790□□□□□	9	17	5	815 (183)	455 (102)
BB□LXXM2090□□□□□		20	6	1167 (262)	616 (138)
BB□LXXM609X□□□□□		24	7	2071 (466)	1086 (244)
BB□LXXM2690□□□□□		26	8	2811 (632)	1744 (392)
BB□LXXM1910□□□□□	10	19	7	1167 (262)	616 (138)
BB□LXXM1020□□□□□		22	6	1538 (346)	794 (178)

MATERIAL:
S Stainless Steel
X Chrome Steel

LUBRICANT: See page 1 for available lubricants

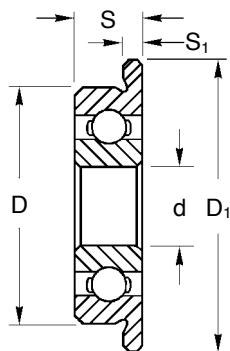
ABEC Tolerance: 1,3,5,7

TYPE:
ZX One Shield
ZZ Two Shields
LX One Teflon Seal
LL Two Teflon Seals



Miniature Instrument FLANGED BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel • (L) Series



NO SHIELDS

Catalog Number	d Bore	D Outside Dia.	S Width	D ₁ Flange Dia.	S ₁ Flange Width	Load Rating N (lbs.)	
						Dynamic	Static
BB□LFXML310XX□□□	1	3	1	3.8	0.3	50 (11)	14 (3)
BB□LFXML312XX□□□		4	1.6	5	0.5	96 (22)	26 (6)
BB□LFXML415XX□□□	1.5	4	1.2	5	0.4	71 (16)	25 (6)
BB□LFXML416XX□□□		5	2	6.5	0.6	112 (25)	33 (7)
BB□LFXML417XX□□□		6	2.5	7.5	0.6	169 (38)	50 (11)
BB□LFXML520XX□□□	2	5	1.5	6.1	0.5	103 (23)	39 (9)
BB□LFXML521XX□□□		5	2	6.2	0.6	169 (38)	50 (11)
BB□LFXML522XX□□□		6	2.3	7.5	0.6	169 (38)	50 (11)
BB□LFXML526XX□□□		6	2.5	7.2	0.6	330 (74)	99 (22)
BB□LFXML527XX□□□		7	2.5	8.2	0.6	330 (74)	99 (22)
BB□LFXML528XX□□□		7	2.8	8.5	0.7	386 (87)	129 (29)
BB□LFXML625XX□□□	2.5	6	1.8	7.1	0.5	125 (28)	50 (11)
BB□LFXML626XX□□□		7	2.5	8.5	0.7	209 (47)	74 (17)
BB□LFXM825YXX□□□		8	2.5	9.2	0.6	386 (87)	129 (29)
BB□LFXMR825XX□□□		8	2.8	9.5	0.7	558 (125)	180 (40)
BB□LFXML630XX□□□	3	6	2	7.2	0.6	125 (28)	50 (11)
BB□LFXML730XX□□□		7	2	8.1	0.5	125 (28)	50 (11)
BB□LFXM830YXX□□□		8	2.5	9.2	0.6	311 (70)	112 (25)
BB□LFXMR830XX□□□		8	3	9.5	0.7	395 (89)	141 (32)
BB□LFXMR930XX□□□		9	3	10.5	0.7	571 (128)	189 (43)
BB□LFXM1030XX□□□		10	4	11.5	1	571 (128)	189 (43)
BB□LFXML740XX□□□	4	7	2	8.2	0.6	125 (28)	46 (10)
BB□LFXML840XX□□□		8	2	9.2	0.6	157 (35)	64 (14)
BB□LFXML940XX□□□		9	2.5	10.3	0.6	292 (66)	135 (30)
BB□LFXM1040XX□□□		10	3	11.2	0.6	235 (53)	93 (21)
BB□LFXM1140XX□□□		11	4	12.5	1	711 (160)	272 (61)
BB□LFXM1240XX□□□		12	4	13.5	1	957 (215)	350 (79)
BB□LFXM1340XX□□□		13	5	15	1	1301 (292)	488 (110)
BB□LFXM1640XX□□□	16	5	18	1	1340 (301)	523 (118)	
BB□LFXML850XX□□□	5	8	2	9.2	0.6	132 (30)	54 (12)
BB□LFXML950XX□□□		9	2.5	10.2		174 (39)	71 (16)

Continued on the next page

LUBRICANT: See page 1 for available lubricants

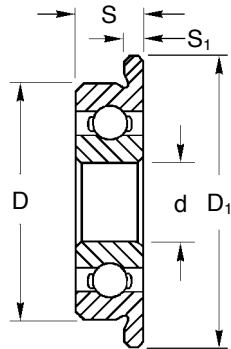
MATERIAL: **ABEC Tolerance: 1,3,5,7**

S Stainless Steel
X Chrome Steel



Miniature Instrument FLANGED BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel • (L) Series



NO SHIELDS

Catalog Number	d Bore	D Outside Dia.	S Width	D ₁ Flange Dia.	S ₁ Flange Width	Load Rating N (lbs.)	
						Dynamic	Static
BB□LFXM1050XX□□□	5	10	3	11.2	0.6	174 (39)	71 (16)
BB□LFXM1150XX□□□		11		12.5	0.8	442 (99)	206 (46)
BB□LFXM1350XX□□□		13	4	15		1077 (242)	432 (97)
BB□LFXM1450XX□□□		14	5	16	1	1329 (299)	507 (114)
BB□LFXM1650XX□□□		16	5	18	1	1729 (389)	675 (152)
BB□LFXM1950XX□□□	19	6	22	1.5	2336 (525)	896 (201)	
BB□LFXM1060XX□□□	6	10	2.5	11.2	0.6	203 (46)	93 (21)
BB□LFXM1260XX□□□		12	3	13.2		292 (66)	125 (28)
BB□LFXM1360XX□□□		13	3.5	15	1	669 (150)	320 (72)
BB□LFXM1560XX□□□		15	5	17	1.2	1340 (301)	523 (118)
BB□LFXM1760XX□□□		17	6	19	1.2	1340 (301)	523 (118)
BB□LFXM1960XX□□□	19	6	22	1.5	2336 (525)	896 (201)	
BB□LFXM1170XX□□□	7	11	2.5	12.2	0.6	189 (42)	78 (18)
BB□LFXM1370XX□□□		13	3	14.2		221 (50)	110 (25)
BB□LFXM1470XX□□□		14	3.5	16	1	722 (162)	370 (83)
BB□LFXM1770XX□□□		17	5	19	1.2	1173 (264)	513 (115)
BB□LFXM1970XX□□□		19	6	22	1.5	2336 (525)	896 (201)
BB□LFXM2270XX□□□	22	7	25		3287 (739)	1379 (310)	
BB□LFXM1280XX□□□	8	12	2.5	13.2	0.6	221 (50)	110 (25)
BB□LFXM1480XX□□□		14	3.5	15.6	0.8	331 (74)	157 (35)
BB□LFXM1680XX□□□		16	4	18	1	769 (173)	416 (94)
BB□LFXM1790XX□□□	9	17	4	19	1	815 (183)	455 (102)
BB□LFXM2090XX□□□		20	6	23	1.5	1167 (262)	616 (138)

LUBRICANT: See page 1 for available lubricants

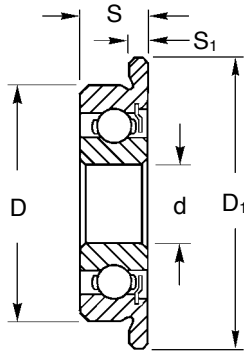
MATERIAL:
S Stainless Steel
X Chrome Steel

ABEC Tolerance: 1,3,5,7



Miniature Instrument FLANGED BALL BEARINGS-SHIELDED TYPE

• Stainless Steel • Chrome Steel • (L) Series



ONE AND TWO SHIELDS

Catalog Number	d Bore	D Outside Dia.	S Width	D ₁ Flange Dia.	S ₁ Flange Width	Load Rating N (lbs.)	
						Dynamic	Static
BB□LFXML520□□□□□	2	5	2.3	6.1	0.6	103 (23)	39 (9)
BB□LFXM520W□□□□□		5	2.5	6.2	0.6	169 (38)	50 (11)
BB□LFXML620□□□□□		6	3	7.2	0.8	330 (74)	99 (22)
BB□LFXML720□□□□□		7	2.5	8.2	0.8	330 (74)	99 (22)
BB□LFXML625□□□□□	2.5	6	2.6	7.1	0.8	125 (28)	50 (11)
BB□LFXML725□□□□□		7	3.5	8.5	0.9	386 (87)	129 (29)
BB□LFXML825□□□□□		8	4	9.5	0.9	552 (124)	177 (40)
BB□LFXML630□□□□□	3	6	2.5	7.2	0.6	125 (28)	50 (11)
BB□LFXML730□□□□□		7	3	8.1	0.8	125 (28)	50 (11)
BB□LFXML830□□□□□		8	4	9.5	0.9	558 (125)	180 (40)
BB□LFXML930□□□□□		9	4	10.2	0.8	571 (128)	189 (42)
BB□LFXM1030□□□□□		10	4	11.5	1	631 (142)	219 (49)
BB□LFXML740□□□□□	4	7	2.5	8.2	0.6	125 (28)	46 (10)
BB□LFXML840□□□□□		8	3	9.2	0.6	157 (35)	64 (14)
BB□LFXML940□□□□□		9	4	10.3	1	292 (66)	135 (30)
BB□LFXM1040□□□□□		10	4	11.6	0.8	235 (53)	93 (21)
BB□LFXML850□□□□□	5	8	2.5	9.2	0.6	132 (30)	54 (12)
BB□LFXML950□□□□□		9	3	10.2		174 (39)	71 (16)

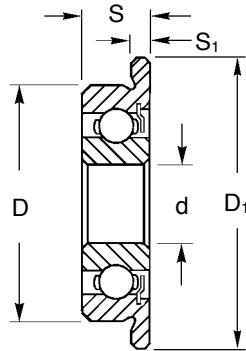
MATERIAL:
S Stainless Steel
X Chrome Steel

LUBRICANT: See page 1 for available lubricants

Continued on the next page

ABEC Tolerance: 1,3,5,7

TYPE:
ZX One Shield
ZZ Two Shields
LX One Teflon Seal
LL Two Teflon Seals



ONE AND TWO SHIELDS

Catalog Number	d Bore	D Outside Dia.	S Width	D ₁ Flange Dia.	S ₁ Flange Width	Load Rating N (lbs.)	
						Dynamic	Static
BB□LFXM1050□□□□□	5	10	4	11.6	0.8	174 (39)	71 (16)
BB□LFXM1150□□□□□		11	5	12.5	1	442 (99)	206 (46)
BB□LFXM1060□□□□□	6	10	3	11.2	0.6	203 (46)	93 (21)
BB□LFXM1260□□□□□		12	4	13.6	0.8	292 (66)	125 (28)
BB□LFXM1360□□□□□		13	5	15	1.1	669 (150)	320 (72)
BB□LFXM1170□□□□□	7	11	3	12.2	0.6	189 (42)	78 (18)
BB□LFXM1370□□□□□		13	4	14.6	0.8	221 (50)	110 (25)
BB□LFXM1470□□□□□		14	5	16	1.1	722 (162)	370 (83)
BB□LFXM1280□□□□□	8	12	3.5	13.6	0.8	221 (50)	110 (25)
BB□LFXM1480□□□□□		14	4	15.6	0.8	331 (74)	157 (35)
BB□LFXM1680□□□□□		16	5	18	1.1	769 (173)	416 (94)
BB□LFXM1790□□□□□	9	17	5	19	1.1	815 (183)	455 (102)
BB□LFXM2090□□□□□		20	6	23	1.5	1167 (262)	616 (138)

MATERIAL:

S Stainless Steel
X Chrome Steel

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3,5,7

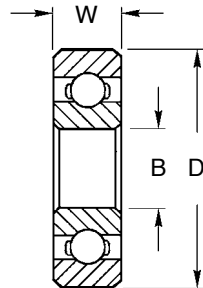
TYPE:

ZX One Shield
ZZ Two Shields
LX One Teflon Seal
LL Two Teflon Seals



Precision PLAIN BALL BEARINGS-OPEN TYPE

• Stainless Steel • Chrome Steel



NO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W Width	Load Rating lbs. (N)	
				Dynamic	Static
BB□RXX-2XXXXX□□□	.1250	.3750	.1562	73 (325)	29 (129)
BB□RXX-2AXXXX□□□		.5000	.1719		
BB□RXX-3XXXXX□□□	.1875	.5000	.1562	148 (658)	64 (285)
BB□RXX-4XXXXX□□□	.2500	.6250	.1960	168 (747)	77 (343)
BB□RXX-4AXXXX□□□		.7500	.2188	405 (1801)	198 (881)
BB□RXX-6XXXXX□□□	.3750	.8750	.2188	575 (2558)	305 (1357)
BB□RXX-8XXXXX□□□	.5000	1.1250	.2500	885 (3937)	505 (2246)
BB□RXX-10XXXX□□□	.6250	1.3750	.2812	1040 (4626)	650 (2891)
BB□RXX-12XXXX□□□	.7500	1.6250	.3125	1620 (7206)	1030 (4582)
BB□RXX-14XXXX□□□	.8750	1.8750	.3750	1740 (7740)	1160 (5160)
BB□RXX-16XXXX□□□	1.0000	2.0000		1740 (7740)	1160 (5160)
BB□RXX-18XXXX□□□	1.1250	2.1250		2290 (10186)	1630 (7251)
BB□RXX-20XXXX□□□	1.2500	2.2500	.3750	2290 (10186)	1650 (7340)
BB□RXX-22XXXX□□□	1.3750	2.5000	.4375	2760 (12277)	2020 (8985)
BB□RXX-24XXXX□□□	1.5000	2.6250	.4375	2900 (12900)	2200 (9786)

LUBRICANT: See page 1 for available lubricants

MATERIAL:

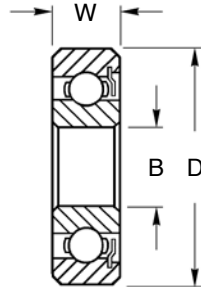
- S Stainless Steel
- X Chrome Steel

ABEC Tolerance: 1,3,5,7



Precision PLAIN BALL BEARINGS-SHIELDED TYPE

• Stainless Steel • Chrome Steel



ONE AND TWO SHIELDS

Catalog Number	B Bore	D Outside Dia.	W Width	Load Rating lbs. (N)	
				Dynamic	Static
BB□RXX-2XXX□□□□□□	.1250	.3750 .5000	.1562 .1719	73 (325)	29 (129)
BB□RXX-3XXX□□□□□□	.1875	.5000	.1562	148 (658)	64 (285)
BB□RXX-4XXX□□□□□□	.2500	.6250 .7500	.1960 .2188	168 (747) 405 (1801)	77 (343) 198 (881)
BB□RXX-6XXX□□□□□□	.3750	.8750	.2188	575 (2558)	305 (1357)
BB□RXX-8XXX□□□□□□	.5000	1.1250	.3125	885 (3937)	505 (2246)
BB□RXX-10XX□□□□□□	.6250	1.3750	.3438	1040 (4626)	650 (2891)
BB□RXX-12XX□□□□□□	.7500	1.6250	.4375	1620 (7206)	1030 (4582)
BB□RXX-14XX□□□□□□	.8750	1.8750	.5000	1740 (7740)	1160 (5160)
BB□RXX-16XX□□□□□□	1.0000	2.0000		1740 (7740)	1160 (5160)
BB□RXX-18XX□□□□□□	1.1250	2.1250		2290 (10186)	1630 (7251)
BB□RXX-20XX□□□□□□	1.2500	2.2500	.5000	2290 (10186)	1650 (7340)
BB□RXX-22XX□□□□□□	1.3750	2.5000	.5625	2760 (12277)	2020 (8985)
BB□RXX-24XX□□□□□□	1.5000	2.6250	.5625	2900 (12900)	2200 (9786)

MATERIAL:

- S Stainless Steel
- X Chrome Steel

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3,5,7

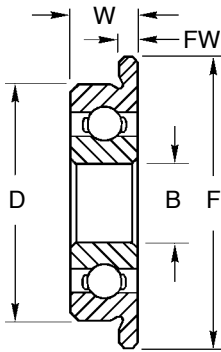
TYPE:

- ZX One Shield
- ZZ Two Shields
- NR Snap Ring Groove
- RS One Rubber Seal
- RR Two Rubber Seals
- LX One Teflon Seal
- LL Two Teflon Seals

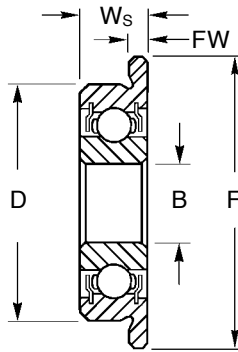


Precision FLANGED BALL BEARINGS OPEN AND SHIELDED TYPE

• Stainless Steel • Chrome Steel



**FIGURE 1
NO SHIELD**



**FIGURE 2
TWO SHIELDS**



Catalog Number	B Bore	D Outside Dia.	Width		Flange Width FW	F Flange Dia.	Load Rating lbs.	
			W	W _s ^Δ			Dynamic	Static
BB□RFX-2XXX□□□□□	.1250	.3750	.1562	.1562	.030	.440	58.40	23.20
BB□RFX-3XXX□□□□□	.1875	.5000	.1562	.1960	.042	.565	118.40	51.20
BB□RFX-4XXX□□□□□	.2500	.6250	.1960	.1960	.042	.690	134.40	61.60
BB□RFX-6XXX□□□□□	.3750	.8750	.2188	.2812	.062	.969	460	244
BB□RFX-8XXX□□□□□	.5000	1.1250	.2500	.3125	.062	1.225	708	404

LUBRICANT: See page 1 for available lubricants

MATERIAL:

- S Stainless Steel
- X Chrome Steel

ABEC Tolerance: 1,3,5,7

TYPE:

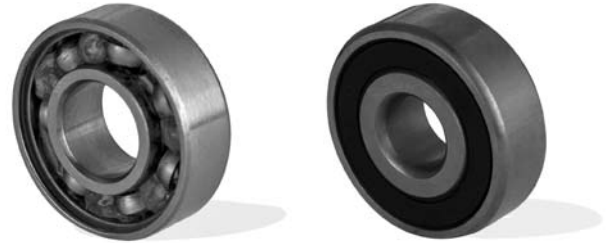
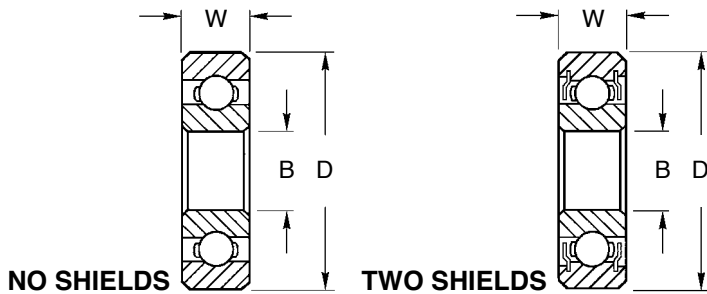
- XX No Shields
- ZX One Shield
- ZZ Two Shields
- NR Snap Ring Groove
- RS One Rubber Seal
- RR Two Rubber Seals
- LX One Teflon Seal
- LL Two Teflon Seals

^Δ Same for one or two shields.



Commercial PLAIN BALL BEARINGS

• 52100 Chrome Steel



Catalog Number	B Bore	D Outside Dia.	W Width	Radius in.	Load Rating lbs. (N)	
					Dynamic	Static
*BBXCOM-1601 □□□□□	.1875	.6875	.2500	.012	294 (1308)	146 (649)
*BBXCOM-1602 □□□□□	.2500	.6875	.2500	.012	294 (1308)	146 (649)
**BBXCOM-1603 □□□□□	.3125	.8750	.2812	.012	464 (2064)	228 (1014)
**BBXCOM-1604 □□□□□	.3750	.8750	.2812	.015	464 (2064)	228 (1014)
BBXCOM-1605 □□□□□	.3125	.9062	.3125	.012	464 (2064)	228 (1014)
BBXCOM-1606 □□□□□	.3750	.9062	.3125	.015	464 (2064)	228 (1014)
BBXCOM-1607 □□□□□	.4375	.9062	.3125	.015	464 (2064)	228 (1014)
BBXCOM-1614 □□□□□	.3750	1.1250	.3750	.025	400 (1779)	229 (1019)
BBXCOM-1615 □□□□□	.4375	1.1250	.3750	.025	400 (1779)	229 (1019)
BBXCOM-1616 □□□□□	.5000	1.1250	.3750	.025	400 (1779)	229 (1019)
BBXCOM-1620 □□□□□	.4375	1.3750	.4375	.025	600 (2669)	354 (1575)
BBXCOM-1621 □□□□□	.5000	1.3750	.4375	.025	600 (2669)	354 (1575)
BBXCOM-1622 □□□□□	.5625	1.3750	.4375	.025	600 (2669)	354 (1575)
BBXCOM-1623 □□□□□	.6250	1.3750	.4375	.025	600 (2669)	354 (1575)
BBXCOM-1628 □□□□□	.6250	1.6250	.5000	.025	738 (3283)	454 (2020)
BBXCOM-1630 □□□□□	.7500	1.6250	.5000	.025	738 (3283)	454 (2020)
BBXCOM-1633 □□□□□	.6250	1.7500	.5000	.025	738 (3283)	454 (2020)
BBXCOM-1635 □□□□□	.7500	1.7500	.5000	.025	738 (3283)	454 (2020)
BBXCOM-1638 □□□□□	.7500	2.0000	.5625	.035	1100 (4893)	709 (3154)
BBXCOM-1640 □□□□□	.8750	2.0000	.5625	.035	1100 (4893)	709 (3154)
BBXCOM-1641 □□□□□	1.0000	2.0000	.5625	.035	1100 (4893)	709 (3154)
BBXCOM-1652 □□□□□	1.1250	2.5000	.6250	.035	1306 (5809)	857 (3812)
BBXCOM-1654 □□□□□	1.2500	2.5000	.6250			
BBXCOM-1657 □□□□□	1.2500	2.5625	.6875			
BBXCOM-1658 □□□□□	1.3125	2.5625	.6875			

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3

TYPE:

- XX No Shields
- ZX One Shield
- ZZ Two Shields
- RS One Rubber Seal
- RR Two Rubber Seals
- LX One Teflon Seal
- LL Two Teflon Seals

* Width (W) for RS & RR = .3125

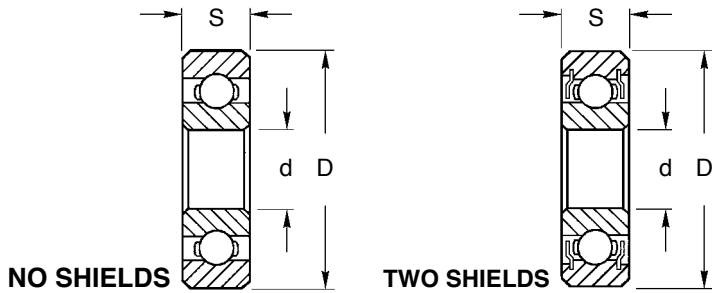
** Width (W) for RS & RR = .3438

NOTES: 1. Radius is the maximum shaft radius or housing fillet that the bearing corner will clear.
2. Available in Stainless Steel upon special request. Minimum order quantities may apply.



Single Row PLAIN BALL BEARINGS-6000 SERIES

• Chrome Steel



Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lbs.)	
				Dynamic	Static
BBXRXXM6000 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	10	26	8	3514 (790)	1935 (435)
BBXRXXM6001 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	12	28	8	3937 (885)	2224 (500)
BBXRXXM6002 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	15	32	9	4292 (965)	2491 (560)
BBXRXXM6003 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	17	35	10	5249 (1180)	3025 (680)
BBXRXXM6004 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	20	42	12	7206 (1620)	4448 (1000)
BBXRXXM6005 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	25	47	12	7740 (1740)	4938 (1110)
BBXRXXM6006 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	30	55	13	10186 (2290)	6895 (1550)
BBXRXXM6007 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	35	62	14	12277 (2760)	8496 (1910)
BBXRXXM6008 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	40	68	15	12900 (2900)	9252 (2080)
BBXRXXM6009 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	45	75	16	16014 (3600)	12144 (2730)
BBXRXXM6010 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	50	80	16	16681 (3750)	13078 (2940)
BBXRXXM6011 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	55	90	18	21752 (4890)	18149 (4080)
BBXRXXM6012 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	60	95	18	22641 (5090)	19617 (4410)
BBXRXXM6013 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	65	100	20	23531 (5290)	21085 (4740)
BBXRXXM6014 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	70	110	20	29224 (6570)	26067 (5860)
BBXRXXM6015 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	75	115	20	30381 (6830)	28157 (6330)
BBXRXXM6016 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	80	125	22	36698 (8250)	31493 (7080)

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3,5

TYPE:

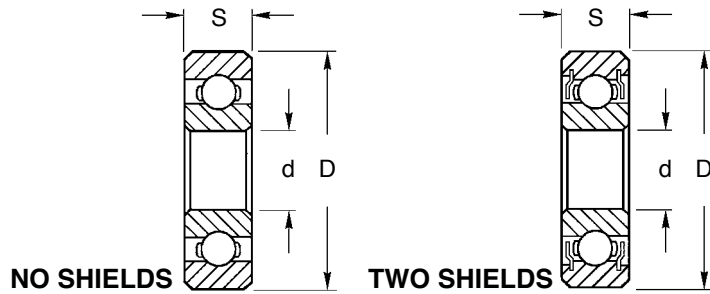
- XX No Shields
- ZX One Shield
- ZZ Two Shields
- RS One Rubber Seal
- RR Two Rubber Seals
- LX One Teflon Seal
- LL Two Teflon Seals

NOTE: Available in Stainless Steel upon request. Minimum order quantities may apply.



Single Row PLAIN BALL BEARINGS-6200 SERIES

• Chrome Steel



Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lbs.)	
				Dynamic	Static
BBXRXXM6200 □□□□□□	10	30	9	4159 (935)	2269 (510)
BBXRXXM6201 □□□□□□	12	32	10	4671 (1050)	2647 (595)
BBXRXXM6202 □□□□□□	15	35	11	5961 (1340)	3447 (775)
BBXRXXM6203 □□□□□□	17	40	12	7384 (1660)	4381 (985)
BBXRXXM6204 □□□□□□	20	47	14	9875 (2220)	6183 (1390)
BBXRXXM6205 □□□□□□	25	52	15	10809 (2430)	6939 (1560)
BBXRXXM6206 □□□□□□	30	62	16	14902 (3350)	10008 (2250)
BBXRXXM6207 □□□□□□	35	72	17	19795 (4450)	13568 (3050)
BBXRXXM6208 □□□□□□	40	80	18	22464 (5050)	15569 (3500)
BBXRXXM6209 □□□□□□	45	85	19	25132 (5650)	17793 (4000)
BBXRXXM6210 □□□□□□	50	90	20	26911 (6050)	19795 (4450)
BBXRXXM6211 □□□□□□	55	100	21	33362 (7500)	26067 (5860)
BBXRXXM6212 □□□□□□	60	110	22	40212 (9040)	32383 (7280)
BBXRXXM6213 □□□□□□	65	120	23	44126 (9920)	35808 (8050)
BBXRXXM6214 □□□□□□	70	125	24	48041 (10800)	36831 (8280)
BBXRXXM6215 □□□□□□	75	130	25	50710 (11400)	41497 (9329)
BBXRXXM6216 □□□□□□	80	140	26	56048 (12600)	43997 (9891)

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3,5

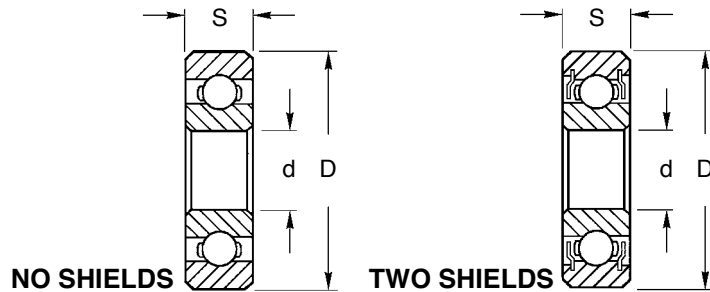
TYPE:

- XX No Shields
- ZX One Shield
- ZZ Two Shields
- RS One Rubber Seal
- RR Two Rubber Seals
- LX One Teflon Seal
- LL Two Teflon Seals

NOTE: Available in Stainless Steel upon request. Minimum order quantities may apply.

Single Row PLAIN BALL BEARINGS-6300 SERIES

• Chrome Steel



Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lbs.)	
				Dynamic	Static
BBXRXXM6300 □□□□□□	10	35	11	6316 (1420)	3759 (845)
BBXRXXM6301 □□□□□□	12	37	12	7473 (1680)	4626 (1040)
BBXRXXM6302 □□□□□□	15	42	13	8807 (1980)	5427 (1220)
BBXRXXM6303 □□□□□□	17	47	14	10409 (2340)	6539 (1470)
BBXRXXM6304 □□□□□□	20	52	15	12277 (2760)	7784 (1750)
BBXRXXM6305 □□□□□□	25	62	17	16236 (3650)	10587 (2380)
BBXRXXM6306 □□□□□□	30	72	19	20462 (4600)	13789 (3100)
BBXRXXM6307 □□□□□□	35	80	21	25577 (5750)	17793 (4000)
BBXRXXM6308 □□□□□□	40	90	23	31360 (7050)	22241 (5000)
BBXRXXM6309 □□□□□□	45	100	25	40701 (9150)	29803 (6700)
BBXRXXM6310 □□□□□□	50	110	27	47596 (10700)	35586 (8000)
BBXRXXM6311 □□□□□□	55	120	29	55202 (12410)	41813 (9400)
BBXRXXM6312 □□□□□□	60	130	31	63076 (14180)	48486 (10900)
BBXRXXM6313 □□□□□□	65	140	33	71394 (16050)	56114 (12615)
BBXRXXM6314 □□□□□□	70	150	35	80179 (18025)	63343 (14240)
BBXRXXM6315 □□□□□□	75	160	37	86740 (19500)	71883 (16160)
BBXRXXM6316 □□□□□□	80	170	39	94614 (21270)	80513 (18100)

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3,5

TYPE:

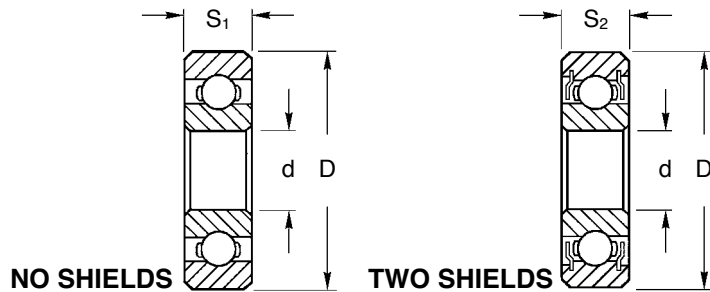
- XX** No Shields
- ZX** One Shield
- ZZ** Two Shields
- RS** One Rubber Seal
- RR** Two Rubber Seals
- LX** One Teflon Seal
- LL** Two Teflon Seals

NOTE: Available in Stainless Steel upon request. Minimum order quantities may apply.



Single Row PLAIN BALL BEARINGS-EXTRA THIN

• Chrome Steel



Catalog Number	d Bore	D Outside Dia.	Width		Load Rating N (lbs.)	
			S ₁	S ₂ ^A	Dynamic	Static
BBXRXXM6700 □□□□□	10	15	3	4	294 (66)	151 (34)
BBXRXXM6800 □□□□□		19	5	5	592 (133)	249 (56)
BBXRXXM6380 □□□□□		19	7	7	592 (133)	249 (56)
BBXRXXM6701 □□□□□	12	18	4	4	320 (72)	182 (41)
BBXRXXM6801 □□□□□		21	5	5	663 (149)	303 (68)
BBXRXXM6381 □□□□□		21	7	7	663 (149)	303 (68)
BBXRXXM6702 □□□□□	15	21	4	4	360 (81)	196 (44)
BBXRXXM6802 □□□□□		24	5	5	721 (162)	351 (79)
BBXRXXM6382 □□□□□		24	7	7	721 (162)	351 (79)
BBXRXXM6703 □□□□□	17	23	4	4	356 (80)	222 (50)
BBXRXXM6803 □□□□□		26	5	5	778 (175)	400 (90)
BBXRXXM6383 □□□□□		26	7	7	778 (175)	400 (90)
BBXRXXM6704 □□□□□	20	27	4	4	374 (84)	254 (57)
BBXRXXM6804 □□□□□		32	7	7	1579 (355)	965 (217)
BBXRXXM6705 □□□□□	25	32	4	N.A.	400 (90)	294 (66)
BBXRXXM6805 □□□□□		37	7	7	1735 (390)	1143 (257)
BBXRXXM6706 □□□□□	30	37	4	N.A.	423 (95)	338 (76)
BBXRXXM6806 □□□□□		42	7	7	1601 (360)	1161 (261)
BBXRXXM6707 □□□□□	35	44	5	N.A.	689 (155)	578 (130)
BBXRXXM6807 □□□□□		47	7	7	1686 (379)	1299 (292)
BBXRXXM6708 □□□□□	40	50	6	N.A.	921 (207)	787 (177)
BBXRXXM6808 □□□□□		52	7	7	1766 (397)	1432 (322)
BBXRXXM6709 □□□□□	45	55	6	N.A.	947 (213)	854 (192)
BBXRXXM6809 □□□□□		58	7	7	1895 (426)	1641 (369)

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3

TYPE:

- XX No Shields
- ZX One Shield
- ZZ Two Shields
- RS One Rubber Seal
- RR Two Rubber Seals
- LX One Teflon Seal
- LL Two Teflon Seals

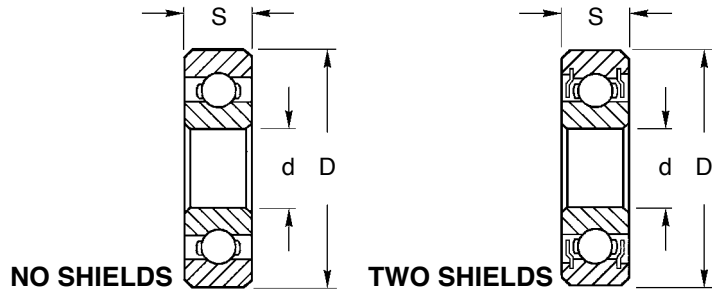
^ASame for one or two shields.

NOTES: 1. Available in Stainless Steel upon request. Minimum order quantities may apply.
2. N.A. = not available



Single Row PLAIN BALL BEARINGS-6900 SERIES

• Chrome Steel



Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lbs.) 1000 rpm
BBXRXXM6900	10	22	6	667 (150)
BBXRXXM6901	12	24	6	823 (185)
BBXRXXM6902	15	28	7	1068 (240)
BBXRXXM6903	17	30	7	1134 (255)
BBXRXXM6904	20	37	9	1824 (410)
BBXRXXM6905	25	42	9	2091 (470)
BBXRXXM6906	30	47	9	2313 (520)
BBXRXXM6907	35	55	10	2914 (655)
BBXRXXM6908	40	62	12	3603 (810)
BBXRXXM6909	45	68	12	3870 (870)
BBXRXXM6910	50	72	13	4026 (905)
BBXRXXM6911	55	80	13	4893 (1100)
BBXRXXM6912	60	85	13	5026 (1130)
BBXRXXM6913	65	90	16	5160 (1160)
BBXRXXM6914	70	100	16	5872 (1320)
BBXRXXM6915	75	105	16	6939 (1560)
BBXRXXM6920	100	140	20	11610 (2610)
BBXRXXM6921	105	145	20	11966 (2690)
BBXRXXM6922	110	150	20	12277 (2760)
BBXRXXM6924	120	165	22	14724 (3310)

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance: 1,3

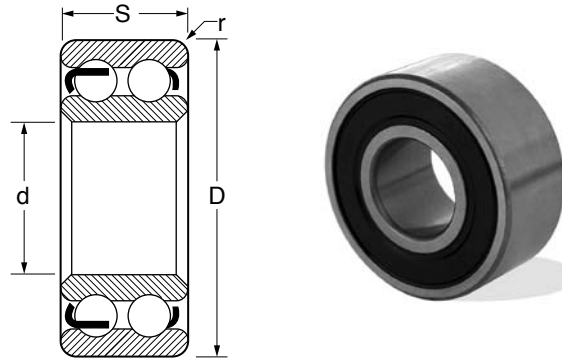
TYPE:

- XX No Shields
- ZX One Shield
- ZZ Two Shields
- RS One Rubber Seal
- RR Two Rubber Seals
- LX One Teflon Seal
- LL Two Teflon Seals

NOTE: Some sizes are available in Stainless Steel. Minimum order quantities may apply.

Double Row ANGULAR CONTACT BALL BEARINGS

• Chrome Steel • 5200 Series



Catalog Number	d Bore	D Outside Dia.	S Width	Balls Per Row		Load Rating N		r Radius mm	Approx. Bearing Weight kg
				No.	Size	Dynamic	Static		
BBXANGM5200□□1□□	10	30	14.287	7	5/16	5337	3358	0.64	0.049
BBXANGM5201□□1□□	12	32	15.875		7/32	7028	4581		0.057
BBXANGM5202□□1□□	15	35	15.875	8	7/32	7739	5248	0.64	0.064
BBXANGM5203□□1□□	17	40	17.462		1/4	9830	6850		0.096
BBXANGM5204□□1□□	20	47	20.638		5/16	14679	10720		0.153
BBXANGM5205□□1□□	25	52	20.638	12	5/16	15791	12054	1.02	0.175
BBXANGM5206□□1□□	30	62	23.812		3/8	22018	17347		0.286
BBXANGM5207□□1□□	35	72	26.988	14	13/32	29135	23575	1.02	0.436
BBXANGM5208□□1□□	40	80	30.162		7/16	32916	27134		0.59
BBXANGM5209□□1□□	45	85	30.162	16	7/16	36920	30692	1.02	0.64
BBXANGM5210□□1□□	50	90	30.162	15	15/32	39366	34251		0.689
BBXANGM5211□□1□□	55	100	33.338	16	1/2	40834	37765	1.52	1.12
BBXANGM5212□□1□□	60	110	36.512		9/16	60940	58716		1.42
BBXANGM5213□□1□□	65	120	38.1		19/32	66278	65388		1.91
BBXANGM5214□□1□□	70	125	39.688		5/8	72060	71171		2.06
BBXANGM5215□□1□□	75	130	41.275	17	5/8	78733	76064	1.52	2.48
BBXANGM5216□□1□□	80	140	44.45		23/32	82825	79622		2.03

LUBRICANT: See page 1 for available lubricants

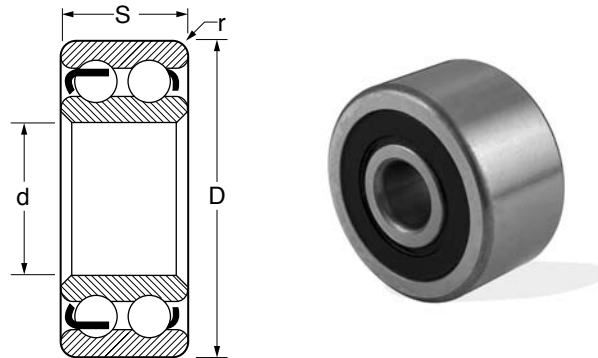
ABEC Tolerance

TYPE:

- XX** No Shields
- ZX** One Shield
- ZZ** Two Shields
- NR** Snap Ring Groove
- RS** One Rubber Seal
- RR** Two Rubber Seals
- LX** One Teflon Seal
- LL** Two Teflon Seals

Double Row ANGULAR CONTACT BALL BEARINGS

• Chrome Steel • 5300 Series



Catalog Number	d Bore	D Outside Dia.	S Width	Balls Per Row		Load Rating N		r Radius mm	Approx. Bearing Weight kg
				No.	Size	Dynamic	Static		
BBXANGM5300 □ □ 1 □ □	10	35		6	9/32	6449	5693	0.64	0.095
BBXANGM5301 □ □ 1 □ □	12	37	19.05	7	17/64	7295	6227	1.02	0.104
BBXANGM5302 □ □ 1 □ □	15	42	19.05		15/32	8362	6939		0.132
BBXANGM5303 □ □ 1 □ □	17	47	22.25	8	5/16	9786	8629	1.02	0.195
BBXANGM5304 □ □ 1 □ □	20	52	22.25		5/16	12454	10453		0.236
BBXANGM5305 □ □ 1 □ □	25	62	25.4	8	3/8	36074	19394	1.02	0.34
BBXANGM5306 □ □ 1 □ □	30	72	30.163		15/32	45371	25443		0.513
BBXANGM5307 □ □ 1 □ □	35	80	34.925	8	17/32	56492	32649	1.52	0.794
BBXANGM5308 □ □ 1 □ □	40	90	36.513		19/32	69391	40789		1.05
BBXANGM5309 □ □ 1 □ □	45	100	39.688	8	21/32	83181	49819	1.52	1.42
BBXANGM5310 □ □ 1 □ □	50	110	44.45	12	23/32	105422	64943	2.03	1.93
BBXANGM5311 □ □ 1 □ □	55	120	49.213		25/32	121880	76509		2.3
BBXANGM5312 □ □ 1 □ □	60	130	53.975	12	7/8	139228	88519	2.03	3.16
BBXANGM5313 □ □ 1 □ □	65	140	58.738		29/32	157911	101863		3.91
BBXANGM5314 □ □ 1 □ □	70	150	63.5		1	177038	115653		4.9
BBXANGM5315 □ □ 1 □ □	75	160	68.263	12	1-1/16	193941	130332	2.03	5.49
BBXANGM5316 □ □ 1 □ □	80	170		13	1-1/8	209955	145900		6.8

LUBRICANT: See page 1 for available lubricants

ABEC Tolerance

TYPE:

- XX** No Shields
- ZX** One Shield
- ZZ** Two Shields
- NR** Snap Ring Groove
- RS** One Rubber Seal
- RR** Two Rubber Seals
- LX** One Teflon Seal
- LL** Two Teflon Seals

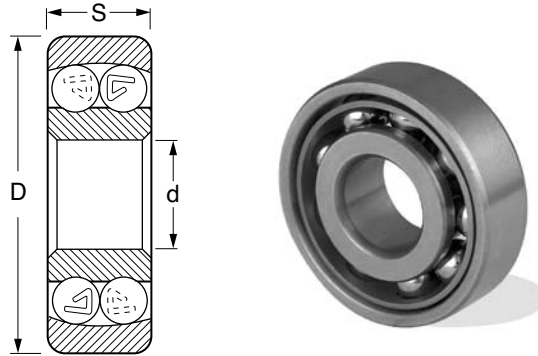


NEW

Double Row

SELF-ALIGNING BALL BEARINGS

- Chrome Steel • 1300 Series
- 1200 Series • 2200 Series



Catalog Number	d Bore	D Outside Dia.	S Width	Load Rating N (lb.)	
				Dynamic	Static
BBXSALM1200□□1□□	10	30	9	4266 (959)	1334 (300)
BBXSALM1201□□1□□	12	32	10	4609 (1036)	1471 (331)
BBXSALM1202□□1□□	15	35	11	5884 (1323)	2010 (452)
BBXSALM1203□□1□□	17	40	12	6227 (1400)	2422 (545)
BBXSALM1204□□1□□	20	47	14	7747 (1742)	3187 (716)
BBXSALM1300□□1□□	10	35	11	5688 (1279)	1863 (419)
BBXSALM1301□□1□□	12	37	12	7600 (1709)	2363 (531)
BBXSALM1302□□1□□	15	42	13	7992 (1797)	2628 (591)
BBXSALM1303□□1□□	17	47	14	9512 (2138)	3677 (827)
BBXSALM1304□□1□□	20	52	15		4021 (904)
BBXSALM2200□□1□□	10	30	14	5198 (1168)	1500 (337)
BBXSALM2201□□1□□	12	32		5884 (1323)	1922 (432)
BBXSALM2202□□1□□	15	35	14	5884 (1323)	2148 (483)
BBXSALM2203□□1□□	17	40	16	7747 (1742)	2746 (617)
BBXSALM2204□□1□□	20	47	18	9611 (2160)	3874 (871)

LUBRICANT: See page 1 for available lubricants

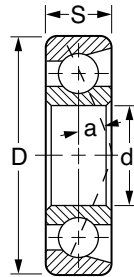
ABEC Tolerance

TYPE:

XX No Shields

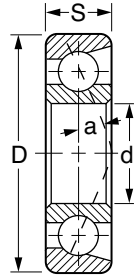
RS One Rubber Seal

RR Two Rubber Seals



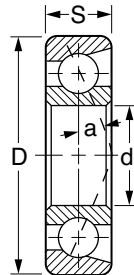
Catalog Number	d Bore	D Outside Dia.	S Width	a Contact Angle	Maximum Speed (rpm)		Load Rating N		Approx. Bearing Weight kg
					Grease	Oil	Dynamic	Static	
BBXANGM7000C BBXANGM7000AC	10	26	8	15° 25°	24000	32000	4900 3600	2100	0.019
BBXANGM7200C BBXANGM7200AC		30	9	15° 25°	22000	28000	5800 5500	2900 2800	0.032
BBXANGM7200B BBXANGM7300C BBXANGM7300AC		30 35 35	9 11 11	40° 15° 25°	19000 18000 18000	27000 26000 26000	5300 9800 9500	2700 4600 4400	0.03 0.053 0.053
BBXANGM7901C BBXANGM7901AC		24	6	15° 25°	28000	36000	3300 3200	1800 1700	0.011
BBXANGM7001C BBXANGM7001AC		28	8	15° 25°	22000	28000	5400 5100	2600 2400	0.021
BBXANGM7201C BBXANGM7201AC	12	32	10	15° 25°	20000	25000	7900 7600	3800 3600	0.037
BBXANGM7201B BBXANGM7301C		32 37	10 12	40° 15°	18000 17000	24000	6900 11800	3200 5600	0.036 0.06
BBXANGM7301AC BBXANGM7301B		37	12	25° 40°	17000 16000	24000 22000	11500 10500	5400 4900	0.06
BBXANGM7902C BBXANGM7902AC		28	7	15° 25°	24000	32000	4700 4500	2600 2500	0.015
BBXANGM7002C BBXANGM7002AC		32	9	15° 25°	19000	25000	6200 5900	3300 3200	0.03
BBXANGM7202C BBXANGM7202AC	15	35	11	15° 25°	17000	22000	9200 8900	4900 4800	0.045
BBXANGM7202B BBXANGM7302C		35 42	11 13	40° 15°	16000 15000	22000 21000	7900 13200	4200 6700	0.045 0.084
BBXANGM7302AC BBXANGM7302B		42	13	25° 40°	15000 14000	21000 19000	12500 12400	6200 6500	0.084 0.08

Continued on the next page



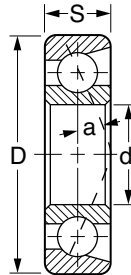
Catalog Number	d Bore	D Outside Dia.	S Width	a Contact Angle	Maximum Speed (rpm)		Load Rating N		Approx. Bearing Weight kg
					Grease	Oil	Dynamic	Static	
BBXANGM7903C BBXANGM7903AC	17	30	7	15° 25°	22000	30000	5000 4800	2800 2700	0.017
BBXANGM7003C BBXANGM7003AC		35	10	15° 25°	16000	22000	6600 6300	3600	0.04
BBXANGM7203C BBXANGM7203AC		40	12	15° 25°	15000	20000	10800 10400	5800 5600	0.062
BBXANGM7203B BBXANGM7303C		40 47	12 14	40° 15°	14000 13000	19000	9900 15700	5500 8200	0.065
BBXANGM7303AC BBXANGM7303B		47	14	25° 40°	13000	19000 17000	15000 14100	7700 8100	0.065
BBXANGM7904C BBXANGM7904AC		20	37	9	15° 25°	20000	28000	6800 6400	4200 4000
BBXANGM7004C BBXANGM7004AC	42		12	15° 25°	14000	19000	10400 10000	6000 5700	0.064
BBXANGM7204C BBXANGM7204AC	47		14	15° 25°	13000	18000	14500 14000	8100 7800	0.1
BBXANGM7204B BBXANGM7304C	47 52		14 15	40° 15°	12000	16000 17000	13400 18400	7600 9800	0.11 0.15
BBXANGM7304AC BBXANGM7304B	52		15	25° 40°	12000 11000	17000 15000	17900 17300	9600	0.15 0.14
BBXANGM7905C BBXANGM7905AC	25		42	9	15° 25°	18000	26000	7800 7500	5400 5200
BBXANGM7005C BBXANGM7005AC		47	12	15° 25°	12000	17000	11600 11100	7400 7000	0.074
BBXANGM7205C BBXANGM7205AC		52	15	15° 25°	11000 11000	16000 16000	16500 15800	10000 9700	0.12 0.12
BBXANGM7205B				40°	10000	14000	14800	9300	0.13

Continued on the next page



Catalog Number	d Bore	D Outside Dia.	S Width	a Contact Angle	Maximum Speed (rpm)		Load Rating N		Approx. Bearing Weight kg		
					Grease	Oil	Dynamic	Static			
BBXANGM7305C BBXANGM7305AC BBXANGM7305B	25	62	17	15°	9500	14000	27800	15900	0.23		
25°				9500	14000	27000	15600				
40°				9000	13000	24300	14100				
BBXANGM7906C BBXANGM7906AC	30	47	9	15°	16000	24000	8200	6200	0.048		
25°				7900			6000				
BBXANGM7006C BBXANGM7006AC		55	13	13	15°	9500	14000	15100	10200	0.11	
25°					14400			9800			
BBXANGM7206C BBXANGM7206AC BBXANGM7206B		62	16	16	15°	9000	13000	23000	14700	0.19	
25°					22100			13500	0.19		
40°					8500			12000	20500	13500	0.2
BBXANGM7306C BBXANGM7306AC BBXANGM7306B		72	19	19	15°	8500	12000	33200	21200	0.35	
25°					8500			12000	32800	20400	0.35
40°					8000			11000	29300	18100	0.34
BBXANGM7406C BBXANGM7406AC BBXANGM7406B	90	23	23	15°	6500	8500	57500	33800	0.96		
25°				6500			8500	55600	32700	0.96	
40°				6000			8000	51400	30100	0.9	
BBXANGM7907C BBXANGM7907AC	35	55	10	15°	14000	22000	12000	9100	0.075		
25°				11700			8800				
BBXANGM7007C BBXANGM7007AC		62	14	14	15°	8500	12000	18200	12700	0.15	
25°					17300			12100			
BBXANGM7207C BBXANGM7207AC BBXANGM7207B		72	17	17	15°	8000	11000	30300	20000	0.28	
25°					8000			11000	29200		18000
40°					7500			10000	28300		14800
BBXANGM7307C BBXANGM7307AC BBXANGM7307B		80	21	21	15°	7500	10000	40300	25800	0.47	
25°	7500				10000			38200	24900	0.47	
40°	7000				9500			38300	24400	0.45	

Continued on the next page

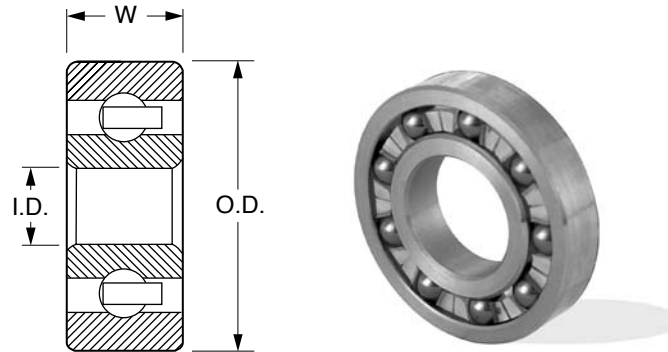


Catalog Number	d Bore	D Outside Dia.	S Width	a Contact Angle	Maximum Speed (rpm)		Load Rating N		Approx. Bearing Weight kg
					Grease	Oil	Dynamic	Static	
BBXANGM7407C	35	100	25	15°	5500	8000	66800	41200	1.14
BBXANGM7407AC				25°	5500	8000	66400	41900	1.14
BBXANGM7407B				40°	5000	7500	60200	37900	1.1
BBXANGM7908C	40	62	12	15°	12000	20000	14500	10600	0.011
BBXANGM7908AC				25°			14100	10100	
BBXANGM7008C		68	15	15°	8000	11000	19700	14900	0.18
BBXANGM7008AC				25°			18700	14100	
BBXANGM7208C		80	18	15°	7500	10000	38400	26300	0.37
BBXANGM7208AC				25°	7500	10000	36800	25400	0.37
BBXANGM7208B				40°	6700	9000	34500	23800	0.42
BBXANGM7308C		90	23	15°	6700	9000	49300	32300	0.66
BBXANGM7308AC				25°	6700	9000	47000	31100	0.66
BBXANGM7308B				40°	6300	8500	46500	29500	0.63
BBXANGM7408C		110	27	15°	5200	7000	80200	53300	1.4
BBXANGM7408AC				25°	5200	7000	73700	42100	1.4
BBXANGM7408B	40°			5000	6500	70100	49100	1.35	
BBXANGM7909C	45	68	12	15°	10000	18000	16000	12600	0.013
BBXANGM7909AC				25°			15400	12200	
BBXANGM7009C		75	16	15°	7500	10000	25900	20200	0.23
BBXANGM7009AC				25°			24700	19100	
BBXANGM7209C		85	19	15°	6700	9000	40400	29300	0.41
BBXANGM7209AC				25°	6700	9000	38600	28100	0.41
BBXANGM7209B				40°	6300	8500	34000	24600	0.42
BBXANGM7309C		100	25	15°	6000	8000	63100	42900	0.86
BBXANGM7309AC				25°	6000	8000	61600	41200	0.86
BBXANGM7309B				40°	5600	7500	59600	39600	0.85
BBXANGM7409C		120	29	15°	5000	6500	93100	60800	1.8
BBXANGM7409AC				25°	5000	6500	84500	55100	1.8
BBXANGM7409B	40°			4500	6000	80700	44100	1.75	



Corrosion-Resistant | Stainless PLAIN BALL BEARINGS

- 316 Stainless Raceways
- 316 Stainless Balls
- Polymer Retainer
- ABEC 0
- Single Row



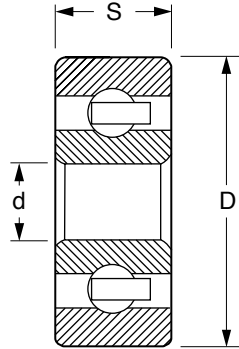
Catalog Number	I.D.	O.D.	W Width	Maximum rpm With No Load	Load Capacity lbs.	
					Dynamic	Static
BBSRIX-SSR4	1/4	5/8	.196	2352	78	51
BBSRIX-SSR4A		3/4	7/32			
BBSRIX-SSR4AW		3/4	9/32			
BBSRIX-SSR6	3/8	7/8	7/32	1600	126	99
BBSRIX-SSR6A		9/32				
BBSRIX-SSR8A		1-1/8	3/8			
BBSRIX-SSR8	1/2	1-1/8	1/4	1142	165	129
BBSRIX-SSR8W			3/8			
BBSRIX-SSR10	5/8	1-1/8	1/4	1142	165	129
BBSRIX-SSR10B		1-3/8	7/16	1069	207	138
BBSRIX-SSR12	3/4	1-5/8	5/16	840	234	156
BBSRIX-SSR16	1	2	1/2	729	276	183



NEW

**Corrosion-Resistant | Stainless
PLAIN BALL BEARINGS**

- 316 Stainless Raceways
- 316 Stainless Balls
- Polymer Retainer
- ABEC 0
- Single Row



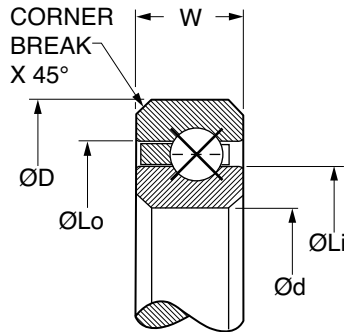
Catalog Number	d Bore	D Outside Dia.	S Width	Maximum rpm With No Load	Load Capacity N (lbs.)	
					Dynamic	Static
BBSRIXMSS625	5	16	5	2352	347 (78)	227 (51)
BBSRIXMSS606	6	17	6	2352	347 (78)	227 (51)
BBSRIXMSS608	8	22	7	1600	560 (126)	440 (99)
BBSRIXMSS6000	10	26	8	1600	560 (126)	440 (99)
BBSRIXMSS6001	12	28	8	1142	734 (165)	574 (129)
BBSRIXMSS6002	15	32	9	1142	734 (165)	574 (129)
BBSRIXMSS6003	17	35	10	1069	921 (207)	614 (138)
BBSRIXMSS6004	20	42	12	840	1041 (234)	694 (156)
BBSRIXMSS6005	25	47	12	729	1228 (276)	814 (183)
BBSRIXMSS6200	10	30	9	1142	734 (165)	574 (129)
BBSRIXMSS6201	12	32	10	1142	734 (165)	574 (129)
BBSRIXMSS6202	15	35	11	1069	921 (207)	734 (165)
BBSRIXMSS6203	17	40	12	1069	921 (207)	734 (165)
BBSRIXMSS6204	20	47	14	840	1041 (234)	881 (198)
BBSRIXMSS6205	25	52	15	729	1228 (276)	1068 (240)



NEW

**Thin Section | Four-Point Contact
BALL BEARINGS**

- 52100 Chrome Steel
- Four-Point Contact Bearings
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Width	Ball Complement		Internal Clearance	
					Ball Qty.	Ball Dia.	Min.	Max.
BBXFOR-KAA10XLO	1.000	1.375	1.1875	.1875	21	3/32	.0010	.0015
BBXFOR-KAA15XLO	1.500	1.875	1.6875	.1875	29	3/32	.0012	.0017
BBXFOR-KAA17XLO	1.750	2.124	1.9375	.1875	33	3/32	.0012	.0022
BBXFOR-KA020XPO	2.000	2.500	2.2500	.2500	27	1/8	.0012	.0022
BBXFOR-KB020XPO		2.625	2.3125	.3125	23	5/32		
BBXFOR-KA025XPO	2.500	3.000	2.7500	.2500	33	1/8	.0012	.0022
BBXFOR-KB025XPO		3.125	2.8125	.3125	28	5/32		
BBXFOR-KA030XPO	3.000	3.500	3.2500	.2500	39	1/8	.0012	.0022
BBXFOR-KB030XPO		3.625	3.3125	.3125	33	5/32		

Catalog Number	Lo Outer Race I.D.	Li Inner Race O.D.	Corner Break	Weight lbs.	Max. Radial rpm	Max. Axial rpm	Load Rating	
							Radial lbs.	Axial lbs.
BBXFOR-KAA10XLO	1.235	1.141	.02	.03	4000	11000	147	367
BBXFOR-KAA15XLO	1.735	1.641	.02	.04	2666	7333	182	455
BBXFOR-KAA17XLO	1.985	1.891		.05	2285	6285	198	496
BBXFOR-KA020XPO	2.313	2.187	.03	.10	2000	5500	320	793
BBXFOR-KB020XPO	2.391	2.234	.05	.16		5000	450	1130
BBXFOR-KA025XPO	2.813	2.687	.03	.13	1600	4400	370	910
BBXFOR-KB025XPO	2.891	2.734	.05	.19			525	1295
BBXFOR-KA030XPO	3.313	3.187	.03	.15	1166	3300	410	1015
BBXFOR-KB030XPO	3.391	3.234	.05	.24	1350	3700	570	1400

NOTE: Larger sizes available upon request. Stainless Steel available upon special request.

Minimum buy quantities may apply.

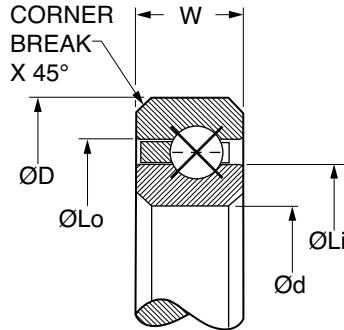
Continued on the next page



NEW

**Thin Section | Four-Point Contact
BALL BEARINGS**

- 52100 Chrome Steel
- Four-Point Contact Bearings
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Width	Ball Complement		Internal Clearance	
					Ball Qty.	Ball Dia.	Min.	Max.
BBXFOR-KA035XPO	3.500	4.000	3.7500	.2500	45	1/8	.0016	.0026
BBXFOR-KB035XPO		4.125	3.8125	.3125	38	5/32		
BBXFOR-KA040XPO	4.000	4.500	4.2500	.2500	51	1/8	.0016	.0026
BBXFOR-KA040XPO		4.625	4.3125	.3125	43	5/32		
BBXFOR-KC040XPO	4.000	4.750	4.3750	.3750	35	3/16	.0016	.0026
BBXFOR-KD040XPO		5.000	4.500	.5000	27	1/4		
BBXFOR-KF040XPO	4.000	5.500	4.750	.7500	19	3/8	.0016	.0026
BBXFOR-KG040XPO		6.000	5.000	1.0000	15	1/2		
BBXFOR-KA042XPO	4.246	4.746	4.4962	.2500	54	1/8	.0016	.0026
BBXFOR-KB042XPO		4.871	4.5587	.3125	45	5/32		

Catalog Number	Lo Outer Race I.D.	Li Inner Race O.D.	Corner Break	Weight lbs.	Max. Radial rpm	Max. Axial rpm	Load Rating	
							Radial lbs.	Axial lbs.
BBXFOR-KA035XPO	3.813	3.687	.03	.18	1000	2857	450	1115
BBXFOR-KB035XPO	3.891	3.734	.05	.27		2900	635	1575
BBXFOR-KA040XPO	4.313	4.187	.03	.20	890	2500	490	1215
BBXFOR-KA040XPO	4.391	4.234	.05	.30	875	2600	700	1700
BBXFOR-KC040XPO	4.470	4.280	.05	.45	1000	2750	860	2130
BBXFOR-KD040XPO	4.626	4.374	.07	.78		1350	3350	
BBXFOR-KF040XPO	4.938	4.562	.09	1.90	1000	2650	2600	6500
BBXFOR-KG040XPO	5.251	4.749		3.60		2700	4450	11100
BBXFOR-KA042XPO	4.560	4.433	.03	.21	830	2360	510	1260
BBXFOR-KB042XPO	4.638	4.480	.05	.31	850	2400	705	1750

NOTE: Larger sizes available upon request. Stainless Steel available upon special request.

Minimum buy quantities may apply.

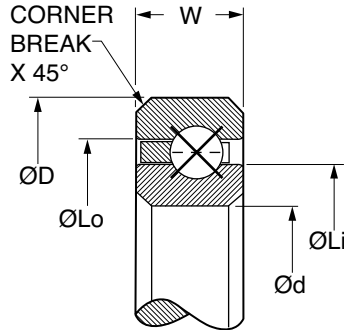
Continued on the next page



NEW

**Thin Section | Four-Point Contact
BALL BEARINGS**

- 52100 Chrome Steel
- Four-Point Contact Bearings
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Weight	Ball Complement		Internal Clearance	
					Ball Qty.	Ball Dia.	Min.	Max.
BBXFOR-KC042XPO	4.246	4.996	4.6212	.3750	37	3/16	.0016	.0026
BBXFOR-KD042XPO		5.246	4.7460	.5000	28	1/4		
BBXFOR-KF042XPO	4.246	5.746	4.9960	.7500	20	3/8	.0016	.0026
BBXFOR-KG042XPO		6.246	5.2460	1.0000	15	1/2		
BBXFOR-KA045XPO	4.500	5.000	4.7500	.2500	57	1/8	.0016	.0026
BBXFOR-KB045XPO		5.125	4.8125	.3125	48	5/32		
BBXFOR-KC045XPO	4.500	5.250	4.8750	.3750	39	3/16	.0016	.0026
BBXFOR-KD045XPO		5.500	5.0000	.5000	30	1/4		
BBXFOR-KF045XPO	4.500	6.000	5.2500	.7500	21	3/8	.0016	.0026
BBXFOR-KG045XPO		6.500	5.5000	1.0000	16	1/2		

Catalog Number	Lo Outer Race I.D.	Li Inner Race O.D.	Corner Break	Weight lbs.	Max. Radial rpm	Max. Axial rpm	Load Rating	
							Radial lbs.	Axial lbs.
BBXFOR-KC042XPO	4.716	4.527	.05	.47	825	2350	900	2270
BBXFOR-KD042XPO	4.872	4.620	.07	.83	950	2525	1400	3500
BBXFOR-KF042XPO	5.185	4.808	.09	2.00	925	2550	2700	6700
BBXFOR-KG042XPO	5.497	4.995		3.80		2500	4450	11350
BBXFOR-KA045XPO	4.813	4.687	.03	.23	780	2230	525	1310
BBXFOR-KB045XPO	4.891	4.734	.05	.33	800	2300	740	1820
BBXFOR-KC045XPO	4.970	4.780	.05	.48	780	2230	910	2310
BBXFOR-KD045XPO	5.126	4.874	.07	.88	890	2420	1450	3600
BBXFOR-KF045XPO	5.438	5.062	.09	2.10	875	2400	2800	6850
BBXFOR-KG045XPO	5.751	5.249		4.00	850		4550	11550

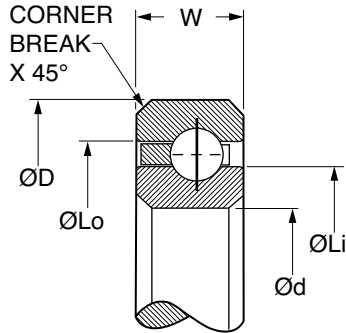
NOTE: Larger sizes available upon request. Stainless Steel available upon special request.
Minimum buy quantities may apply.



NEW

**Thin Section | Conrad Style
BALL BEARINGS**

- 52100 Chrome Steel
- Conrad Radial Contact
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Width	Ball Complement		Internal Clearance	
					Ball Qty.	Ball Dia.	Min.	Max.
BBXCRC-KAA10CLO	1.000	1.375	1.188		21		.0010	.0016
BBXCRC-KAA15CLO	1.500	1.875	1.688	.1875	29	3/32	.0012	.0018
BBXCRC-KAA17CLO	1.750	2.124	1.938		33		.0012	.0024
BBXCRC-KA020CPO	2.000	2.500	2.250	.2500	27	1/8	.0012	.0024
BBXCRC-KB020CPO		2.625	2.313	.3125	23	5/32		
BBXCRC-KA025CPO	2.500	3.000	2.750	.2500	33	1/8	.0012	.0024
BBXCRC-KB025CPO		3.125	2.813	.3125	28	5/32		
BBXCRC-KA030CPO	3.000	3.500	3.250	.2500	39	1/8	.0012	.0024
BBXCRC-KB030CPO		3.625	3.313	.3125	33	5/32		
BBXCRC-KA035CPO	3.500	4.000	3.750	.2500	45	1/8	.0016	.0028
BBXCRC-KB035CPO		4.125	3.813	.3125	38	5/32		
BBXCRC-KA040CPO	4.000	4.500	4.250	.2500	51	1/8	.0016	.0028
BBXCRC-KB040CPO		4.625	4.313	.3125	43	5/32		
BBXCRC-KC040CPO		4.750	4.375	.3750	35	3/16		

Catalog Number	Lo Outer Race I.D.	Li Inner Race O.D.	Corner Break	Weight lbs.	Max. Radial rpm	Max. Axial rpm	Load Rating	
							Radial lbs.	Axial lbs.
BBXCRC-KAA10CLO	1.235	1.141		.03	21000		147	
BBXCRC-KAA15CLO	1.735	1.641	.02	.04	14000	0	182	0
BBXCRC-KAA17CLO	1.985	1.891		.05	12000		198	
BBXCRC-KA020CPO	2.313	2.187	.03	.10	10500	0	320	0
BBXCRC-KB020CPO	2.391	2.234	.05	.16	10500	0	450	0
BBXCRC-KA025CPO	2.813	2.687	.03	.13	8400	0	365	0
BBXCRC-KB025CPO	2.891	2.734	.05	.19	8400	0	525	0
BBXCRC-KA030CPO	3.313	3.187	.03	.15	6000	0	410	0
BBXCRC-KB030CPO	3.391	3.234	.05	.24	7000	0	570	0
BBXCRC-KA035CPO	3.813	3.687	.03	.18	5142	0	450	0
BBXCRC-KB035CPO	3.891	3.734	.05	.27	5145	0	635	0
BBXCRC-KA040CPO	4.313	4.187	.03	.20	4500	0	490	0
BBXCRC-KB040CPO	4.391	4.234	.05	.30	4500	0	700	0
BBXCRC-KC040CPO	4.470	4.280	.05	.45	5275		860	

NOTE: Larger sizes available upon request. Stainless Steel available upon special request.

Minimum buy quantities may apply.

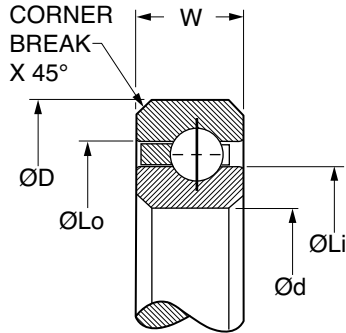
Continued on the next page



NEW

**Thin Section | Conrad Style
BALL BEARINGS**

- 52100 Chrome Steel
- Conrad Radial Contact
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Width	Ball Complement		Internal Clearance	
					Ball Qty.	Ball Dia.	Min.	Max.
BBXCRC-KD040CPO	4.000	5.0000	4.500	.5000	27	1/4	.0016	.0028
BBXCRC-KF040CPO		5.5000	4.750	.7500	19	3/8		
BBXCRC-KG040CPO		6.0000	5.000	1.0000	15	1/2		
BBXCRC-KA042CPO	4.246	4.7460	4.496	.2500	54	1/8	.0016	.0028
BBXCRC-KB042CPO		4.8710	4.559	.3125	45	5/32		
BBXCRC-KC042CPO		4.9960	4.621	.3750	37	3/16		
BBXCRC-KD042CPO	4.246	5.2460	4.746	.5000	28	1/4	.0016	.0028
BBXCRC-KF042CPO		5.7462	4.996	.7500	20	3/8		
BBXCRC-KG042CPO		6.2460	5.246	1.0000	15	1/2		
BBXCRC-KA045CPO	4.500	5.0000	4.750	.2500	57	1/8	.0016	.0028
BBXCRC-KB045CPO		5.1250	4.813	.3125	48	5/32		
BBXCRC-KC045CPO		5.2500	4.875	.3750	39	3/16		
BBXCRC-KD045CPO	4.500	5.5000	5.000	.5000	30	1/4	.0016	.0028
BBXCRC-KF045CPO		6.0000	5.250	.7500	21	3/8		

Catalog Number	Lo Outer Race I.D.	Li Inner Race O.D.	Corner Break	Weight lbs.	Max. Radial rpm	Max. Axial rpm	Load Rating	
							Radial lbs.	Axial lbs.
BBXCRC-KD040CPO	4.626	4.374	.07	.78	5250	0	1350	0
BBXCRC-KF040CPO	4.938	4.562	.09	1.90			2600	
BBXCRC-KG040CPO	5.251	4.749	.09	3.60			4450	
BBXCRC-KA042CPO	4.560	4.433	.03	.21	4235	0	510	0
BBXCRC-KB042CPO	4.638	4.480	.05	.31	4250		705	
BBXCRC-KC042CPO	4.716	4.527	.05	.47	4240		900	
BBXCRC-KD042CPO	4.872	4.620	.07	.83	4940	0	1400	0
BBXCRC-KF042CPO	5.185	4.808	.09	2.00	4900		2700	
BBXCRC-KG042CPO	5.497	4.995	.09	3.80	4900		4450	
BBXCRC-KA045CPO	4.813	4.687	.03	.23	4000	0	525	0
BBXCRC-KB045CPO	4.891	4.734	.05	.33			740	
BBXCRC-KC045CPO	4.970	4.780	.05	.48	4000	0	910	0
BBXCRC-KD045CPO	5.126	4.874	.07	.88			1450	
BBXCRC-KF045CPO	5.438	5.062	.09	2.10			2800	

NOTE: Larger sizes available upon request. Stainless Steel available upon special request.

Minimum buy quantities may apply.

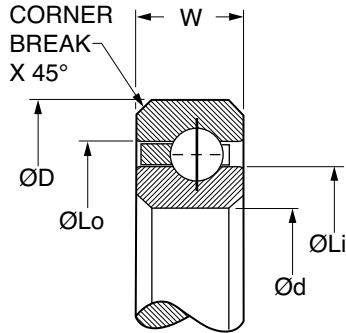
Continued on the next page



NEW

**Thin Section | Conrad Style
BALL BEARINGS**

- 52100 Chrome Steel
- Conrad Radial Contact
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Width	Ball Complement		Internal Clearance	
					Ball Qty.	Ball Dia.	Min.	Max.
BBXCRC-KG045CPO	4.500	6.500	5.500	1.0000	16	1/2	.0016	.0028
BBXCRC-KA047CPO	4.752	5.252	5.002	.2500	60	1/8	.0020	.0034
BBXCRC-KB047CPO		5.377	5.064	.3125	50	5/32		
BBXCRC-KC047CPO		5.502	5.127	.3750	41	3/16		
BBXCRC-KD047CPO	4.752	5.752	5.252	.5000	31	1/4	.0020	.0034
BBXCRC-KF047CPO		6.252	5.502	.7500	22	3/8		
BBXCRC-KG047CPO		6.752	5.752	1.0000	17	1/2		
BBXCRC-KA050CPO	5.000	5.500	5.250	.2500	63	1/8	.0020	.0034
BBXCRC-KB050CPO		5.625	5.313	.3125	53	5/32		
BBXCRC-KC050CPO		5.750	5.375	.3750	43	3/16		
BBXCRC-KD050CPO	5.000	6.000	5.500	.5000	33	1/4	.0020	.0034
BBXCRC-KF050CPO		6.500	5.750	.7500	23	3/8		
BBXCRC-KG050CPO		7.000	6.000	1.0000	18	1/2		

Catalog Number	Lo Outer Race I.D.	Li Inner Race O.D.	Corner Break	Weight lbs.	Max. Radial rpm	Max. Axial rpm	Load Rating	
							Radial lbs.	Axial lbs.
BBXCRC-KG045CPO	5.751	5.249	.09	4.00	4500	0	4550	0
BBXCRC-KA047CPO	5.065	4.938	.03	.24	3790	0	535	0
BBXCRC-KB047CPO	5.143	4.985	.05	.34	3800		750	
BBXCRC-KC047CPO	5.221	5.032	.05	.50	3795		940	
BBXCRC-KD047CPO	5.378	5.126	.07	.94	4400	0	1470	0
BBXCRC-KF047CPO	5.690	5.313	.09	2.20			2900	
BBXCRC-KG047CPO	6.003	5.501	.09	4.10			4850	
BBXCRC-KA050CPO	5.314	5.187	.03	.25	3600	0	545	0
BBXCRC-KB050CPO	5.392	5.233	.05	.38	3600		790	
BBXCRC-KC050CPO	5.470	5.280	.05	.58	3620		990	
BBXCRC-KD050CPO	5.626	5.374	.07	1.00	4200	0	1550	0
BBXCRC-KF050CPO	5.939	5.662	.09	2.30	4175		3050	
BBXCRC-KG050CPO	6.251	5.749	.09	4.30	4200		4950	

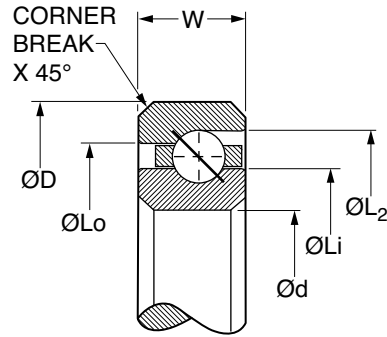
NOTE: Larger sizes available upon request. Stainless Steel available upon special request. Minimum buy quantities may apply.



NEW

**Thin Section | Angular Contact Style
BALL BEARINGS**

- 52100 Chrome Steel
- Angular Contact Single Bearings
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Width	Ball Complement		Lo Outer Race I.D.
					Ball Qty.	Ball Dia.	
BBXANG-KAA10ARO	1.000	1.375	1.1875	.1875	28	3/32	1.235
BBXANG-KAA15ARO	1.500	1.875	1.6875	.1875	40	3/32	1.735
BBXANG-KAA17ARO	1.750	2.124	1.9375	.1875	46	3/32	1.985
BBXANG-KA020ARO	2.000	2.500	2.2500	.2500	36	1/8	2.313
BBXANG-KB020ARO		2.625	2.3125	.3125	31	5/32	2.391
BBXANG-KA025ARO	2.500	3.000	2.7500	.2500	44	1/8	2.813
BBXANG-KB025ARO		3.125	2.8125	.3125	38	5/32	2.891
BBXANG-KA030ARO	3.000	3.500	3.2500	.2500	52	1/8	3.313
BBXANG-KB030ARO		3.625	3.3125	.3125	44	5/32	3.391

Catalog Number	Li Inner Race O.D.	L ₂ Outer Race Land	Corner Break	Weight lbs.	Maximum rpm	Load Rating	
						Radial lbs.	Axial lbs.
BBXFOR-KAA10XLO	1.141	1.279	.02	.03	21000	147	430
BBXFOR-KAA15XLO	1.641	1.778	.02	.04	14000	182	525
BBXFOR-KAA17XLO	1.891	2.027	.02	.05	12000	198	600
BBXFOR-KA020XPO	2.187	2.371	.03	.10	10500	320	800
BBXFOR-KB020XPO	2.234	2.465	.05	.16		450	1175
BBXFOR-KA025XPO	2.687	2.871	.03	.13	8400	365	900
BBXFOR-KB025XPO	2.734	2.965	.05	.19		525	1500
BBXFOR-KA030XPO	3.187	3.371	.03	.15	6000	410	1100
BBXFOR-KB030XPO	3.234	3.465	.05	.24	7000	570	1700

NOTE: Larger sizes available upon request. Stainless Steel available upon special request.

Minimum buy quantities may apply.

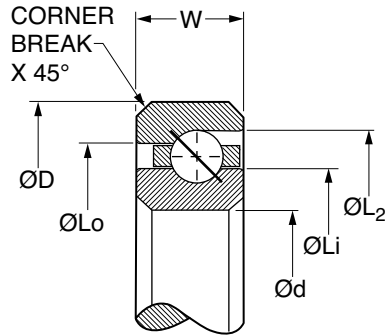
Continued on the next page



NEW

**Thin Section | Angular Contact Style
BALL BEARINGS**

- 52100 Chrome Steel
- Angular Contact Single Bearings
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Width	Ball Complement		Lo Outer Race I.D.
					Ball Qty.	Ball Dia.	
BBXANG-KA035ARO	3.500	4.000	3.7500	.2500	60	1/8	3.813
BBXANG-KB035ARO		4.125	3.8125	.3125	51	5/32	3.891
BBXANG-KA040ARO	4.000	4.500	4.2500	.2500	68	1/8	4.313
BBXANG-KB040ARO		4.625	4.3125	.3125	58	5/32	4.391
BBXANG-KC040ARO	4.000	4.750	4.3750	.3750	49	3/16	4.470
BBXANG-KD040ARO		5.000	4.5000	.5000	36	1/4	4.626
BBXANG-KF040ARO	4.000	5.500	4.7500	.7500	26	3/8	4.938
BBXANG-KG040ARO		6.000	5.0000	1.0000	20	1/2	5.251
BBXANG-KA042ARO	4.246	4.746	4.4962	.2500	72	1/8	4.560
BBXANG-KB042ARO		4.871	4.5587	.3125	61	5/32	4.638

Catalog Number	Li Inner Race O.D.	L ₂ Outer Race Land	Corner Break	Weight lbs.	Maximum rpm	Load Rating	
						Radial lbs.	Axial lbs.
BBXANG-KA035ARO	3.687	3.871	.03	.18	5142	450	1100
BBXANG-KB035ARO	3.734	3.965	.05	.27	5145	635	1875
BBXANG-KA040ARO	4.187	4.371	.03	.20	4500	490	1275
BBXANG-KB040ARO	4.234	4.465	.05	.30		700	2000
BBXANG-KC040ARO	4.280	4.558	.05	.45	5275	860	2200
BBXANG-KD040ARO	4.374	4.743	.07	.78	5250	1350	3900
BBXANG-KF040ARO	4.562	5.118	.09	1.90	5250	2600	7900
BBXANG-KG040ARO	4.749	5.496		3.60		4450	12800
BBXANG-KA042ARO	4.433	4.617	.03	.21	4235	510	1300
BBXANG-KB042ARO	4.480	4.711	.05	.31	4250	705	2050

NOTE: Larger sizes available upon request. Stainless Steel available upon special request.

Minimum buy quantities may apply.

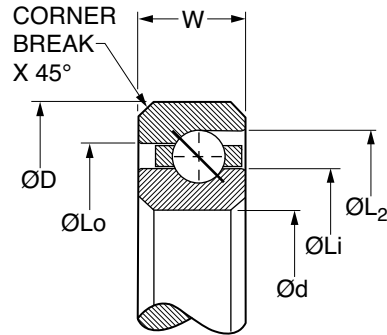
Continued on the next page



NEW

**Thin Section | Angular Contact Style
BALL BEARINGS**

- 52100 Chrome Steel
- Angular Contact Single Bearings
- Snap-Over Cage
- ABEC 1



Catalog Number	d Bore	D O.D.	Pitch	W Width	Ball Complement		Lo Outer Race I.D.
					Ball Qty.	Ball Dia.	
BBXANG-KC042ARO	4.246	4.996	4.6212	.3750	52	3/16	4.716
BBXANG-KD042ARO		5.246	4.7460	.5000	38	1/4	4.872
BBXANG-KF042ARO	4.246	5.7462	4.9960	.7500	27	3/8	5.185
BBXANG-KG042ARO		6.246	5.2460	1.0000	21	1/2	5.497
BBXANG-KA045ARO	4.500	5.000	4.7500	.2500	76	1/8	4.813
BBXANG-KB045ARO		5.125	4.8125	.3125	64	5/32	4.891
BBXANG-KC045ARO	4.500	5.250	4.8750	.3750	55	3/16	4.970
BBXANG-KD045ARO		5.500	5.0000	.5000	40	1/4	5.126
BBXANG-KF045ARO	4.500	6.000	5.2500	.7500	29	3/8	5.438
BBXANG-KG045ARO		6.500	5.5000	1.0000	22	1/2	5.751

Catalog Number	Li Inner Race O.D.	L ₂ Outer Race Land	Corner Break	Weight lbs.	Maximum rpm	Load Rating	
						Radial lbs.	Axial lbs.
BBXANG-KC042ARO	4.527	4.805	.05	.47	4240	900	2300
BBXANG-KD042ARO	4.620	4.989	.07	.83	4940	1400	4100
BBXANG-KF042ARO	4.808	5.364	.09	2.00	4900	2700	8200
BBXANG-KG042ARO	4.995	5.742	.09	3.80	4900	4450	13700
BBXANG-KA045ARO	4.687	4.871	.03	.23	4000	525	1350
BBXANG-KB045ARO	4.734	4.965	.05	.33		740	2175
BBXANG-KC045ARO	4.780	5.058	.05	.48	4000	910	2500
BBXANG-KD045ARO	4.874	5.243	.07	.88	4620	1450	4300
BBXANG-KF045ARO	5.062	5.618	.09	2.10	4650	2800	8500
BBXANG-KG045ARO	5.249	5.996		4.00	4500	4550	13900

NOTE: Larger sizes available upon request. Stainless Steel available upon special request. Minimum buy quantities may apply.

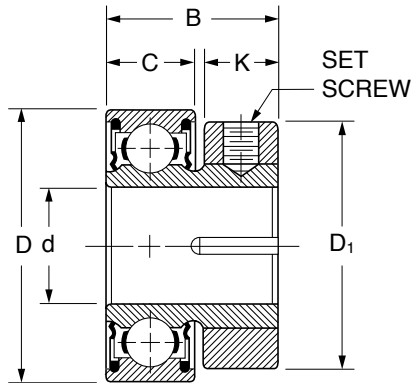
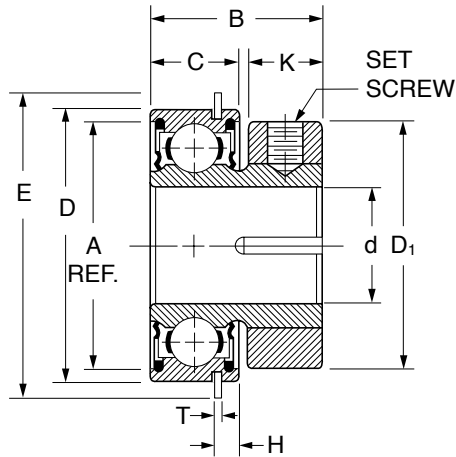

FIGURE 1

FIGURE 2

Figure 1 • Standard Type

Catalog Number	d* Bore +.0005 -.0000	D Outside Dia. +.0000 -.0004	Width		D ₁	K	Set Screw Threads
			Inner B +.000 -.005	Outer C +.000 -.005			
BBXFLG-S3PP4A	3/8	.8750	.5625	.2812	25/32	1/4	#8-36
BBXFLG-S5PP2	1/2	1.1250	.6250	.3125	29/32	9/32	

Figure 2 • Wireloc Type

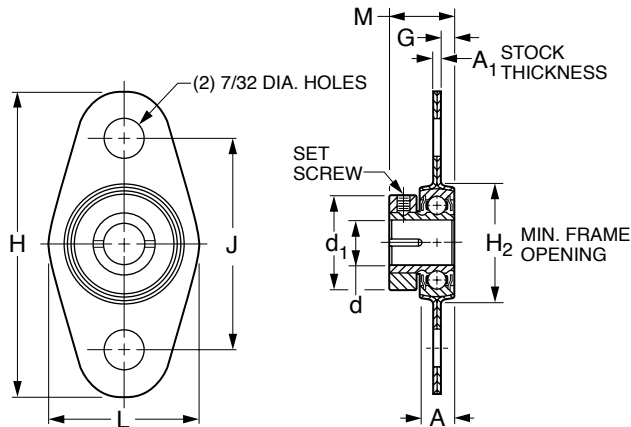
Catalog Number	d* Bore +.0005 -.0000	D Outside Dia. +.0000 -.0004	Width		E	A	D ₁	K	H	T	Set Screw Threads
			Inner B +.000 -.005	Outer C +.000 -.005							
BBXFLG-S1PPG74	3/8	.8750	.5625	.2812	63/64	.786	25/32	1/4	.090	.026	#8-36
BBXFLG-S1PPG73A	1/2	1.1250	.6250	.3125	1-15/64	1.018	29/32	9/32	.031	.031	

*Bore tolerance applies prior to collar assembly.

- NOTES:** 1. Except for bore, bearings inspected to ABEC-1 tolerances.
 2. Recommended shaft tolerance: Nominal bore size -.0005

FLANGETTE UNIT

- Chrome Steel Bearing
- 2-pc. Pressed Steel Housing
- Collar and Set Screw



Catalog Number	d* Bore +.0005 -.0000	A	d ₁	H ₂	M	G	A ₁	H	L	J	Set Screw Thread	Max. Radial Unit Load (lbs.)
BBDFLG-S3PPB5AST	.3750	9/32	25/32	1-3/32	.562	.107	.0329	2-3/32	1-3/16	1-17/32	#8-36	150
BBDFLG-S5PPB2ST	.5000	5/16	29/32	1-9/32	.625	.120	.0359	2-11/32	1-7/16	1-25/32		220

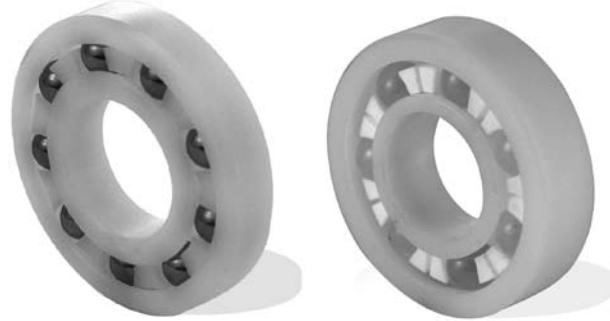
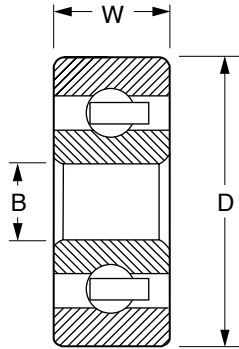
*Bearings inspected to ABEC-1 tolerances except bore. Bore tolerance applies prior to collar assembly.

NOTE: Recommended shaft tolerance: Nominal bore size to $-.0005$ ".



Plastic Raceways PLAIN BALL BEARINGS

- Acetal Raceways • Glass or 316 Stainless Steel Balls

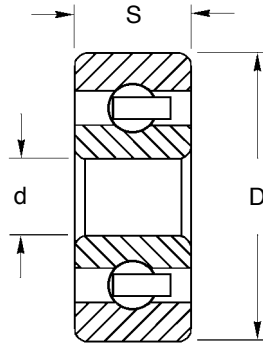


Catalog Number	B Bore	D Outside Dia.	W Width	Maximum rpm With No Load	Load Rating lbs. (N)	
					Dynamic	Static
BBPRIX-R3XXS	3/16	1/2	5/32	3167	17 (76)	11 (49)
BBPRIX-R3AX <input type="checkbox"/>		5/8	.196	2352	26 (116)	17 (76)
BBPRIX-R4XX <input type="checkbox"/>	1/4	5/8	.196	2352	26 (116)	17 (76)
BBPRIX-R4AX <input type="checkbox"/>		3/4	7/32			
BBPRIX-R4AW <input type="checkbox"/>		3/4	9/32			
BBPRIX-R6XX <input type="checkbox"/>	3/8	7/8	7/32	1600	42 (187)	33 (147)
BBPRIX-R6AX <input type="checkbox"/>		7/8	9/32	1600	42 (187)	33 (147)
BBPRIX-R8AX <input type="checkbox"/>		1-1/8	3/8	1142	55 (245)	43 (191)
BBPRIX-R8XX <input type="checkbox"/>	1/2	1-1/8	1/4	1142	55 (245)	43 (191)
BBPRIX-R10A <input type="checkbox"/>	5/8	1-3/8	.375	1069	69 (307)	46 (205)
BBPRIX-R10B <input type="checkbox"/>			7/16			
BBPRIX-R12X <input type="checkbox"/>	3/4	1-5/8	5/16	842	78 (347)	52 (231)
BBPRIX-R16X <input type="checkbox"/>	1	2	1/2	729	92 (409)	61 (271)

G Glass Balls
S 316 Stainless Steel Balls

Plastic Raceways PLAIN BALL BEARINGS

• Acetal Raceways • Glass or 316 Stainless Steel Balls



Catalog Number	d Bore	D Outside Dia.	S Width	Max. rpm With No Load	Load Rating N (lbs.)		
					Dynamic	Static	
BBPRIXM625X <input type="checkbox"/>	5	16	5	2352	116 (26)	76 (17)	
BBPRIXM606X <input type="checkbox"/>	6	17	6	2352	116 (26)	76 (17)	
BBPRIXM1906 <input type="checkbox"/>		19		3017	67 (15)	44 (10)	
BBPRIXM1907 <input type="checkbox"/>		19		3017	58 (13)	40 (9)	
BBPRIXM2207 <input type="checkbox"/>	7	22	7	2606	85 (19)	58 (13)	
BBPRIXM608X <input type="checkbox"/>	8	22	7	1600	187 (42)	147 (33)	
BBPRIXM2409 <input type="checkbox"/>	9	24	7	2384	85 (19)	58 (13)	
BBPRIXM2609 <input type="checkbox"/>		26	8	2205	102 (23)	67 (15)	
BBPRIXM6000 <input type="checkbox"/>		26	8	1600	187 (42)	147 (33)	
BBPRIXM6200 <input type="checkbox"/>	10	30	9	1142	245 (55)	191 (43)	
BBPRIXM3510 <input type="checkbox"/>		35	11	1638	280 (63)	187 (42)	
BBPRIXM6001 <input type="checkbox"/>		27	8	1142	245 (55)	191 (43)	
BBPRIXM2812 <input type="checkbox"/>	12	28	8	2047	160 (36)	107 (24)	
BBPRIXM3212 <input type="checkbox"/>		32		10	1142	245 (55)	191 (43)
BBPRIXM3712 <input type="checkbox"/>		37		12	1550	307 (69)	205 (46)
BBPRIXM3215 <input type="checkbox"/>		32		8	1800	191 (43)	129 (29)
BBPRIXM6002 <input type="checkbox"/>	15	32	9	1142	245 (55)	191 (43)	
BBPRIXM6202 <input type="checkbox"/>		35	11	1069	307 (69)	205 (46)	
BBPRIXM4215 <input type="checkbox"/>		42	13	1360	369 (83)	245 (55)	
BBPRIXM3517 <input type="checkbox"/>	17	35	8	1630	262 (59)	178 (40)	
BBPRIXM6003 <input type="checkbox"/>		35	10	1069	307 (69)	205 (46)	
BBPRIXM6203 <input type="checkbox"/>		40	12	1069	307 (69)	205 (46)	
BBPRIXM4717 <input type="checkbox"/>		47	14	1220	440 (99)	294 (66)	
BBPRIXM4220 <input type="checkbox"/>	20	42	8	1365	307 (69)	205 (46)	
BBPRIXM6004 <input type="checkbox"/>		42	12	840	347 (78)	231 (52)	
BBPRIXM6204 <input type="checkbox"/>		47	14	840	347 (78)	231 (52)	
BBPRIXM5220 <input type="checkbox"/>		52	15	1103	529 (119)	351 (79)	
BBPRIXM6005 <input type="checkbox"/>		47	12	729	409 (92)	271 (61)	
BBPRIXM6205 <input type="checkbox"/>	52	15					

G Glass Balls

S 316 Stainless Steel Balls

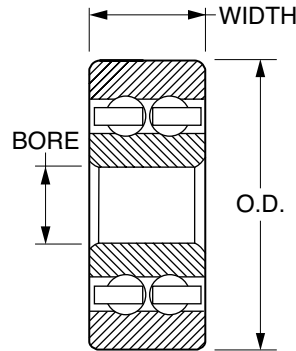


NEW

Plastic Raceways

PLAIN BALL BEARINGS-DOUBLE ROW

• Acetal Raceways • Glass or 316 Stainless Steel Balls



INCH

Catalog Number	Bore in.	O.D. Outside Dia. in.	Width in.	Maximum rpm With No Load	Load Rating lbs.	
					Dynamic	Static
BBPRIX-R4DR <input type="checkbox"/> BBPRIX-R4ADR <input type="checkbox"/>	1/4	5/8 3/4	3/8	1881	50	33
BBPRIX-R6DR <input type="checkbox"/> BBPRIX-R8DR <input type="checkbox"/>	3/8 1/2	7/8 1-1/8	7/16	1280 913	60 78	43 61
BBPRIX-R10BDR <input type="checkbox"/> BBPRIX-R12DR <input type="checkbox"/> BBPRIX-R16DR <input type="checkbox"/>	5/8 3/4 1	1-3/8 1-5/8 2	7/16 5/8 3/4	855 672 583	85 100 127	68 83 110

G Glass Balls
S 316 Stainless Steel Balls

METRIC

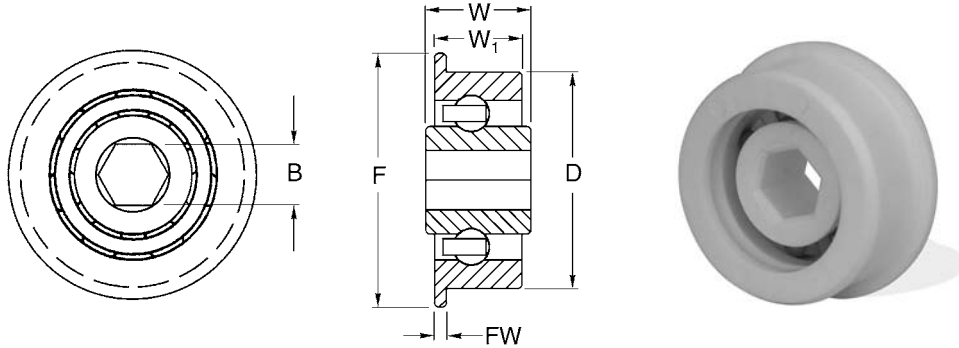
Catalog Number	Bore mm.	O.D. Outside Dia. mm.	Width mm.	Maximum rpm With No Load	Load Rating N	
					Dynamic	Static
BBPRIXM5200DR <input type="checkbox"/> BBPRIXM5201DR <input type="checkbox"/>	10 12	30 32	14.28 15.87	913	347	271
BBPRIXM5202DR <input type="checkbox"/> BBPRIXM5203DR <input type="checkbox"/>	15 17	35 40	15.87 17.46	855	378	302
BBPRIXM5204DR <input type="checkbox"/> BBPRIXM5205DR <input type="checkbox"/>	20 25	47 52	20.63	672 583	445 565	369 489

G Glass Balls
S 316 Stainless Steel Balls



Plastic Raceways FLANGED CONVEYOR BALL BEARINGS

• Polypropylene • Hex Bore • 316 Stainless Steel Balls



Catalog Number	B Hex Bore	D Outside Dia.	Width		F Flange Dia.	FW Flange Width	Maximum rpm With No Load	Load Rating lbs. (N)	
			Inner W	Outer W ₁				Dynamic	Static
BBPRIF-13SRS	5/16	1.00	.47	.84	1.16	.12	1600	42 (187)	33 (147)
BBPRIF-15SRS	7/16	1.50	.93	.70	1.56	.10	1069	69 (307)	46 (205)
BBPRIF-16SRS		1.60	.60	.70	1.80				
BBPRIF-17SRS		1.78	.60	1.10	1.86				
BBPRIF-18SRS		1.87	.60	.70	2.00				
BBPRIF-19SRS	2.26	2.37			.10	729	92 (409)	61 (271)	
BBPRIF-20SRS	2.056	2.32			.10	729	92 (409)	61 (271)	
BBPRIF-21SRS	11/16	2.056	.60	.70	2.32	.10	729	92 (409)	61 (271)
BBPRIF-22SRS		2.26			2.37				

NOTE: Items with 7/16 Hex Bore can be manufactured with 1/2 Dia. Bore on special order.

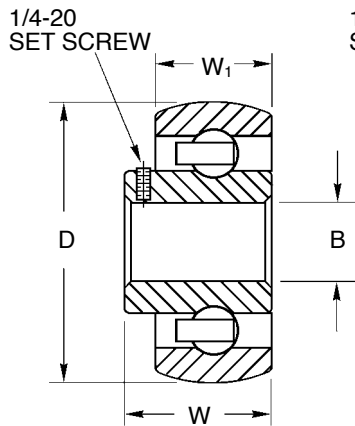


FIGURE 1

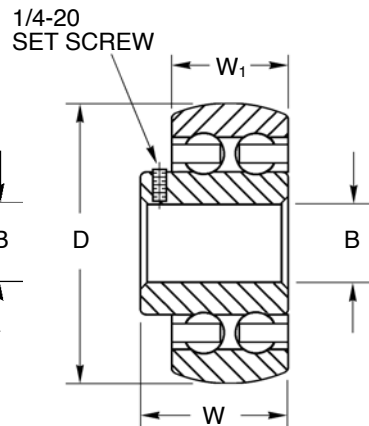


FIGURE 2



Figure 1 • Single Row

Catalog Number	B Bore	D Outside Dia.	W Width	W ₁ Width	Maximum rpm With No Load	Load Rating lbs.	
						Dynamic	Static
BBPRIX-I500S BBPRIX-I625S BBPRIX-I3/4S	1/2 5/8 3/4	1.850	.950	.591	840	78	52
BBPRIX-I5/8S BBPRIX-I750S BBPRIX-I100S	5/8 3/4 1	2.047	1.060	.709	729	92	61
BBPRIX-I118S BBPRIX-I316S BBPRIX-I125S	1-1/8 1-3/16 1-1/4	2.441	1.220	.709	690	151	114

Figure 2 • Double Row

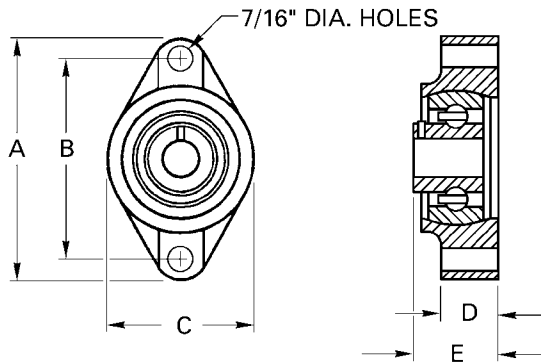
Catalog Number	B Bore	D Outside Dia.	W Width	W ₁ Width	Maximum rpm With No Load	Load Rating lbs.	
						Dynamic	Static
BBPRIX-I500DS BBPRIX-I625DS BBPRIX-I3/4DS	1/2 5/8 3/4	1.850	.886 .886 .950	.512 .512 .591	672	117	104
BBPRIX-I5/8DS BBPRIX-I750DS BBPRIX-I100DS	5/8 3/4 1	2.047	1.060 1.060 1.220	.709	583	138	92
BBPRIX-I118DS BBPRIX-I316DS BBPRIX-I125DS	1-1/8 1-3/16 1-1/4	2.441	1.220	.709	552	189	142

NOTES: 1. These are replacement bearings for mounting blocks and pillow blocks on pages 53, 54 and 55.
2. Insert bearings also available with 316 stainless steel raceways, on special order.



Plastic Two-Bolt Flange Mounting Blocks With **INSERT BALL BEARINGS**

- Polyester Block
- 316 Stainless Steel Balls
- Acetal Ball Bearings
- Removable Insert



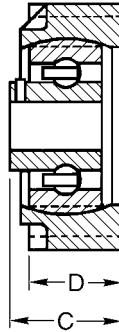
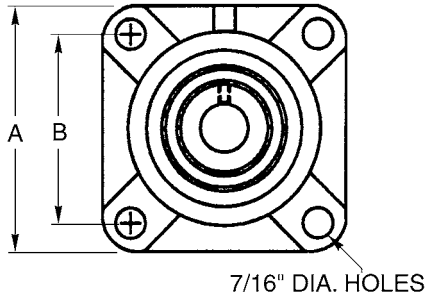
Catalog Number	Shaft Size Reference	A	B	C	D	E
BBPBLF-204-1/2	1/2					
BBPBLF-204-5/8	5/8	4.49	3.54	2.52	.448	1.04
BBPBLF-204-3/4	3/4					
BBPBLF-205-5/8	5/8					
BBPBLF-205-3/4	3/4	5.16	3.89	2.74	.523	1.15
BBPBLF-205-1	1					
BBPBLF-206-1-1/8	1-1/8					
BBPBLF-206-11875	1-3/16	5.83	4.61	3.15	.522	1.20
BBPBLF-206-1-1/4	1-1/4					

NOTE: See page 52 for replacement insert ball bearing data.



Plastic Four-Bolt Flange Mounting Blocks With **INSERT BALL BEARINGS**

- Polyester Block
- 316 Stainless Steel Balls
- Acetal Ball Bearings
- Removable Insert



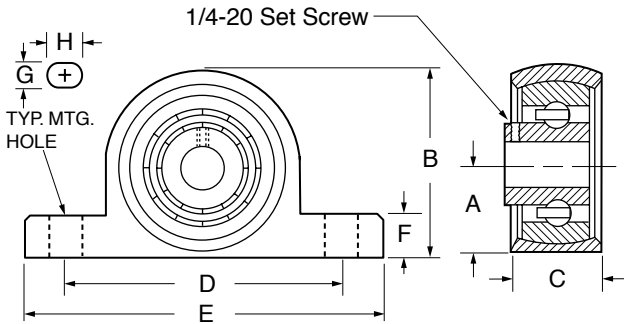
Catalog Number	Shaft Size Reference	A	B	C	D
BBPBLD-204-1/2	1/2	3.39	2.50	1.10	.55
BBPBLD-204-5/8	5/8				
BBPBLD-204-3/4	3/4				
BBPBLD-205-5/8	5/8	3.74	2.75	1.10	.55
BBPBLD-205-3/4	3/4				
BBPBLD-205-1	1				
BBPBLD-206-1-1/8	1-1/8	4.21	3.26	1.24	.56
BBPBLD-206-11875	1-3/16				
BBPBLD-206-1-1/4	1-1/4				

NOTE: See page 52 for replacement insert ball bearing data.



Plastic Pillow Blocks With INSERT BALL BEARINGS

- Polyester Block
- 316 Stainless Steel Balls
- Acetal Ball Bearings
- Removable Insert



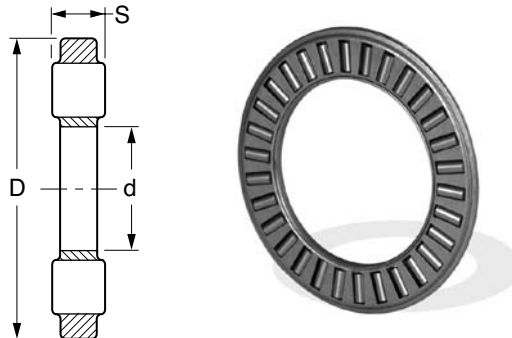
Catalog Number	Shaft Size Reference	A	B	C	D	E	F	G	H
BBPBLK-204-1/2	1/2								
BBPBLK-204-5/8	5/8	1.33	2.56	1.49	3.74	5.00	.55	.43	.55
BBPBLK-204-3/4	3/4								
BBPBLK-205-5/8	5/8								
BBPBLK-205-3/4	3/4	1.41	2.79	1.49	4.13	5.53	.57	.43	.55
BBPBLK-205-1	1								
BBPBLK-206-1-1/8	1-1/8								
BBPBLK-206-11875	1-3/16	1.68	3.30	1.81	4.68	6.41	.66	.55	.70
BBPBLK-206-1-1/4	1-1/4								

NOTE: See page 52 for replacement insert ball bearing data.

NEW

Axial Needle Roller THRUST BEARINGS

- Steel Needles



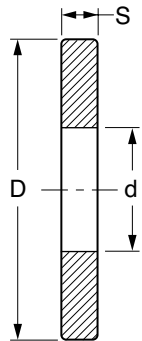
Catalog Number	d Bore	D Outside Dia.	S Width	Maximum Speed (rpm)	Load Rating N		Weight g
				Oil	Dynamic	Static	
BTHBNGMAXK0414TN*	4	14	2	18000	4380	7500	0.7
BTHBNGMAXK0515TN*	5	15		17000	4680	9100	0.8
BTHBNGMAXK0619TN*	6	19		16000	6740	15400	1
BTHBNGMAXK0821TN*	8	21	2	15000	7750	19000	2
BTHBNGMAXK1024	10	24		14000	9150	24500	3
BTHBNGMAXK1226	12	26		16000	9860	28600	3
BTHBNGMAXK1528	15	28	2	11000	11200	35500	4
BTHBNGMAXK1730	17	30		10000	11800	38600	4
BTHBNGMAXK2035	20	35		8500	12900	45600	5
BTHBNGMAXK2542	25	42	2	7000	13800	57800	7
BTHBNGMAXK3047	30	47		6000	15600	69500	8
BTHBNGMAXK3552	35	52		5500	16900	80100	10
BTHBNGMAXK4060	40	60	3	4700	27500	113500	16
BTHBNGMAXK4565	45	65		4300	29050	127600	18
BTHBNGMAXK5070	50	70		3900	31500	13800	20
BTHBNGMAXK5578	55	78	3	3500	37400	185000	28
BTHBNGMAXK6085	60	85		3200	43900	232500	33
BTHBNGMAXK6590	65	90		3000	45800	254600	35
BTHBNGMAXK7095	70	95	4	2900	53600	254400	60
BTHBNGMAXK75100	75	100		2700	54500	264600	61
BTHBNGMAXK80105	80	105		2600	55600	278500	63
BTHBNGMAXK85110	85	110	4	2400	57500	28800	67
BTHBNGMAXK90120	90	120		2300	72500	401000	86
BTHBNGMAXK100135	100	135		2000	90500	559500	104
BTHBNGMAXK110145	110	145	4	1900	96500	617500	122
BTHBNGMAXK120155	120	155	4	1700	101500	679600	131
BTHBNGMAXK130170	130	170	5	1600	132400	838900	205
BTHBNGMAXK140180	140	180	5	1500	137200	899600	219
BTHBNGMAXK150190	150	190		1400	142800	959000	232
BTHBNGMAXK160200	160	200		1300	147600	1015000	246

*Plastic Retainer Only

NEW

Axial THRUST WASHERS

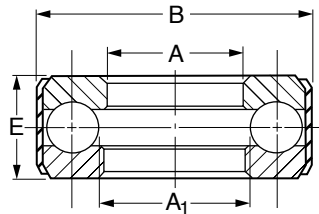
• Steel



Catalog Number	d Bore	D Outside Dia.	S Width	Maximum Speed (rpm)	Weight g	Matching Bearing Designation
				Oil		
BTHBNGMAS0414	4	14	1	18000	1	BTHBNGMAXK0414TN
BTHBNGMAS0515	5	15		17000	1	BTHBNGMAXK0515TN
BTHBNGMAS0619	6	19		16000	2	BTHBNGMAXK0619TN
BTHBNGMAS0821	8	21	1	15000	2	BTHBNGMAXK0821TN
BTHBNGMAS1024	10	24		14000	3	BTHBNGMAXK1024
BTHBNGMAS1226	12	26		16000	3	BTHBNGMAXK1226
BTHBNGMAS1528	15	28	1	11000	3	BTHBNGMAXK1528
BTHBNGMAS1730	17	30		10000	4	BTHBNGMAXK1730
BTHBNGMAS2035	20	35		8500	5	BTHBNGMAXK2035
BTHBNGMAS2542	25	42	1	7000	7	BTHBNGMAXK2542
BTHBNGMAS3047	30	47		6000	8	BTHBNGMAXK3047
BTHBNGMAS3552	35	52		5500	9	BTHBNGMAXK3552
BTHBNGMAS4060	40	60	1	4700	12	BTHBNGMAXK4060
BTHBNGMAS4565	45	65		4300	13	BTHBNGMAXK4565
BTHBNGMAS5070	50	70		3900	14	BTHBNGMAXK5070
BTHBNGMAS5578	55	78	1	3500	18	BTHBNGMAXK5578
BTHBNGMAS6085	60	85		3200	22	BTHBNGMAXK6085
BTHBNGMAS6590	65	90		3000	24	BTHBNGMAXK6590
BTHBNGMAS7095	70	95	1	2900	25	BTHBNGMAXK7095
BTHBNGMAS75100	75	100		2700	27	BTHBNGMAXK75100
BTHBNGMAS80105	80	105		2600	28	BTHBNGMAXK80105
BTHBNGMAS85110	85	110	1	2400	29	BTHBNGMAXK85110
BTHBNGMAS90120	90	120		2300	39	BTHBNGMAXK90120
BTHBNGMAS100135	100	135		2000	50	BTHBNGMAXK100135
BTHBNGMAS110145	110	145	1	1900	55	BTHBNGMAXK110145
BTHBNGMAS120155	120	155		1700	59	BTHBNGMAXK120155
BTHBNGMAS130170	130	170		1600	65	BTHBNGMAXK130170
BTHBNGMAS140180	140	180	1	1500	79	BTHBNGMAXK140180
BTHBNGMAS150190	150	190		1400	84	BTHBNGMAXK150190
BTHBNGMAS160200	160	200		1300	89	BTHBNGMAXK160200

BANDED THRUST BEARINGS

- Banded Assembly
- Oil Hole
- Grooved Race
- Low Carbon Steel Band
- 52100 Chrome Steel Balls and Washers



Catalog Number	A Shaft Dia.	B O.D.	E Width	Dynamic Capacity lbf	Static Capacity lbf	A ₁	Max* Speed rpm
BTDASY-TB050121	.500	1.219	.563	3850	5600	.531	7000
BTDASY-TB056121	.563					.594	
BTDASY-TB062134	.625	1.344		4100	6700	.656	6000
BTDASY-TB068134	.688	1.344	.563	4100	6700	.719	6000
BTDASY-TB075146	.750	1.469		4250	7300	.781	5500
BTDASY-TB081146	.813	1.469	.563	4250	7300	.844	5500
BTDASY-TB087184	.875	1.844	.625	6600	12200	.906	4100
BTDASY-TB093184	.938	1.844	.625	6600	12200	.969	4100
BTDASY-TB100196	1.000	1.969		6700	13100	1.031	3800
BTDASY-TB106196	1.063	1.969	.625	6700	13100	1.094	3800
BTDASY-TB112209	1.125	2.094		6900	14000	1.156	3600
BTDASY-TB118209	1.188	2.094		6900	14000	1.219	3600
BTDASY-TB125234	1.250	2.344	.625	7200	15700	1.281	3200
BTDASY-TB131234	1.313	2.344		7200	15700	1.344	3200
BTDASY-TB137246	1.375	2.469		7300	16600	1.406	3000
BTDASY-TB143246	1.438	2.469	.625	7300	16600	1.469	3000
BTDASY-TB150259	1.500	2.594		7700	18300	1.531	2800

*Speed limit shown is for oil lubrication.



- Choice of carbon or stainless steel balls
- Retainers are lightweight and corrosion-resistant with natural lubricity
- Injection-molded, heat-stabilized nylon retainers that capture the balls in precision molded pockets for smooth, free-turning, quiet operation
- Precision-grade 100 tolerance ($\pm .0001"$, $\pm .0025$ mm) hardened steel balls
- Hardened steel thrust washers

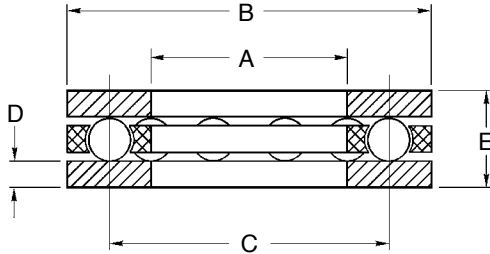
LOAD RATINGS FOR THRUST BEARINGS

Catalog Number		15 rpm		100 rpm		450 rpm		900 rpm		1200 rpm		1800 rpm		3600 rpm	
Carbon Steel	Stainless Steel	INCH (POUNDS)													
BTHASY-012	BTYASY-012	120	84	63	44	38	26	30	21	27	19	24	17	19	17
BTHASY-018	BTYASY-018	126	88	70	48	40	28	32	22	29	20	25	18	25	18
BTHASY-025	BTYASY-025	131	92	69	49	42	29	34	24	29	20	26	18	26	18
BTHASY-031	BTYASY-031	136	95	72	40	43	30	34	24	31	21	27	19	27	19
BTHASY-037	BTYASY-037	175	123	93	65	56	39	44	31	40	28	35	24	35	24
BTHASY-043	BTYASY-043	190	133	101	70	61	42	48	33	44	31	38	26	38	26
BTHASY-050	BTYASY-050	201	140	106	74	64	45	51	35	46	32	40	28	40	28
BTHASY-056	BTYASY-056	213	149	113	79	68	47	54	38	49	34	49	34	49	34
BTHASY-062	BTYASY-062	251	175	133	93	80	56	64	40	58	40	51	36	51	36
BTHASY-068	BTYASY-068	273	191	145	101	87	61	69	44	63	44	55	38	55	38
BTHASY-075	BTYASY-075	293	205	155	108	94	66	74	48	68	45	59	41	59	41
BTHASY-081	BTYASY-081	314	220	166	116	101	71	80	50	72	50	63	44	63	44
BTHASY-087	BTYASY-087	328	196	174	122	105	73	83	53	76	53	66	46	66	46
BTHASY-093	BTYASY-093	384	268	204	143	123	86	98	62	89	62	77	54	77	54
BTHASY-100	BTYASY-100	459	321	243	170	147	103	117	74	106	74	93	65	93	65
BTHASY-112	BTYASY-112	504	352	267	187	162	113	128	82	117	82	102	71	102	71
BTHASY-125	BTYASY-125	545	381	289	202	175	122	139	90	125	90	110	77	110	77
BTHASY-150	BTYASY-150	522	365	277	194	168	118	133	85	121	85	105	73	105	73
Carbon Steel	Stainless Steel	METRIC (POUNDS)													
BTHASYM512X	BTYASYM512X	126	88	70	49	40	28	32	20	29	20	25	17	25	17
BTHASYM614X	BTYASYM614X	131	91	69	48	42	29	34	20	29	20	26	18	26	18
BTHASYM717X	BTYASYM717X	136	95	72	40	43	30	34	21	31	21	27	19	27	19
BTHASYM816X	BTYASYM816X	136	95	72	50	43	30	34	21	31	21	27	19	27	19
BTHASYM1021	BTYASYM1021	175	122	93	65	56	39	44	28	40	28	35	24	35	24
BTHASYM1224	BTYASYM1224	201	140	106	74	64	44	51	32	46	32	40	28	40	28
BTHASYM1628	BTYASYM1628	251	175	133	93	80	56	64	40	58	40	51	35	51	35
BTHASYM1932	BTYASYM1932	293	205	155	108	94	65	74	47	68	47	59	41	59	41
BTHASYM2541	BTYASYM2541	459	321	243	170	147	103	117	74	106	74	93	65	93	65
BTHASYM2844	BTYASYM2844	504	352	267	187	162	113	128	82	117	82	102	71	102	71



Three-Piece Set THRUST BEARINGS & WASHERS

- Nylon Retainer



Materials

	Carbon Steel	Stainless Steel
Washer:	CR 1075 steel heat-treated to Rc 59-61	Type 410 steel heat-treated to Rc 38-42
Ball:	Grade 100 S.A.E. 1018 steel with Rc 60 Minimum	Type 440C stainless steel with Rc 58-65
Retainer:	HS nylon permitting continuous use up to 250°F	HS nylon permitting continuous use up to 250°F

Catalog Number		A		B		D Thick- ness	C Ball Circle	Ball Size	Qty	E Height
		Bore	Tolerance	O.D.	Tolerance					
Carbon Steel	Stainless Steel	Washer				Ball			Bearing	
BTHASY-012	BTYASY-012	1/8	.128 - .133	7/16	.430 - .437	.050	.281	.0938	6	.190-.196
BTHASY-018	BTYASY-018	3/16	.191 - .195	1/2	.492 - .499		.344			
BTHASY-025	BTYASY-025	1/4	.253 - .258	9/16	.555 - .562		.406			
BTHASY-031	BTYASY-031	5/16	.316 - .321	5/8	.617 - .624	.062	.469	9		
BTHASY-037	BTYASY-037	3/8	.378 - .383	13/16	.805 - .812		.594			
BTHASY-043	BTYASY-043	7/16	.441 - .446	7/8	.867 - .874		.656			
BTHASY-050	BTYASY-050	1/2	.503 - .508	15/16	.930 - .937	.093	.719	8	.245-.253	
BTHASY-056	BTYASY-056	9/16	.566 - .571	1	.992 - .999		.781			
BTHASY-062	BTYASY-062	5/8	.628 - .635	1-1/8	1.115-1.124		.875			
BTHASY-068	BTYASY-068	11/16	.691 - .698	1-3/16	1.178-1.187	.125	.938	7		
BTHASY-075	BTYASY-075	3/4	.753 - .760	1-1/4	1.240-1.249		1.000			
BTHASY-081	BTYASY-081	13/16	.816 - .823	1-5/16	1.303-1.312		1.063			
BTHASY-087	BTYASY-087	7/8	.878 - .885	1-3/8	1.365-1.374	.125	1.125	10		
BTHASY-093	BTYASY-093	15/16	.941 - .950	1-9/16	1.551-1.562		1.250			
BTHASY-100	BTYASY-100	1	1.003-1.012	1-5/8	1.613-1.624		1.313			
BTHASY-112	BTYASY-112	1-1/8	1.128-1.137	1-3/4	1.738-1.749	.125	1.438	12	.427-.447	
BTHASY-125	BTYASY-125	1-1/4	1.253-1.262	1-7/8	1.863-1.874		1.563			
BTHASY-150	BTYASY-150	1-1/2	1.503-1.512	2-1/8	2.113-2.124		1.813			

NOTE: Thrust bearings and washers are available individually.
Contact the Customer Service Department for availability.

See page 59 for load ratings.

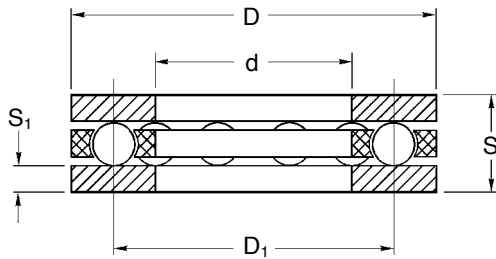
WASHER THICKNESS TOLERANCE

D	Tolerance
.050	.048 - .052
.062	.060 - .064
.093	.090 - .096
.125	.120 - .130



Three-Piece Set THRUST BEARINGS & WASHERS

- Nylon Retainer



Materials

Item	Carbon Steel	Stainless Steel
Washers:	CR 1075 steel heat-treated to HRC 59-61	Type 410 steel heat-treated to HRC 38-42
Balls:	Grade 100 S.A.E. 1018 steel with HRC 60 Minimum	Type 440C stainless steel with HRC 58-65
Retainer:	HS nylon permitting continuous use up to 120°C	HS nylon permitting continuous use up to 120°C

Catalog Number		d		D		S ₁ ^Δ Thick- ness	D ₁ Ball Circle	Ball Size	Qty	S Height
		Bore	Tolerance	O.D.	Tolerance					
Carbon Steel	Stainless Steel	Washer				Ball		Bearing		
BTHASYM512X	BTYASYM512X	5	5.08 – 5.21	12	11.96 – 11.78	1.27	8.7	2.38	7	4.82 – 5.02
BTHASYM614X	BTYASYM614X	6	6.07 – 6.20	14	13.97 – 13.79		10.3		8	
BTHASYM717X	BTYASYM717X	7	7.06 – 7.18	17	16.97 – 16.79		11.9		9	
BTHASYM816X	BTYASYM816X	8	8.08 – 8.20	16	15.96 – 15.80	1.57	11.9	3.18	9	6.22 – 6.44
BTHASYM1021	BTYASYM1021	10	10.06 – 10.19	21	20.96 – 20.78		15.1		6	
BTHASYM1224	BTYASYM1224	12	12.06 – 12.19	24	23.98 – 23.80		18.3		8	
BTHASYM1628	BTYASYM1628	16	16.07 – 16.26	28	27.97 – 27.74	2.36	22.2	4	6	8.56 – 8.88
BTHASYM1932	BTYASYM1932	19	19.08 – 19.25	32	31.98 – 31.75		25.4		8	
BTHASYM2541	BTYASYM2541	25	25.07 – 25.30	41	40.97 – 40.69		33.3		10	
BTHASYM2844	BTYASYM2844	28	28.07 – 28.30	44	43.97 – 43.69	3.18	36.5	4.76	12	10.86 – 11.36

NOTE: Thrust bearings and washers are available individually.
Contact the Customer Service Department for availability.

See page 59 for load ratings.

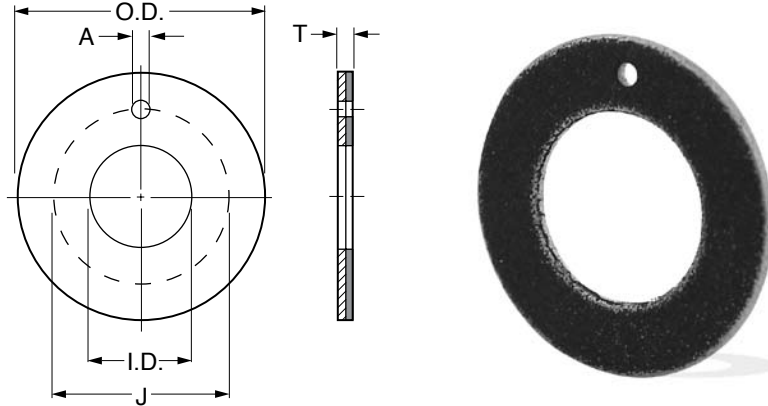
Δ WASHER THICKNESS TOLERANCE

S₁ TOLERANCE:	1.27	(1.22–1.32)
	1.57	(1.52–1.63)
	2.36	(2.28–2.44)
	3.18	(3.05–3.30)



NEW Self-Lubricating THRUST WASHERS

- Carbon Steel Backing • Self-Lubricating Liner • Maintenance-Free

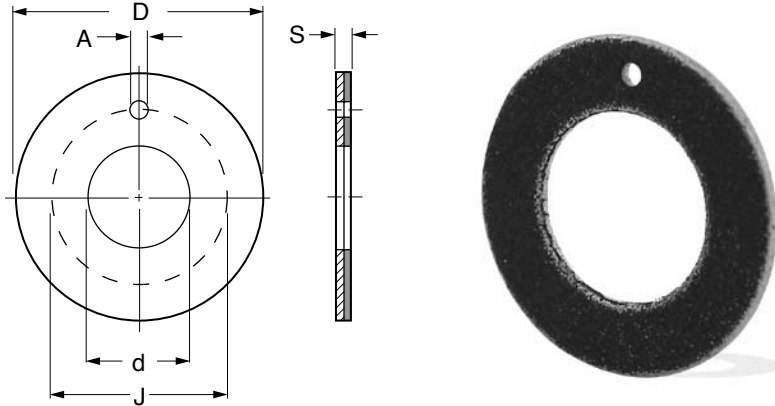


Catalog Number	I.D. +.010	O.D. -.010	T + .0020	J Dowel Hole -.010	A
BTNWAS-TW06TH	.500	.875	.0585	.692	.067
BTNWAS-TW07TH	.562	1.000		.786	
BTNWAS-TW08TH	.625	1.125		.880	.099
BTNWAS-TW09TH	.687	1.187		.942	
BTNWAS-TW10TH	.750	1.125		1.005	
BTNWAS-TW11TH	.812	1.375		1.099	
BTNWAS-TW12TH	.875	1.500		1.192	.130
BTNWAS-TW14TH	1.000	1.750		1.380	
BTNWAS-TW16TH	1.125	2.000		1.567	.161
BTNWAS-TW18TH	1.250	2.125		1.692	
BTNWAS-TW20TH	1.375	2.250	1.817		
BTNWAS-TW22TH	1.500	2.500	2.005	.192	
BTNWAS-TW24TH	1.625	2.625	2.130		
BTNWAS-TW26TH	1.750	2.750	2.255		
BTNWAS-TW28TH	2.000	3.000	2.505		
BTNWAS-TW30TH	2.125	3.125	.0895		2.630
BTNWAS-TW32TH	2.250	3.250	2.755		

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

NEW
Self-Lubricating
THRUST WASHERS

- Carbon Steel Backing
- Self-Lubricating Liner
- Maintenance-Free



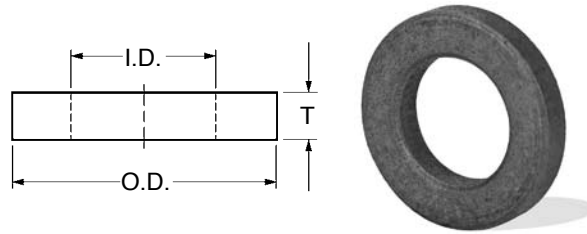
Catalog Number	d +0.25	D -0.25	S	J Dowel Hole ±0.12	A
BTNWASMTW1020M	10	20	1.500 1.450	—	—
BTNWASMTW1224M	12	24		18	1.87 1.62
BTNWASMTW1426M	14	26		20	2.37
BTNWASMTW1630M	16	30		22	2.12
BTNWASMTW1832M	18	32		25	
BTNWASMTW2036M	20	36		28	
BTNWASMTW2238M	22	38		30	3.37
BTNWASMTW2442M	24	42		33	3.12
BTNWASMTW2644M	26	44		35	
BTNWASMTW2848M	28	48		38	
BTNWASMTW3254M	32	54	43		
BTNWASMTW3862M	38	62	50		
BTNWASMTW4266M	42	66	54		
BTNWASMTW4874M	48	74	2.000	61	4.37
BTNWASMTW5278M	52	78	1.950	65	4.12
BTNWASMTW6290M	62	90		76	

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).



Sintered Bronze THRUST WASHERS

- Sintered Bronze • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D.*	O.D. ^Δ	T ± .0025
BTNWAS-040602	.130	.370	1/16
BTNWAS-060802	.192	.495	1/16
BTNWAS-080702	.255	.4375	1/16
BTNWAS-080802	.255	.500	1/16
BTNWAS-081002	.255	.625	1/16
BTNWAS-101002	.315	.625	1/16
BTNWAS-101202	.315	.750	1/16
BTNWAS-121002	.385	.625	1/16
BTNWAS-121001			1/32
BTNWAS-121202	.380	.750	1/16
BTNWAS-121204			1/8
BTNWAS-141202	.440	.750	1/16
BTNWAS-141204			1/8
BTNWAS-161202	.505	.750	1/16
BTNWAS-161406	.505	.875	3/16
BTNWAS-161602			1/16
BTNWAS-161603	.510	1.000	3/32
BTNWAS-161604			1/8
BTNWAS-182002			1/16
BTNWAS-182004	.565	1.250	1/8
BTNWAS-201602			1/16
BTNWAS-201604	.628	1.000	1/8
BTNWAS-201902			1/16
BTNWAS-201903	.628	1.1875	3/32
BTNWAS-201904			1/8
BTNWAS-202002	.628	1.250	1/16
BTNWAS-202004			1/8
BTNWAS-212402			1/16
BTNWAS-212404	.656	1.500	1/8
BTNWAS-242002			1/16
BTNWAS-242004	.753	1.250	1/8
BTNWAS-242202			1/16
BTNWAS-242204	.753	1.375	1/8
BTNWAS-242208			1/4
BTNWAS-242503	.765	1.5625	3/32
BTNWAS-282402			1/16
BTNWAS-282404	.8905	1.500	1/8
BTNWAS-283204	.880	2.000	1/8

Continued on the next page

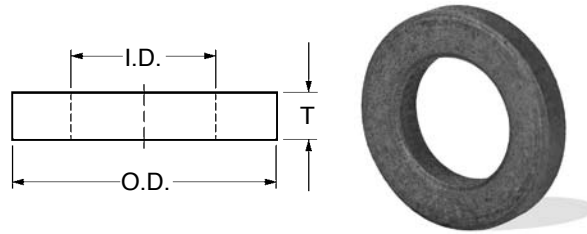
*I.D. Tolerances: up to & including 1.253 is ± .005

ΔO.D. Tolerances: up to & including 1.500 is ± .010
over 1.500 & including 3.000 is ± .015



Sintered Bronze THRUST WASHERS

• Sintered Bronze • Oil-Impregnated • Self-Lubricating



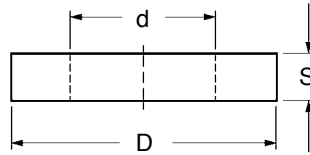
Catalog Number	I.D.*	O.D. ^Δ	T ± .0025
BTNWA-283404	.8905	2.125	1/8
BTNWA-322402			1/16
BTNWA-322404	1.003	1.500	1/8
BTNWA-322406			3/16
BTNWA-322602			1/16
BTNWA-322604	1.0155	1.625	1/8
BTNWA-322608			1/4
BTNWA-322802			1/16
BTNWA-322804	1.012	1.750	1/8
BTNWA-323204			1/8
BTNWA-323206	1.016	2.000	3/16
BTNWA-324604	1.0155	2.875	1/8
BTNWA-343802			1/16
BTNWA-343804	1.0625	2.375	1/8
BTNWA-363004	1.140	1.875	1/8
BTNWA-402704	1.253	1.690	1/8
BTNWA-403202			1/16
BTNWA-403204	1.265	2.000	1/8
BTNWA-403802			1/16
BTNWA-403804	1.265	2.375	1/8
BTNWA-405302			1/16
BTNWA-405304	1.255	3.312	1/8
BTNWA-443104	1.379	1.940	1/8
BTNWA-483204	1.503	2.000	1/8
BTNWA-484004	1.503	2.505	1/8
BTNWA-485606	1.510	3.500	3/16
BTNWA-503904	1.578	2.4375	1/8
BTNWA-563904	1.755	2.440	1/8
BTNWA-564204	1.765	2.625	1/8
BTNWA-624204	1.953	2.625	1/8
BTNWA-644804			1/8
BTNWA-644806	2.011	3.000	3/16
BTNWA-644808			1/4
BTNWA-655806	2.031	3.625	3/16
BTNWA-805204	2.502	3.250	1/8
BTNWA-886208	2.766	3.875	1/4

*I.D. Tolerances: up to & including 1.253 is ± .005
 over 1.253 & including 2.502 is ± .010
 over 2.502 is ± .015

^Δ O.D. Tolerances: up to & including 1.500 is ± .010
 over 1.500 & including 3.000 is ± .015
 over 3.000 is ± .020

Sintered Bronze THRUST WASHERS

• Sintered Bronze • Oil-Impregnated • Self-Lubricating

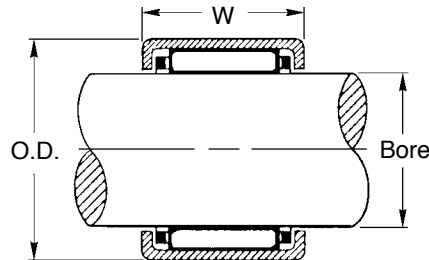


Catalog Number	d ±0.13	D ±0.25	S ±0.07
BTNWASM0316	3.2	9.5	1.6
BTNWASM0416	4.3	9.5	1.6
BTNWASM0516	5.3	12.5	1.6
BTNWASM0616	6.4	12.5	1.6
BTNWASM0816	8.4	19	1.6
BTNWASM1016	10.5	19	1.6
BTNWASM1032	10.5	19	3.2
BTNWASM1316	13	25	1.6
BTNWASM1332	13	25	3.2



Shell-Type NEEDLE ROLLER BEARINGS-OPEN END

- 52100 Hardened Chrome Steel Needle Bearing
- Low Carbon Steel Bearing Cage
- Case-Hardened Steel Roller Cup
- Drawn Cup
- Cage Guided



Features:

- Extremely high speed
- High load capacity
- Low profile, lightweight caged
- Caged needle bearings offer up to 3X the speed of uncaged designs
- Extremely low rolling friction
- High lubrication capacity
- Low sensitivity to misalignment
- Needles have high length to diameter ratios

Catalog Number	Bore	O.D.	Shaft Diameter		W +.000 -.010	Limiting Speed* rpm	Load Capacities lbs.		Housing Diameter	
			Min.	Max.			Dynamic	Static	Min.	Max.
BNDSCE-24TN	.1250	.2500	.1247	.1250	.250	48000	240	165	.2500	.2505
BNDSCE-21/24	.1562	.2812	.1560	.1563						
BNDSCE-34TN	.1875	.3438	.1872	.1875	.250	40000	400	305	.3432	.3437
BNDSCE-36					.375		620	530		
BNDSCE-44	.2500	.4375	.2495	.2500	.250	35000	360	260	.4370	.4380
BNDSCE-45					.312		570	470		
BNDSCE-47					.438		920	870		
BNDSCE-55	.3125	.5000	.3120	.3125	.312	29000	650	590	.4995	.5005
BNDSCE-57					.438		1060	1090		
BNDSCE-59					.562		1340	1480		
BNDSCE-65	.3750	.5625	.3745	.3750	.312	25000	650	610	.5620	.5630
BNDSCE-66					.375		870	890		
BNDSCE-67					.438		980	1030		
BNDSCE-68	.500	.6250	.4370	.4375	.500	22000	1300	1490	.6245	.6255
BNDSCE-610							.625	1660		
BNDSCE-78	.4375	.6250	.4370	.4375	.500	19000	1430	1760	.6870	.6880
BNDSCE-710					.625		1830	2410		
BNDSCE-85					.312		820	890		
BNDSCE-86	.5000	.6875	.4995	.5000	.375	19000	1040	1210	.6870	.6880
BNDSCE-87					.438		1330	1660		
BNDSCE-88					.500		1550	2030		
BNDSCE-810	.625	.6875	.4995	.5000	.750	19000	1980	2750	.6870	.6880
BNDSCE-812							.750	2230		

NOTES: 1. Hardened shafts required Rc 58 min.
2. TN is for plastic cage

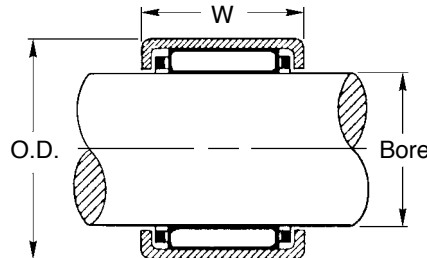
Continued on the next page

*Limiting speeds shown apply to oil lubrication. With grease, 60% of the given values are permissible. See following section for available inner rings. Closed end bearings available on special order.



Shell-Type NEEDLE ROLLER BEARINGS-OPEN END

- 52100 Hardened Chrome Steel Needle Bearing
- Low Carbon Steel Bearing Cage
- Case-Hardened Steel Roller Cup
- Drawn Cup
- Cage Guided



Features:

- Extremely high speed
- High load capacity
- Low profile, lightweight caged
- Caged needle bearings offer up to 3X the speed of uncaged designs
- Extremely low rolling friction
- High lubrication capacity
- Low sensitivity to misalignment
- Needles have high length to diameter ratios

Catalog Number	Bore	O.D.	Shaft Diameter		W +.000 -.010	Limiting Speed* rpm	Load Capacities lbs.		Housing Diameter	
			Min.	Max.			Dynamic	Static	Min.	Max.
BNDSCE-96 BNDSCE-98 BNDSCE-910 BNDSCE-912	.5625	.7500	.5620	.5625	.375 .500 .625 .750	18000	1160 1730 2120 2050	1440 2420 3150 2380	.7495	.7505
BNDSCE-105 BNDSCE-107 BNDSCE-1071/2 BNDSCE-108 BNDSCE-1010 BNDSCE-1012	.6250	.8125	.6245	.6250	.312 .438 .469 .500 .625 .750	17000 16000 16000 16000	3250 970 1480 1600 1830 2330	4300 1180 2100 2320 2700 3650	.8120	.8130
BNDSCE-116 BNDSCE-118 BNDSCE-1110 BNDSCE-1112	.6875	.8750	.6870	.6875	.375 .500 .375 .500	15000	1290 1930 1290 1930	1770 2950 1770 2950	.8745	.8755
BNDSCE-126 BNDSCE-128 BNDSCE-1210 BNDSCE-1212	.7500	1.0000	.7495	.7500	.375 .500 .625 .750	13000	1600 2210 2850 3450	1860 2800 3950 5000	.9995	1.0005
BNDSCE-138 BNDSCE-1314	.8125	1.0625	.8120	.8125	.500 .875	12000	2420 4150	3200 6500	1.0620	1.0630
BNDSCE-146 BNDSCE-148 BNDSCE-1412 BNDSCE-1416	.8750	1.1250	.8745	.8750	.375 .500 .750 1.000	11000	1850 2500 3800 4950	2400 3550 6100 8500	1.1245	1.1255
BNDSCE-168 BNDSCE-1612 BNDSCE-1616	1.0000	1.2500	.9995	1.000	.500 .750 1.000	10000	2850 4050 5600	4300 6800 10200	1.2495	1.2505

NOTE: Hardened shafts required Rc 58 min.

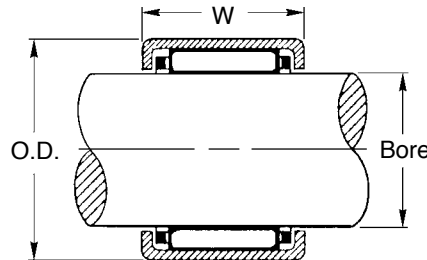
*Limiting speeds shown apply to oil lubrication. With grease, 60% of the given values are permissible. See following section for available inner rings. Closed end bearings available on special order.

Continued on the next page



Shell-Type NEEDLE ROLLER BEARINGS-OPEN END

- 52100 Hardened Chrome Steel Needle Bearing
- Low Carbon Steel Bearing Cage
- Case-Hardened Steel Roller Cup
- Drawn Cup
- Cage Guided



Features:

- Extremely high speed
- High load capacity
- Low profile, lightweight caged
- Caged needle bearings offer up to 3X the speed of uncaged designs
- Extremely low rolling friction
- High lubrication capacity
- Low sensitivity to misalignment
- Needles have high length to diameter ratios

Catalog Number	Bore	O.D.	Shaft Diameter		W +.000 -.010	Limiting Speed* rpm	Load Capacities lbs.		Housing Diameter	
			Min.	Max.			Dynamic	Static	Min.	Max.
BNDSCE-188 BNDSCE-1812 BNDSCE-1816	1.1250	1.3750	1.1245	1.1250	.500 .750 1.000	9000	2900 4250 5800	4550 7500 11100	1.3745	1.3755
BNDSCE-208 BNDSCE-2012 BNDSCE-2016 BNDSCE-2020	1.2500	1.5000	1.2495	1.2500	.500 .750 1.000 1.250	8000	3000 4750 6100 7500	4950 8900 12300 16100	1.4995	1.5005
BNDSCE-2110	1.3125	1.6250	1.3120	1.3125	.625	7600	4750	7600	1.6245	1.6255
BNDSCE-228 BNDSCE-2212	1.3750		1.3745	1.3750	.500 .750	5300 9600	3050 4800	5300 9600		
BNDSCE-248 BNDSCE-2410 BNDSCE-2412 BNDSCE-2414 BNDSCE-2416 BNDSCE-2420	1.5000	1.8750	1.4995	1.5000	.500 .625 .750 .875 1.000 1.250	5800 8300 10900 13500 14900 19200	4200 5500 6800 8100 8700 10600	5800 8300 10900 13500 14900 19200	1.8745	1.8755
BNDSCE-2610 BNDSCE-2620	1.6250	2.0000	1.6245	1.6250	.625 1.250	8900 21900	5700 11400	8900 21900	1.9995	2.0005
BNDSCE-2816 BNDSCE-3216	1.7500 2.0000	2.1250 2.3750	1.7495 1.9995	1.7500 2.0000	1.000	17000 17900	9300	17000 17900	2.1245 2.3745	2.1255 2.3755
BNDSCE-3612 BNDSCE-3616	2.2500	2.6250	2.2494	2.2500	.750 1.000	16200 24000	8400 11300	16200 24000	2.6245	2.6255

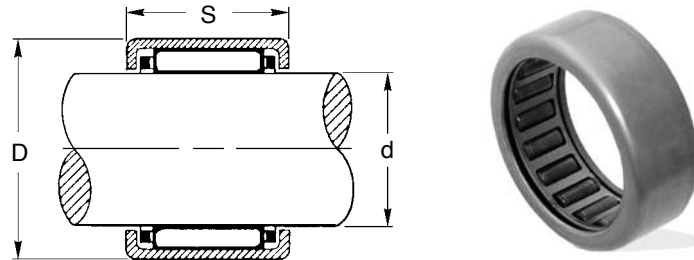
NOTE: Hardened shafts required Rc 58 min.

*Limiting speeds shown apply to oil lubrication. With grease, 60% of the given values are permissible.

See following section for available inner rings. Closed end bearings available on special order.

Shell-Type NEEDLE ROLLER BEARINGS-OPEN END

- 52100 Hardened Chrome Steel Needle Bearing
- Low Carbon Steel Bearing Cage
- Case-Hardened Steel Roller Cup



Features:

- Extremely high speed
- High load capacity
- Low profile, lightweight caged
- Caged needle bearings offer up to 3X the speed of uncaged designs
- Extremely low rolling friction
- High lubrication capacity
- Low sensitivity to misalignment
- Needles have high length to diameter ratios

Catalog Number	d Shaft Dia.	D	S Face Width (-0.2)	Limiting Speed* rpm	Load Capacity N	
					Dynamic	Static
BNDHKXM0306	3	6.5	6	46000	1230	840
BNDHKXM0408	4	8	8	41000	1780	1310
BNDHKXM0509	5	9	9	38000	2400	1990
BNDHKXM0608	6	10	8	35000	2030	1650
BNDHKXM0609			9		2850	2600
BNDHKXM0709	7	11	9	31000	3100	2950
BNDHKXM0808	8	12	8	28000	2750	2600
BNDHKXM0810			10		3400	3950
BNDHKXM0908	9	13	8	25000	3850	4150
BNDHKXM0910			10		4250	4650
BNDHKXM0912			12		5300	6300
BNDHKXM1010	10	14	10	23000	4400	5100
BNDHKXM1012			12		5500	6800
BNDHKXM1015			15		6800	8800
BNDHKXM1210	12	16	10	20000	4950	6200
BNDHKXM1212		18	12	19000	6500	7300
BNDHKXM1312	13	19	12	18000	6800	7900
BNDHKXM1412	14	20	12	16000	7100	8500
BNDHKXM1512	15	21	12	16000	7900	9400
BNDHKXM1516			16		10500	14400
BNDHKXM1522			22		13400	19500

NOTE: Hardened shafts required HRC 58 min.

Continued on the next page

*Limiting speeds shown apply to oil lubrication.

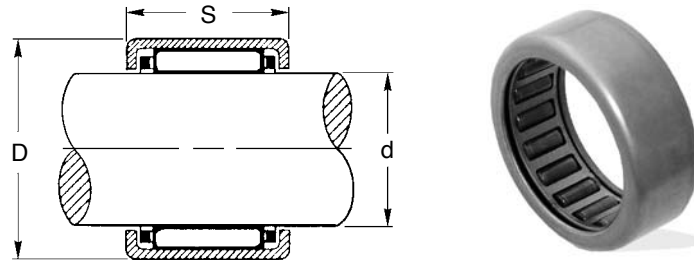
With grease, 60% of the given values are permissible.

See following section for available inner rings.

Closed-end bearings available on special order.

Shell-Type NEEDLE ROLLER BEARINGS-OPEN END

- 52100 Hardened Chrome Steel Needle Bearing
- Low Carbon Steel Bearing Cage
- Case-Hardened Steel Roller Cup



Features:

- Extremely high speed
- High load capacity
- Low profile, lightweight caged
- Caged needle bearings offer up to 3X the speed of uncaged designs
- Extremely low rolling friction
- High lubrication capacity
- Low sensitivity to misalignment
- Needles have high length to diameter ratios

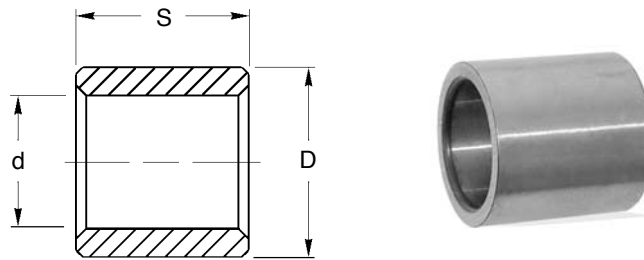
Catalog Number	d Shaft Dia.	D	S Face Width (-0.2)	Limiting Speed* rpm	Load Capacity N	
					Dynamic	Static
BNDHKXM1612	16	22	12	15000	7600	9700
BNDHKXM1616			16		10900	15300
BNDHKXM1622			22		13100	19400
BNDHKXM1712	17	23	12	14000	7900	10300
BNDHKXM1812	18	24	12	13000	8100	10900
BNDHKXM1816			16		11600	17300
BNDHKXM2010	20	26	10	12000	6400	8200
BNDHKXM2012			12		8600	12100
BNDHKXM2016			16		12700	20100
BNDHKXM2020			20		15700	26000
BNDHKXM2030			30		21800	40000
BNDHKXM2210	22	28	10	11000	7500	10500
BNDHKXM2212			12		9100	13400
BNDHKXM2216			16		13400	22100
BNDHKXM2220			20		16500	29000
BNDHKXM2512	25	32	12	10000	11000	15200
BNDHKXM2516			16		15600	24000
BNDHKXM2520			20		19900	33000
BNDHKXM2526			26		25500	45000
BNDHKXM2538			38		34000	66000

NOTE: Hardened shafts required HRC 58 min.

*Limiting speeds shown apply to oil lubrication.
With grease, 60% of the given values are permissible.
See following section for available inner rings.
Closed-end bearings available on special order.

Inner Races FOR NEEDLE BEARINGS

• Alloy Steel Hardened to HRC 58 Min.



Features:

- O.D. ground to 0.4 μm AA surface roughness
- Press-fit onto shaft
- All corners chamfered for easy assembly
- Wider units to accommodate shaft translation
- Used as inner race on soft shafts
- Can be used as hardened bushings

Catalog Number	Bore Nominal	Shaft Size h5	d H6	D h5	S h6
BNDIRXM050812	5	5.006	5	7.997	12
BNDIRXM060912	6	6.006	6	8.997	12
BNDIRXM0710105	7	7.006	7	9.997	10.5
BNDIRXM071012					12
BNDIRXM071016					16
BNDIRXM0812105	8	8.007	8	12.001	10.5
BNDIRXM0812125					12.5
BNDIRXM1013125	10	10.007	10	13.001	12.5
BNDIRXM101413					13
BNDIRXM1215125	12	12.009	12	15.001	12.5
BNDIRXM1215165					16.5
BNDIRXM1215225					22.5
BNDIRXM121613					13
BNDIRXM121616	16.001	16	16	22	16
BNDIRXM121622					22
BNDIRXM1518165	15	15.009	15	18.001	16.5
BNDIRXM152013					20.007
BNDIRXM1720165	17	17.009	17	20.007	16.5
BNDIRXM1720205					20.5
BNDIRXM1720305					30.5
BNDIRXM172213					13
BNDIRXM172216	22.007	16	16	23	16
BNDIRXM172223					23
BNDIRXM202517	20	20.011	20	25.007	17
BNDIRXM2025205					20.5
BNDIRXM2025265					26.5
BNDIRXM2025385					38.5

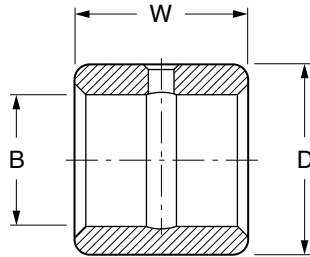
Tolerance Chart

Dimensions		H6	h5	h6
Over	Incl.			
3	6	+0.008	-0.005	-0.008
6	10	+0.009	-0.006	-0.009
10	18	+0.011	-0.008	-0.011
18	30	+0.013	-0.009	-0.013
30	40	+0.016	-0.011	-0.016



Inner Races FOR NEEDLE BEARINGS

- Alloy Steel Hardened to Rc 58 Min.
- Oil Hole and Groove
- Precision Ground



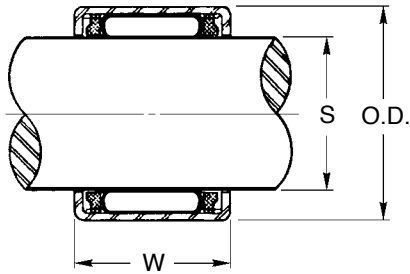
Features:

- O.D. ground to 16 μ in. AA surface roughness
- All corners chamfered for easy assembly
- Wider units to accommodate shaft translation
- Used as inner race on soft shafts
- Can be used as hardened bushings

Catalog Number	B +.0000 -.0005	D +.0000 -.0005	W +.015 -.005	Shaft Diameter			
				Press Fit		Slip Fit	
				Min.	Max.	Min.	Max.
BNDIRX-060912 BNDIRX-061012	.3750	.5625 .6250	.750	.3752	.3755	.3744	.3748
BNDIRX-081208 BNDIRX-081212 BNDIRX-081216	.5000	.7500	.500 .750 1.000	.5003	.5006	.4993	.4998
BNDIRX-101412 BNDIRX-101416	.6250	.8750	.750 1.000	.6253	.6256	.6243	.6248
BNDIRX-121608 BNDIRX-121612 BNDIRX-121616	.7500	1.0000	.500 .750 1.000	.7503	.7507	.7492	.7497
BNDIRX-141812 BNDIRX-141816 BNDIRX-141820	.8750	1.1250	.750 1.000 1.125	.8753	.8757	.8742	.8747
BNDIRX-162012 BNDIRX-162016 BNDIRX-162020	1.0000	1.2500	.750 1.000 1.250	1.0003	1.0007	.9992	.9997
BNDIRX-182216 BNDIRX-202416	1.1250 1.2500	1.3750 1.5000	1.000	1.1253 1.2504	1.1257 1.2508	1.1242 1.2490	1.1247 1.2496

Shell-Type ROLLER CLUTCHES-UNIDIRECTIONAL DRIVE

- Case Hardened Steel Roller Cup
- 52100 Hardened Chrome Steel Needle Bearing

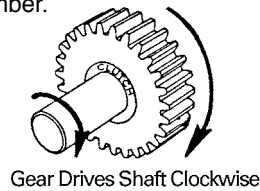


Features:

- Ideal for indexing, backstopping or overrunning operations
- Free rolling one way, drives in opposite direction
- Lightweight, low profile
- High indexing frequency, up to 4 CPS
- Temperature range, grease +50°F to +160°F (+10°C to +70°C)
- Minimum backlash

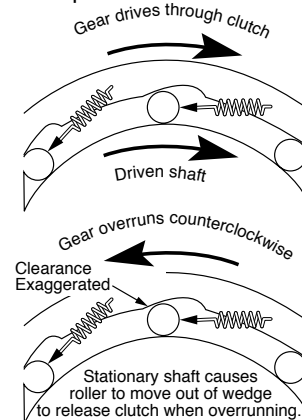
What It Does

Transmits torque load in one direction. Overruns freely in opposite direction. Either shaft or housing can be driving member.



How It Works

Rollers wedge between shaft and outer race. Positive wedging forces prevent slipping. Springs position rollers for instantaneous lock-up.



WITHOUT BEARING SUPPORTS

Catalog Number	Bore	Clutch O.D.	W Clutch Width +.000 -.010	Max. Torque lb. in.	S* Recom- mended Shaft Dia. +.0000 -.0005	Housing Bore +.0010 -.0000	Shaft Rotating Overrun Speed Max. rpm	Housing Rotating Overrun Speed Max. rpm
BCDHFZ-040708	.2500	.4375		18.6	.2500	.4370	21000	12000
BCDHFZ-061008	.3750	.6250	.500	50.4	.3750	.6245	14000	12000
BCDHFZ-081208	.5000	.7500		85.9	.5000	.7495	11000	9000
BCDHFZ-121410	.6250	.8750	.625	175.2	.6250	.8745	8500	5000
BCDHFZ-162110	1.0000	1.3130		442.5	1.0000	1.3120	5300	5000

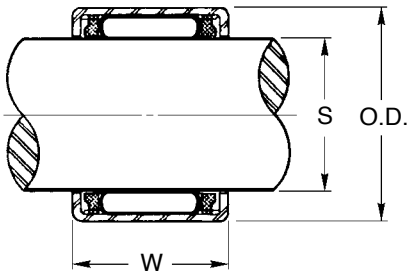
WITH BEARING SUPPORTS

Catalog Number	Bore	Clutch O.D.	W Clutch Width +.000 -.008	Max. Torque lb. in.	S* Recom- mended Shaft Dia. +.0000 -.0005	Housing Bore +.0010 -.0000	Shaft Rotating Overrun Speed Max. rpm	Housing Rotating Overrun Speed Max. rpm
BCDFLZ-061014	.3750	.6250	.875	50.4	.3750	.6245	14000	12000
BCDFLZ-101416	.6250	.8750	1.000	175.2	.6250	.8745	8500	5000

*Shaft surface hardness must be Rc 58 min.

Shell-Type ROLLER CLUTCHES-UNIDIRECTIONAL DRIVE

- Case Hardened Steel Roller Cup
- 52100 Hardened Chrome Steel Needle Bearing

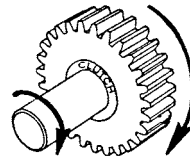


Features:

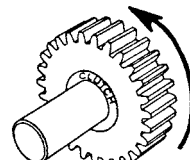
- Ideal for indexing, backstopping or overrunning operations
- Free rolling one way, drives in opposite direction
- Lightweight, low profile
- High indexing frequency, up to 4 CPS
- Temperature range, grease +10°C to +70°C (+50°F to +160°F)
- Minimum backlash

What It Does

Transmits torque load in one direction. Overruns freely in opposite direction. Either shaft or housing can be driving member.



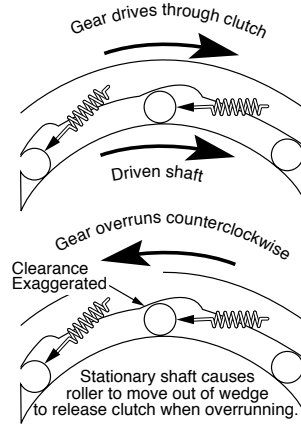
Gear Drives Shaft Clockwise



Gear Overruns Shaft Counter-clockwise

How It Works

Rollers wedge between shaft and outer race. Positive wedging forces prevent slipping. Springs position rollers for instantaneous lock-up.



Catalog Number	Bore	Clutch O.D.	W Clutch Width -0.2	Max. Torque N · m	S* Recommended Shaft Dia. h6	Housing Bore N7 for Steel R7 for Alum.	Shaft Rotating Overrun Speed Max. rpm	Housing Rotating Overrun Speed Max. rpm
BCDHFZM0406	4	8	6	0.34	4	8	34000	8000
BCDHFZM0612	6	10		1.76	6	10	23000	13000
BCDHFZM0812	8	12	12	3.15	8	12	17000	12000
BCDHFZM1012	10	14		5.3	10	14	14000	11000
BCDHFZM1216	12	18		12.2	12	18	11000	8000
BCDHFZM1416	14	20	16	17.3	14	20	9500	8000
BCDHFZM1616	16	22		20.5	16	22	8500	7500
BCDHFZM1816	18	24	16	24.1	18	24	7500	7500
BCDHFZM2016	20	26		28.5	20	26	7000	6500
BCDHFZM2520	25	32		66	25	32	5500	5500
BCDHFZM3020	30	37	20	90	30	37	4500	4500
BCDHFZM3520	35	42		121	35	42	3900	3900

*Shaft surface hardness must be HRC 58 min.

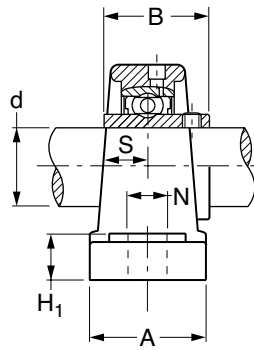
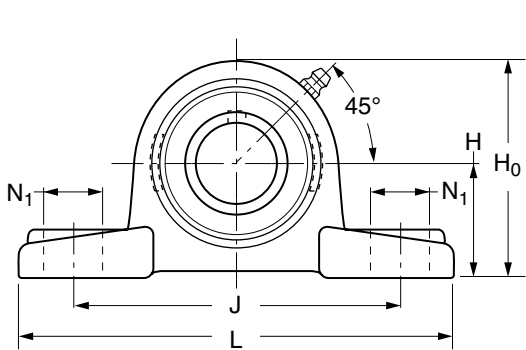


NEW

Standard Duty

PILLOW BLOCKS-SET SCREW TYPE

- Cast Iron Housing
- Solid Base
- Dual Seal Type



Catalog Number	Ød Shaft	H	L	J	A	N	N ₁	H ₁	H ₀	S	B	Bolt Size	Weight lb.
BBXBLK-UCP2018S	1/2												
BBXBLK-UCP20210S	5/8	1-3/16	4-15/16	3-3/4	1-1/4	15/32	5/8	1/2	2-1/4	7/16	1-5/64	3/8	1.32
BBXBLK-UCP20311S	11/16												
BBXBLK-UCP20412	3/4	1-5/16	5	3-3/4	1-15/32	1/2	5/8	9/16	2-1/2	15/32	1-7/32	3/8	1.43
BBXBLK-UCP20514	7/8												
BBXBLK-UCP20515	1-5/16	1-7/16	5-1/2	4-1/8	1-1/2	1/2	3/4	19/32	2-3/4	9/16	1-11/32	1/2	1.58
BBXBLK-UCP20516	1												
BBXBLK-UCP20618	1-1/8												
BBXBLK-UCP20619	1-3/16	1-11/16	6-5/16	4-3/4	1-23/32	9/16	3/4	5/8	3-7/32	5/8	1-1/2	1/2	2.53
BBXBLK-UCP20620	1-1/4												
BBXBLK-UCP20720	1-1/4												
BBXBLK-UCP20721	1-5/16	1-7/8	6-9/16	4-3/4	1-7/8	19/32	3/4	21/32	3-5/8	11/16	1-11/16	1/2	3.36
BBXBLK-UCP20722	1-3/8												
BBXBLK-UCP20723	1-7/16												
BBXBLK-UCP20824	1-1/2	1-15/16	7-3/32	5-3/8	2-1/8	19/32	13/16	23/32	3-27/32	3/4	1-15/16	1/2	4.14
BBXBLK-UCP20825	1-9/16												
BBXBLK-UCP20926	1-5/8												
BBXBLK-UCP20927	1-11/16	2-1/8	7-7/16	5-3/4	2-1/8	19/32	13/16	25/32	4-5/32	3/4	1-15/16	1/2	4.62
BBXBLK-UCP20928	1-3/4												
BBXBLK-UCP21030	1-7/8	2-1/4	8-1/32	6-1/4	2-1/4	3/4	7/8	13/16	4-13/32	3/4	2-1/32	5/8	5.51
BBXBLK-UCP21031	1-15/16												
BBXBLK-UCP21132	2												
BBXBLK-UCP21134	2-1/8	2-1/2	8-17/32	6-25/32	2-3/8	3/4	7/8	7/8	4-29/32	7/8	2-3/16	5/8	7.27
BBXBLK-UCP21135	2-3/16												
BBXBLK-UCP21236	2-1/4												
BBXBLK-UCP21238	2-3/8	2-3/4	9-3/8	7-5/16	2-19/32	3/4	1	15/16	5-13/32	1	2-9/16	5/8	12.12
BBXBLK-UCP21239	2-7/16												
BBXBLK-UCP21340	2-1/2	3	10-5/16	8	2-3/4	29/32	1-3/16	1-1/32	5-7/8	1	2-9/16	3/4	12.34
BBXBLK-UCP21444	2-3/4	3-1/8	10-15/32	8-9/32	2-27/32	29/32	1-5/32	1-1/16	6-3/32	1-3/16	2-15/16	3/4	14.56
BBXBLK-UCP21548	3	3-1/4	10-25/32	8-17/32	2-29/32	1	1-5/32	1-3/32	6-3/8	1-5/16	3-1/16	3/4	16.09
BBXBLK-UCP21752	3-1/4	3-3/4	12-7/32	9-23/32	3-9/32	1	1-3/16	1-1/4	7-5/16	1-11/32	3-3/8	3/4	23.76
BBXBLK-UCP21856	3-1/2	4	12-27/32	10-5/16	3-15/32	1-1/16	1-3/16	1-5/16	7-25/32	1-9/16	3-3/4	3/4	28.70

NOTE: See page 82 for insert bearing data.

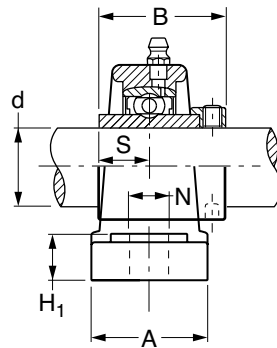
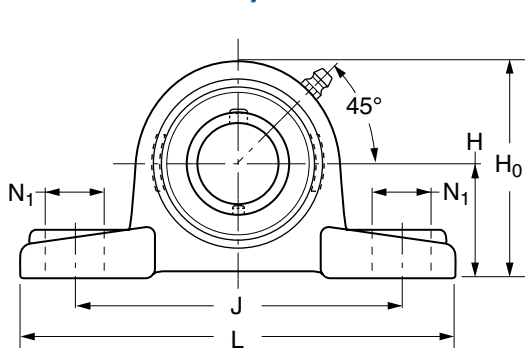


NEW

Standard Duty

PILLOW BLOCKS-LOCKING COLLAR TYPE

- Cast Iron Housing
- Solid Base
- Dual Seal Type
- Eccentric Collar



Catalog Number	Ød Shaft	H	L	J	A	N	N ₁	H ₁	H ₀	S	B	Bolt Size	Weight lb.
BBXBLK-HCP2018S	1/2												
BBXBLK-HCP20210S	5/8	1-3/16	4-15/16	3-3/4	1-1/4	15/32	5/8	1/2	2-1/4	9/16	1-15/32	3/8	1.50
BBXBLK-HCP20311S	11/16												
BBXBLK-HCP20412	3/4	1-5/16	5	3-3/4	1-15/32	1/2	5/8	9/16	2-1/2	11/16	1-25/32	3/8	1.59
BBXBLK-HCP20514	7/8												
BBXBLK-HCP20515	15/16	1-7/16	5-1/2	4-1/8	1-1/2	1/2	3/4	19/32	2-3/4	11/16	1-3/4	3/8	.18
BBXBLK-HCP20516	1												
BBXBLK-HCP20618	1-1/8												
BBXBLK-HCP20619	1-3/16	1-11/16	6-5/16	4-3/4	1-25/32	9/16	3/4	5/8	3-7/32	5/8	1-29/32	1/2	2.97
BBXBLK-HCP20620	1-1/4												
BBXBLK-HCP20720	1-1/4												
BBXBLK-HCP20721	1-5/16	1-7/8	6-9/16	4-31/32	1-7/8	19/32	3/4	21/32	3-5/8	3/4	2	1/2	3.74
BBXBLK-HCP20722	1-3/8												
BBXBLK-HCP20723	1-7/16												
BBXBLK-HCP20824	1-1/2	1-15/16	7-3/32	5-3/8	2-1/8	19/32	13/16	23/32	3-27/32	27/32	2-7/32	1/2	4.40
BBXBLK-HCP20825	1-9/16												
BBXBLK-HCP20926	1-5/8												
BBXBLK-HCP20927	1-11/16	2-1/8	7-7/16	5-3/4	2-1/8	19/32	13/16	25/32	4-5/32	27/32	2-7/32	1/2	5.34
BBXBLK-HCP20928	1-3/4												
BBXBLK-HCP21030	1-7/8	2-1/4	8-1/32	6-1/4	2-1/4	3/4	7/8	13/16	4-13/32	31/32	2-15/32	5/8	6.05
BBXBLK-HCP21031	1-15/16												
BBXBLK-HCP21132	2												
BBXBLK-HCP21134	2-1/8	2-1/2	8-17/32	6-25/32	2-3/8	3/4	7/8	7/8	4-29/32	1-3/32	2-13/16	5/8	7.83
BBXBLK-HCP21135	2-3/16												
BBXBLK-HCP21236	2-1/4												
BBXBLK-HCP21238	2-3/8	2-3/4	9-3/8	7-5/16	2-19/32	3/4	1	15/16	5-13/32	1-7/32	3-1/16	5/8	11.50
BBXBLK-HCP21239	2-7/16												
BBXBLK-HCP21340	2-1/2	3	10-5/16	8	2-3/4	29/32	1-5/32	1-1/32	5-7/8	1-11/32	3-3/8	3/4	13.90
BBXBLK-HCP21444	2-3/4	3-1/8	10-15/32	8-9/32	2-27/32	29/32	1-5/32	1-1/16	6-3/32	1-11/32	3-3/8	3/4	15.43
BBXBLK-HCP21548	3	3-1/4	10-25/32	8-17/32	2-29/32	1	1-5/32	1-3/32	6-3/8	1-15/32	3-5/8	3/4	17.19
BBXBLK-HCP21752	3-1/4	3-3/4	12-7/32	9-23/32	3-9/32	1	1-3/16	1-1/4	7-5/16	15/16	2-7/8	3/4	24.50
BBXBLK-HCP21856	3-1/2	4	12-27/32	10-5/16	3-15/32	1-1/16	1-3/16	1-5/16	7-25/32	31/32	2-27/32	7/8	29.00

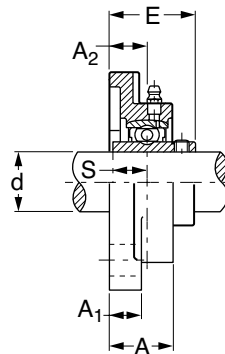
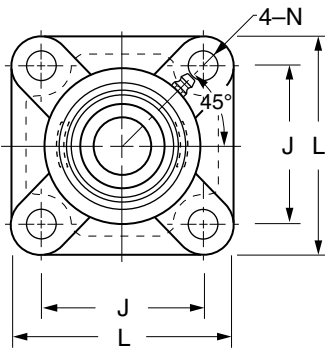
NOTE: See page 83 for insert bearing data.



NEW

**Standard Duty Four-Bolt Flange Mounting Blocks
SET SCREW TYPE**

- Cast Iron Housing • Dual Seal Type



Catalog Number	Ød Shaft	L	J	A ₂	A ₁	A	E	N	S	Bolt Size	Weight lb.
BBXBLK-UCF2018S	1/2										
BBXBLK-UCF20210S	5/8	3	2-1/8	19/32	7/16	31/32	1-7/32	7/16	7/16	3/8	1.14
BBXBLK-UCF20311S	11/16										
BBXBLK-UCF20412	3/4	3-3/8	2-17/32	19/32	7/16	1	1-5/16	7/16	1/2	3/8	1.41
BBXBLK-UCF20514	7/8										
BBXBLK-UCF20515	15/16	3-3/4	2-3/4	5/8	1/2	1-1/16	1-13/32	7/16	9/16	3/8	1.76
BBXBLK-UCF20516	1										
BBXBLK-UCF20618	1-1/8										
BBXBLK-UCF20619	1-3/16	4-1/4	3-9/32	23/32	1/2	1-7/32	1-19/32	7/16	5/8	3/8	2.35
BBXBLK-UCF20620	1-1/4										
BBXBLK-UCF20720	1-1/4										
BBXBLK-UCF20721	1-5/16	4-19/32	3-5/8	3/4	19/32	1-11/32	1-3/4	9/16	11/16	1/2	3.08
BBXBLK-UCF20722	1-3/8										
BBXBLK-UCF20723	1-7/16										
BBXBLK-UCF20824	1-1/2	5-1/8	4-1/32	27/32	19/32	1-13/32	2-1/32	9/16	3/4	1/2	3.96
BBXBLK-UCF20825	1-9/16										
BBXBLK-UCF20926	1-5/8										
BBXBLK-UCF20927	1-11/16	5-13/32	4-1/8	7/8	5/8	1-1/2	2-1/16	5/8	3/4	9/16	4.85
BBXBLK-UCF20928	1-3/4										
BBXBLK-UCF21030	1-7/8	5-5/8	4-3/8	7/8	5/8	1-9/16	2-5/32	23/32	3/4	5/8	5.29
BBXBLK-UCF21031	1-15/16										
BBXBLK-UCF21132	2										
BBXBLK-UCF21134	2-1/8	6-3/8	5-1/8	1	23/32	1-11/16	2-5/16	23/32	7/8	5/8	7.71
BBXBLK-UCF21135	2-3/16										
BBXBLK-UCF21236	2-1/4										
BBXBLK-UCF21238	2-3/8	6-29/32	5-5/8	1-5/32	23/32	1-29/32	2-23/32	23/32	1	5/8	9.25
BBXBLK-UCF21239	2-7/16										
BBXBLK-UCF21340	2-1/2	7-3/8	5-7/8	1-3/16	7/8	1-31/32	2-3/4	23/32	1	5/8	11.68
BBXBLK-UCF21444	2-3/4	7-5/8	6	1-7/32	7/8	2-1/8	2-31/32	23/32	1-3/16	5/8	13.00
BBXBLK-UCF21547	2-15/16										
BBXBLK-UCF21548	3	7-7/8	6-1/4	1-11/32	7/8	2-7/32	3-3/32	23/32	1-5/16	5/8	13.88
BBXBLK-UCF21752	3-1/4	8-21/32	6-29/32	1-13/32	15/16	2-15/32	3-7/16	29/32	1-11/32	3/4	19.62
BBXBLK-UCF21856	3-1/2	9-1/4	7-3/8	1-9/16	1	2-11/16	3-25/32	29/32	1-9/16	3/4	25.52

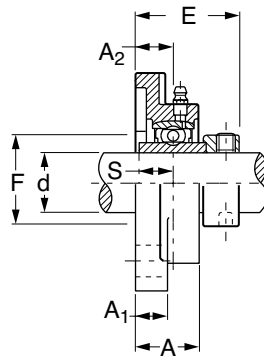
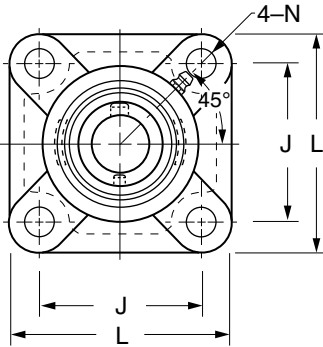
NOTE: See page 82 for insert bearing data.



NEW

**Standard Duty Four-Bolt Flange Mounting Blocks
LOCKING COLLAR TYPE**

- Cast Iron Housing
- Dual Seal Type
- Eccentric Collar



Catalog Number	Ød Shaft	L	J	A ₂	A ₁	A	E	N	S	F Min.	Bolt Size	Weight lb.
BBXBLK-HCF2018S	1/2											
BBXBLK-HCF20210S	5/8	3	2-1/8	19/32	7/16	31/32	1-1/2	7/16	9/16	—	3/8	1.12
BBXBLK-HCF20311S	11/16											
BBXBLK-HCF20412	3/4	3-3/8	2-17/32	19/32	7/16	1	1-5/8	7/16	21/32	1-7/32	3/8	1.45
BBXBLK-HCF20514	7/8											
BBXBLK-HCF20515	15/16	3-3/4	2-3/4	5/8	1/2	1-1/16	1-11/16	7/16	11/16	1-13/32	3/8	1.76
BBXBLK-HCF20516	1											
BBXBLK-HCF20618	1-1/8											
BBXBLK-HCF20619	1-3/16	4-1/4	3-9/32	23/32	1/2	1-7/32	1-29/32	7/16	23/32	1-21/32	3/8	2.64
BBXBLK-HCF20620	1-1/4											
BBXBLK-HCF20720	1-1/4											
BBXBLK-HCF20721	1-5/16	4-19/32	3-5/8	3/4	19/32	1-11/32	2-1/32	9/16	3/4	1-31/32	1/2	3.52
BBXBLK-HCF20722	1-3/8											
BBXBLK-HCF20723	1-7/16											
BBXBLK-HCF20824	1-1/2	5-1/8	4-1/32	27/32	19/32	1-13/32	2-7/32	9/16	27/32	2-5/32	1/2	4.19
BBXBLK-HCF20825	1-9/16											
BBXBLK-HCF20926	1-5/8											
BBXBLK-HCF20927	1-11/16	5-13/32	4-1/8	7/8	5/8	1-1/2	2-1/4	5/8	27/32	—	9/16	5.07
BBXBLK-HCF20928	1-3/4											
BBXBLK-HCF21030	1-7/8	5-5/8	4-3/8	7/8	5/8	1-9/16	2-3/8	23/32	31/32	2-17/32	5/8	5.73
BBXBLK-HCF21031	1-15/16											
BBXBLK-HCF21132	2											
BBXBLK-HCF21134	2-1/8	6-3/8	5-1/8	1	23/32	1-11/16	2-23/32	23/32	1-3/32	2-13/16	5/8	8.38
BBXBLK-HCF21135	2-3/16											
BBXBLK-HCF21236	2-1/4											
BBXBLK-HCF21238	2-3/8	6-7/8	5-5/8	1-5/32	23/32	1-7/8	2-31/32	23/32	1-7/32	3-1/32	5/8	10.58
BBXBLK-HCF21239	2-7/16											
BBXBLK-HCF21340	2-1/2	7-3/8	5-7/8	1-3/16	7/8	1-31/32	3-7/32	23/32	1-11/32	3-5/16	5/8	13.22
BBXBLK-HCF21444	2-3/4	7-19/32	6	1-7/32	7/8	2-1/8	3-1/4	23/32	1-11/32	3-1/2	5/8	13.89
BBXBLK-HCF21548	3	7-7/8	6-1/4	1-11/32	7/8	2-7/32	3-15/32	23/32	1-15/32	3-11/16	5/8	15.87
BBXBLK-HCF21752	3-1/4	8-21/32	6-7/8	1-13/32	15/16	2-15/32	3-3/8	29/32	29/32	—	3/4	19.20
BBXBLK-HCF21856	3-1/2	9-1/4	7-3/8	1-9/16	31/32	2-11/16	3-15/32	29/32	1	—	3/4	25.10

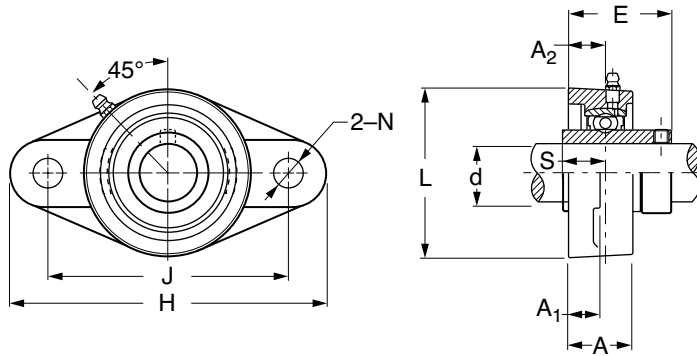
NOTE: See page 83 for insert bearing data.



NEW

**Standard Duty Two-Bolt Flange Mounting Blocks
SET SCREW TYPE**

• Cast Iron Housing • Dual Seal Type



Catalog Number	Ød Shaft	H	J	L	A ₂	A ₁	A	E	N	S	Bolt Size	Weight lb.
BBXBLK-UFL2018S	1/2											
BBXBLK-UFL20210S	5/8	3-29/32	3	2-1/4	19/32	7/16	1	1-7/32	7/16	7/16	3/8	.99
BBXBLK-UFL20311S	11/16											
BBXBLK-UFL20412	3/4	4-7/16	3-9/16	2-3/8	19/32	7/16	1	1-5/16	7/16	1/2	3/8	1.12
BBXBLK-UFL20514	7/8											
BBXBLK-UFL20515	15/16	5-1/8	3-29/32	2-11/16	5/8	17/32	1-1/16	1-13/32	7/16	9/16	3/8	1.32
BBXBLK-UFL20516	1											
BBXBLK-UFL20618	1-1/8											
BBXBLK-UFL20619	1-3/16	5-27/32	4-5/8	3-5/32	23/32	17/32	1-7/32	1-19/32	7/16	5/8	3/8	1.98
BBXBLK-UFL20620	1-1/4											
BBXBLK-UFL20720	1-1/4											
BBXBLK-UFL20721	1-5/16	6-11/32	5-1/8	3-9/16	3/4	9/16	1-11/32	1-3/4	9/16	11/16	1/2	2.64
BBXBLK-UFL20722	1-3/8											
BBXBLK-UFL20723	1-7/16											
BBXBLK-UFL20824	1-1/2	6-7/8	5-11/16	3-15/16	27/32	9/16	1-7/16	2-1/32	9/16	3/4	1/2	3.30
BBXBLK-UFL20825	1-9/16											
BBXBLK-UFL20926	1-5/8											
BBXBLK-UFL20927	1-11/16	7-13/32	5-27/32	4-1/4	7/8	5/8	1-1/2	2-1/16	23/32	3/4	5/8	4.18
BBXBLK-UFL20928	1-3/4											
BBXBLK-UFL21030	1-7/8											
BBXBLK-UFL21031	1-15/16	7-3/4	6-3/16	4-17/32	7/8	5/8	1-19/32	2-5/32	23/32	3/4	5/8	4.85
BBXBLK-UFL21032	2											
BBXBLK-UFL21132	2											
BBXBLK-UFL21134	2-1/8	8-13/16	7-1/4	5-1/8	1	23/32	1-11/16	2-5/16	23/32	7/8	5/8	6.83
BBXBLK-UFL21135	2-3/16											
BBXBLK-UFL21236	2-1/4											
BBXBLK-UFL21238	2-3/8	9-27/32	7-31/32	5-1/2	1-5/32	23/32	1-29/32	2-23/32	23/32	1	5/8	8.82
BBXBLK-UFL21239	2-7/16											
BBXBLK-UFL21340	2-1/2	10-5/32	8-9/32	6-3/32	1-3/16	25/32	1-31/32	2-3/4	29/32	1	3/4	11.20
BBXBLK-UFL21444	2-3/4	10-7/16	8-1/2	6-5/16	1-7/32	25/32	2-1/8	2-31/32	29/32	1-3/16	3/4	12.34
BBXBLK-UFL21547	2-15/16											
BBXBLK-UFL21548	3	10-27/32	8-7/8	6-15/32	1-11/32	7/8	2-3/16	3-3/32	29/32	1-5/16	3/4	13.66
BBXBLK-UFL21752	3-1/4	12	9-25/32	7-1/2	1-13/32	7/8	2-15/32	3-7/16	1	1-11/32	7/8	21.60
BBXBLK-UFL21856	3-1/2	12-19/32	10-7/16	8-1/16	1-19/32	29/32	2-11/16	3-13/16	1	1-9/16	7/8	27.33

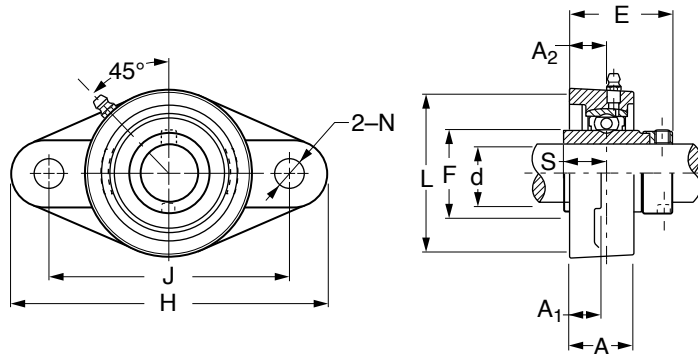
NOTE: See page 82 for insert bearing data.



NEW

**Standard Duty Two-Bolt Flange Mounting Blocks
LOCKING COLLAR TYPE**

- Cast Iron Housing • Dual Seal Type • Eccentric Collar



Catalog Number	Ød Shaft	H	J	L	A ₂	A ₁	A	E	N	S	F Min.	Bolt Size	Weight lb.
BBXBLK-HFL2018S	1/2												
BBXBLK-HFL20210S	5/8	3-29/32	3	2-1/4	19/32	7/16	31/32	1-1/2	7/16	9/16	—	3/8	1.06
BBXBLK-HFL20311S	11/16												
BBXBLK-HFL20412	3/4	4-7/16	3-9/16	2-3/8	19/32	7/16	1	1-5/8	7/16	21/32	1-7/32	3/8	1.61
BBXBLK-HFL20514	7/8												
BBXBLK-HFL20515	15/16	5-1/8	3-29/32	2-11/16	5/8	1/2	1-1/16	1-11/16	7/16	11/16	1-13/32	3/8	1.76
BBXBLK-HFL20516	1												
BBXBLK-HFL20618	1-1/8												
BBXBLK-HFL20619	1-3/16	5-13/16	4-19/32	3-5/32	23/32	1/2	1-7/32	1-29/32	7/16	23/32	1-21/32	3/8	2.65
BBXBLK-HFL20620	1-1/4												
BBXBLK-HFL20720	1-1/4												
BBXBLK-HFL20721	1-5/16	6-11/32	5-1/8	3-17/32	3/4	9/16	1-11/32	2-1/32	9/16	3/4	1-31/32	1/2	3.53
BBXBLK-HFL20722	1-3/8												
BBXBLK-HFL20723	1-7/16												
BBXBLK-HFL20824	1-1/2	6-29/32	5-21/32	3-15/16	27/32	9/16	1-13/32	2-3/16	9/16	27/32	2-5/32	1/2	4.19
BBXBLK-HFL20825	1-9/16												
BBXBLK-HFL20926	1-5/8												
BBXBLK-HFL20927	1-11/16	7-13/32	5-27/32	4-1/4	7/8	5/8	1-1/2	2-1/4	23/32	27/32	—	5/8	5.07
BBXBLK-HFL20928	1-3/4												
BBXBLK-HFL21030	1-7/8	7-3/4	6-3/16	4-7/32	7/8	5/8	1-9/16	2-3/8	23/32	31/32	2-17/32	5/8	5.74
BBXBLK-HFL21031	1-15/16												
BBXBLK-HFL21132	2												
BBXBLK-HFL21134	2-1/8	8-13/16	7-1/4	5-1/8	31/32	25/32	1-11/16	2-11/16	23/32	1-3/32	2-13/16	5/8	8.38
BBXBLK-HFL21135	2-3/16												
BBXBLK-HFL21236	2-1/4												
BBXBLK-HFL21238	2-3/8	9-27/32	7-31/32	5-1/2	1-5/32	23/32	1-29/32	2-31/32	23/32	1-7/32	3-1/32	5/8	10.60
BBXBLK-HFL21239	2-7/16												
BBXBLK-HFL21340	2-1/2	10-5/32	8-9/32	6-3/32	1-3/16	25/32	1-31/32	3-7/32	29/32	1-11/32	3-5/16	3/4	13.20
BBXBLK-HFL21444	2-3/4	10-7/16	8-1/2	6-5/16	1-7/32	25/32	2-1/8	3-1/4	29/32	1-11/32	3-1/2	3/4	13.90
BBXBLK-HFL21548	3	10-13/16	8-27/32	6-15/32	1-11/32	7/8	2-5/32	3-1/2	29/32	1-15/32	3-11/16	3/4	15.87

NOTE: See page 83 for insert bearing data.

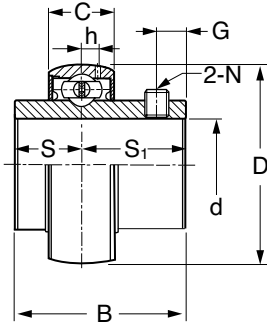


NEW

Standard Duty

BALL BEARING INSERTS-SET SCREW TYPE

- Wide Inner Ring Bearing
- Lubrication Groove with Hole on Set Screw Side
- Additional Oil Hole on Opposite Side
- Antirotation Device • Dual Seal



Catalog Number	Ød Shaft	D	B	C	S	S ₁	G	h	N	Basic Load Rating lb.		Weight lb.
										Dynamic	Static	
BBXINS-UC2018S	1/2											.28
BBXINS-UC20210S	5/8	1.5728	1.0787	.5512	.4528	.6260	.1654	.1378	#10-32	2416	1074	.26
BBXINS-UC20311S	11/16											.24
BBXINS-UC20412	3/4	1.8540	1.2205	.6299	.5000	.7205	.1850	.1732	1/4-28	2827	1494	.40
BBXINS-UC20514	7/8											.51
BBXINS-UC20515	15/16	2.0472	1.3386	.6693	.5630	.7756	.2165	.1693	1/4-28	3147	1771	.48
BBXINS-UC20516	1											.44
BBXINS-UC20618	1-1/8											.75
BBXINS-UC20619	1-3/16	2.4409	1.5000	.7480	.6260	.8740	.2165	.1969	1/4-28	4383	2517	.68
BBXINS-UC20620	1-1/4											.66
BBXINS-UC20720	1-1/4											1.16
BBXINS-UC20721	1-5/16	2.8346	1.6890	.7874	.6890	1.0000	.2559	.2283	5/16-24	5777	3416	1.12
BBXINS-UC20722	1-3/8											1.05
BBXINS-UC20723	1-7/16											.99
BBXINS-UC20824	1-1/2	3.1496	1.9370	.8268	.7480	1.1890	.3150	.2480	5/16-24	6654	4091	1.49
BBXINS-UC20825	1-9/16											1.43
BBXINS-UC20926	1-5/8											1.72
BBXINS-UC20927	1-11/16	3.3465	1.9370	.8661	.7480	1.1890	.3150	.2677	5/16-24	7159	4675	1.63
BBXINS-UC20928	1-3/4											1.54
BBXINS-UC21030	1-7/8											1.92
BBXINS-UC21031	1-15/16	3.5433	2.0315	.9055	.7480	1.2835	.3543	.2559	3/8-24	7890	5215	1.81
BBXINS-UC21032	2											1.72
BBXINS-UC21132	2											2.79
BBXINS-UC21134	2-1/8	3.9370	2.1890	.9843	.8740	1.3150	.3543	.2835	3/8-24	9790	6564	2.57
BBXINS-UC21135	2-3/16											2.42
BBXINS-UC21236	2-1/4											3.67
BBXINS-UC21238	2-3/8	4.3307	2.5630	1.0630	1.0000	1.5630	.4134	.3228	3/8-24	10745	7373	3.36
BBXINS-UC21239	2-7/16											3.19
BBXINS-UC21340	2-1/2	4.7244	2.5630	1.1024	1.0000	1.5630	.4724	.3159	3/8-24	12858	8992	4.27
BBXINS-UC21444	2-3/4	4.9213	2.9370	1.1811	1.1890	1.7480	.4724	.3543	7/16-20	13668	10116	4.53
BBXINS-UC21547	2-15/16											5.06
BBXINS-UC21548	3	5.1181	3.0630	1.1811	1.3110	1.7520	.4724	.3543	7/16-20	14836	11127	4.69
BBXINS-UC21752	3-1/4	5.9055	3.3740	1.3780	1.3425	2.0315	.5512	.4331	7/16-20	18703	14342	7.92
BBXINS-UC21856	3-1/2	6.2992	3.7795	1.4567	1.5630	2.2165	.5512	.4724	1/2-20	21558	16073	10.03
BBXINS-UC22064	4	7.0866	4.2520	1.5748	1.6535	2.5984	.6299	.4764	5/8-18	27426	20861	12.78

NOTE: See pages 76, 78 & 80 for matching blocks.

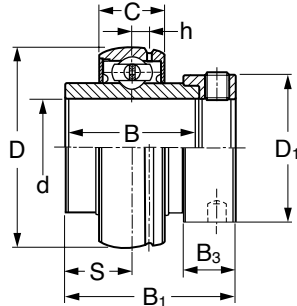


NEW

Standard Duty

BALL BEARING INSERTS-LOCKING COLLAR TYPE

- Wide Inner Ring Bearing
- Lubrication Groove with Hole on Collar Side
- Additional Oil Hole on Opposite Side
- Antirotation Device • Dual Seal



Catalog Number	Ød Shaft	D	C	B	S	B ₁	B ₃	h	D ₁	Basic Load Rating lb.		Weight lb.
										Dynamic	Static	
BBXINS-HC2018S	1/2											.51
BBXINS-HC20210S	5/8	1.5748	.5512	1.0945	.5472	1.4685	.5315	.1378	1.1260	2146	1074	.46
BBXINS-HC20311S	11/16											.42
BBXINS-HC20412	3/4	1.8540	.6299	1.3386	.6693	1.7126	.5315	.1732	1.3110	2877	1494	.51
BBXINS-HC20514	7/8											.62
BBXINS-HC20515	15/16	2.0472	.6693	1.3701	.6850	1.7441	.5315	.1693	1.5000	3147	1771	.60
BBXINS-HC20516	1											.53
BBXINS-HC20618	1-1/8											.92
BBXINS-HC20619	1-3/16	2.4409	.7480	1.4331	.7165	1.9016	.6260	.1969	1.7520	4383	2517	.88
BBXINS-HC20620	1-1/4											.84
BBXINS-HC20720	1-1/4											1.46
BBXINS-HC20721	1-5/16	2.8346	.7874	1.4803	.7402	2.0118	.6890	.2283	2.1890	5777	3416	1.43
BBXINS-HC20722	1-3/8											1.34
BBXINS-HC20723	1-7/16											1.28
BBXINS-HC20824	1-1/2	3.1496	.8268	1.6850	.8425	2.2165	.7205	.2480	2.3740	6654	4091	1.78
BBXINS-HC20825	1-9/16											1.74
BBXINS-HC20926	1-5/8											2.06
BBXINS-HC20927	1-11/16	3.3465	.8661	1.6850	.8425	2.2165	.7205	.2677	2.5000	7159	4675	2.01
BBXINS-HC20928	1-3/4											1.92
BBXINS-HC21030	1-7/8	3.5433	.9055	1.9370	.9685	2.4685	.7205	.2559	2.7520	7890	5215	2.48
BBXINS-HC21031	1-15/16											2.42
BBXINS-HC21132	2											3.31
BBXINS-HC21134	2-1/8	3.9370	.9843	2.1811	1.0906	2.8071	.8150	.2835	3.0000	9790	6564	3.17
BBXINS-HC21135	2-3/16											2.97
BBXINS-HC21236	2-1/4											4.27
BBXINS-HC21238	2-3/8	4.3307	1.0630	2.4331	1.2165	3.0591	.8780	.3228	3.3150	10745	7373	4.07
BBXINS-HC21239	2-7/16											3.87
BBXINS-HC21340	2-1/2	4.7244	1.1024	2.685	1.3425	3.3740	.9252	.3150	3.3858	12858	8992	5.40
BBXINS-HC21444	2-3/4	4.9213	1.1811	2.685	1.3425	3.3740	.9252	.3543	3.8110	13668	10116	5.66
BBXINS-HC21548	3	5.1181	1.1811	2.937	1.4685	3.6260	.9409	.3543	4.0160	14836	11127	6.03
BBXINS-HC21752	3-1/4	5.9055	1.3780	2.0945	.9213	2.8819	1.0630	.4331	4.6850	18703	14342	7.92
BBXINS-HC21856	3-1/2	6.2992	1.4567	2.1654	.9646	2.8543	.9449	.4724	4.7244	21558	16073	9.79

NOTE: See pages 77, 79 & 81 for matching blocks.

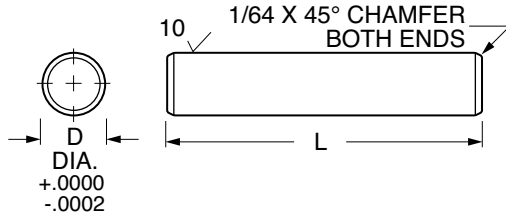


NEW

303 Stainless Steel

SOLID PRECISION SHAFTING

- Precision Ground
- Chamfered Ends
- Straightness .0004 Per Inch



Catalog Number			L Length ±.010
D Diameter .1247	D Diameter .1872	D Diameter .2497	
BBSHAF-04010	BBSHAF-06010	BBSHAF-08010	1
BBSHAF-04011	BBSHAF-06011	BBSHAF-08011	1-1/8
BBSHAF-04012	BBSHAF-06012	BBSHAF-08012	1-1/4
BBSHAF-04013	BBSHAF-06013	BBSHAF-08013	1-3/8
BBSHAF-04015	BBSHAF-06015	BBSHAF-08015	1-1/2
BBSHAF-04016	BBSHAF-06016	BBSHAF-08016	1-5/8
BBSHAF-04017	BBSHAF-06017	BBSHAF-08017	1-3/4
BBSHAF-04018	BBSHAF-06018	BBSHAF-08018	1-7/8
BBSHAF-04020	BBSHAF-06020	BBSHAF-08020	2
BBSHAF-04021	BBSHAF-06021	BBSHAF-08021	2-1/8
BBSHAF-04022	BBSHAF-06022	BBSHAF-08022	2-1/4
BBSHAF-04023	BBSHAF-06023	BBSHAF-08023	2-3/8
BBSHAF-04025	BBSHAF-06025	BBSHAF-08025	2-1/2
BBSHAF-04026	BBSHAF-06026	BBSHAF-08026	2-5/8
BBSHAF-04027	BBSHAF-06027	BBSHAF-08027	2-3/4
BBSHAF-04028	BBSHAF-06028	BBSHAF-08028	2-7/8
BBSHAF-04030	BBSHAF-06030	BBSHAF-08030	3
BBSHAF-04031	BBSHAF-06031	BBSHAF-08031	3-1/8
BBSHAF-04032	BBSHAF-06032	BBSHAF-08032	3-1/4
BBSHAF-04033	BBSHAF-06033	BBSHAF-08033	3-3/8
BBSHAF-04035	BBSHAF-06035	BBSHAF-08035	3-1/2
BBSHAF-04036	BBSHAF-06036	BBSHAF-08036	3-5/8
BBSHAF-04037	BBSHAF-06037	BBSHAF-08037	3-3/4
BBSHAF-04038	BBSHAF-06038	BBSHAF-08038	3-7/8
BBSHAF-04040	BBSHAF-06040	BBSHAF-08040	4
BBSHAF-04041	BBSHAF-06041	BBSHAF-08041	4-1/8
BBSHAF-04042	BBSHAF-06042	BBSHAF-08042	4-1/4
BBSHAF-04043	BBSHAF-06043	BBSHAF-08043	4-3/8
BBSHAF-04045	BBSHAF-06045	BBSHAF-08045	4-1/2
BBSHAF-04046	BBSHAF-06046	BBSHAF-08046	4-5/8
BBSHAF-04047	BBSHAF-06047	BBSHAF-08047	4-3/4
BBSHAF-04048	BBSHAF-06048	BBSHAF-08048	4-7/8

NOTE: Grooving, other modifications and sizes available on special order. Continued on the next page

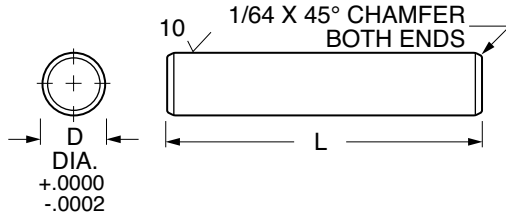


NEW

303 Stainless Steel

SOLID PRECISION SHAFTING

- Precision Ground
- Chamfered Ends
- Straightness .0004 Per Inch



Catalog Number			L Length ±.010
D Diameter .1247	D Diameter .1872	D Diameter .2497	
BBSHAF-04050	BBSHAF-06050	BBSHAF-08050	5
BBSHAF-04051	BBSHAF-06051	BBSHAF-08051	5-1/8
BBSHAF-04052	BBSHAF-06052	BBSHAF-08052	5-1/4
BBSHAF-04053	BBSHAF-06053	BBSHAF-08053	5-3/8
BBSHAF-04055	BBSHAF-06055	BBSHAF-08055	5-1/2
BBSHAF-04056	BBSHAF-06056	BBSHAF-08056	5-5/8
BBSHAF-04057	BBSHAF-06057	BBSHAF-08057	5-3/4
BBSHAF-04058	BBSHAF-06058	BBSHAF-08058	5-7/8
BBSHAF-04060	BBSHAF-06060	BBSHAF-08060	6
BBSHAF-04061	BBSHAF-06061	BBSHAF-08061	6-1/8
BBSHAF-04062	BBSHAF-06062	BBSHAF-08062	6-1/4
BBSHAF-04063	BBSHAF-06063	BBSHAF-08063	6-3/8
BBSHAF-04065	BBSHAF-06065	BBSHAF-08065	6-1/2
BBSHAF-04066	BBSHAF-06066	BBSHAF-08066	6-5/8
BBSHAF-04067	BBSHAF-06067	BBSHAF-08067	6-3/4
BBSHAF-04068	BBSHAF-06068	BBSHAF-08068	6-7/8
BBSHAF-04070	BBSHAF-06070	BBSHAF-08070	7
BBSHAF-04071	BBSHAF-06071	BBSHAF-08071	7-1/8
BBSHAF-04072	BBSHAF-06072	BBSHAF-08072	7-1/4
BBSHAF-04073	BBSHAF-06073	BBSHAF-08073	7-3/8
BBSHAF-04075	BBSHAF-06075	BBSHAF-08075	7-1/2
BBSHAF-04076	BBSHAF-06076	BBSHAF-08076	7-5/8
BBSHAF-04077	BBSHAF-06077	BBSHAF-08077	7-3/4
BBSHAF-04078	BBSHAF-06078	BBSHAF-08078	7-7/8
BBSHAF-04080	BBSHAF-06080	BBSHAF-08080	8
BBSHAF-04081	BBSHAF-06081	BBSHAF-08081	8-1/8
BBSHAF-04082	BBSHAF-06082	BBSHAF-08082	8-1/4
BBSHAF-04083	BBSHAF-06083	BBSHAF-08083	8-3/8
BBSHAF-04085	BBSHAF-06085	BBSHAF-08085	8-1/2
BBSHAF-04086	BBSHAF-06086	BBSHAF-08086	8-5/8
BBSHAF-04087	BBSHAF-06087	BBSHAF-08087	8-3/4
BBSHAF-04088	BBSHAF-06088	BBSHAF-08088	8-7/8

NOTE: Grooving, other modifications and sizes available on special order. Continued on the next page

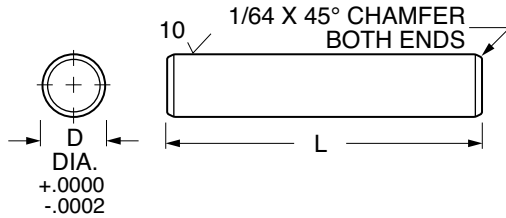


NEW

303 Stainless Steel

SOLID PRECISION SHAFTING

- Precision Ground
- Chamfered Ends
- Straightness .0004 Per Inch



Catalog Number			L Length ±.010
D Diameter .1247	D Diameter .1872	D Diameter .2497	
BBSHAF-04090	BBSHAF-06090	BBSHAF-08090	9
BBSHAF-04091	BBSHAF-06091	BBSHAF-08091	9-1/8
BBSHAF-04092	BBSHAF-06092	BBSHAF-08092	9-1/4
BBSHAF-04093	BBSHAF-06093	BBSHAF-08093	9-3/8
BBSHAF-04095	BBSHAF-06095	BBSHAF-08095	9-1/2
BBSHAF-04096	BBSHAF-06096	BBSHAF-08096	9-5/8
BBSHAF-04097	BBSHAF-06097	BBSHAF-08097	9-3/4
BBSHAF-04098	BBSHAF-06098	BBSHAF-08098	9-7/8
BBSHAF-04100	BBSHAF-06100	BBSHAF-08100	10
BBSHAF-04101	BBSHAF-06101	BBSHAF-08101	10-1/8
BBSHAF-04102	BBSHAF-06102	BBSHAF-08102	10-1/4
BBSHAF-04103	BBSHAF-06103	BBSHAF-08103	10-3/8
BBSHAF-04105	BBSHAF-06105	BBSHAF-08105	10-1/2
BBSHAF-04106	BBSHAF-06106	BBSHAF-08106	10-5/8
BBSHAF-04107	BBSHAF-06107	BBSHAF-08107	10-3/4
BBSHAF-04108	BBSHAF-06108	BBSHAF-08108	10-7/8
BBSHAF-04110	BBSHAF-06110	BBSHAF-08110	11
BBSHAF-04111	BBSHAF-06111	BBSHAF-08111	11-1/8
BBSHAF-04112	BBSHAF-06112	BBSHAF-08112	11-1/4
BBSHAF-04113	BBSHAF-06113	BBSHAF-08113	11-3/8
BBSHAF-04115	BBSHAF-06115	BBSHAF-08115	11-1/2
BBSHAF-04116	BBSHAF-06116	BBSHAF-08116	11-5/8
BBSHAF-04117	BBSHAF-06117	BBSHAF-08117	11-3/4
BBSHAF-04118	BBSHAF-06118	BBSHAF-08118	11-7/8
BBSHAF-04120	BBSHAF-06120	BBSHAF-08120	12
BBSHAF-04121	BBSHAF-06121	BBSHAF-08121	12-1/8
BBSHAF-04122	BBSHAF-06122	BBSHAF-08122	12-1/4
BBSHAF-04123	BBSHAF-06123	BBSHAF-08123	12-3/8
BBSHAF-04125	BBSHAF-06125	BBSHAF-08125	12-1/2
BBSHAF-04126	BBSHAF-06126	BBSHAF-08126	12-5/8
BBSHAF-04127	BBSHAF-06127	BBSHAF-08127	12-3/4
BBSHAF-04128	BBSHAF-06128	BBSHAF-08128	12-7/8

NOTE: Grooving, other modifications and sizes available on special order. Continued on the next page

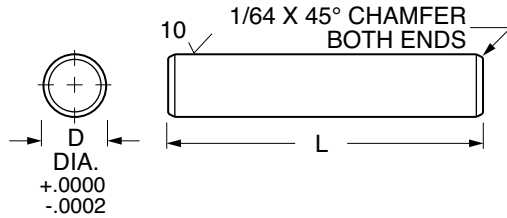


NEW

303 Stainless Steel

SOLID PRECISION SHAFTING

- Precision Ground
- Chamfered Ends
- Straightness .0004 Per Inch



Catalog Number			L Length ±.010
D Diameter .1247	D Diameter .1872	D Diameter .2497	
BBSHAF-04130	BBSHAF-06130	BBSHAF-08130	13
BBSHAF-04131	BBSHAF-06131	BBSHAF-08131	13-1/8
BBSHAF-04132	BBSHAF-06132	BBSHAF-08132	13-1/4
BBSHAF-04133	BBSHAF-06133	BBSHAF-08133	13-3/8
BBSHAF-04135	BBSHAF-06135	BBSHAF-08135	13-1/2
BBSHAF-04136	BBSHAF-06136	BBSHAF-08136	13-5/8
BBSHAF-04137	BBSHAF-06137	BBSHAF-08137	13-3/4
BBSHAF-04138	BBSHAF-06138	BBSHAF-08138	13-7/8
BBSHAF-04140	BBSHAF-06140	BBSHAF-08140	14
BBSHAF-04141	BBSHAF-06141	BBSHAF-08141	14-1/8
BBSHAF-04142	BBSHAF-06142	BBSHAF-08142	14-1/4
BBSHAF-04143	BBSHAF-06143	BBSHAF-08143	14-3/8
BBSHAF-04145	BBSHAF-06145	BBSHAF-08145	14-1/2
BBSHAF-04146	BBSHAF-06146	BBSHAF-08146	14-5/8
BBSHAF-04147	BBSHAF-06147	BBSHAF-08147	14-3/4
BBSHAF-04148	BBSHAF-06148	BBSHAF-08148	14-7/8
BBSHAF-04150	BBSHAF-06150	BBSHAF-08150	15
BBSHAF-04151	BBSHAF-06151	BBSHAF-08151	15-1/8
BBSHAF-04152	BBSHAF-06152	BBSHAF-08152	15-1/4
BBSHAF-04153	BBSHAF-06153	BBSHAF-08153	15-3/8
BBSHAF-04155	BBSHAF-06155	BBSHAF-08155	15-1/2
BBSHAF-04156	BBSHAF-06156	BBSHAF-08156	15-5/8
BBSHAF-04157	BBSHAF-06157	BBSHAF-08157	15-3/4
BBSHAF-04158	BBSHAF-06158	BBSHAF-08158	15-7/8
BBSHAF-04160	BBSHAF-06160	BBSHAF-08160	16
BBSHAF-04161	BBSHAF-06161	BBSHAF-08161	16-1/8
BBSHAF-04162	BBSHAF-06162	BBSHAF-08162	16-1/4
BBSHAF-04163	BBSHAF-06163	BBSHAF-08163	16-3/8
BBSHAF-04165	BBSHAF-06165	BBSHAF-08165	16-1/2
BBSHAF-04166	BBSHAF-06166	BBSHAF-08166	16-5/8
BBSHAF-04167	BBSHAF-06167	BBSHAF-08167	16-3/4
BBSHAF-04168	BBSHAF-06168	BBSHAF-08168	16-7/8

NOTE: Grooving, other modifications and sizes available on special order. Continued on the next page

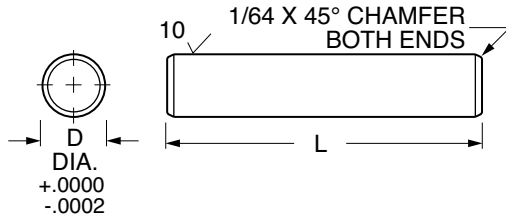


NEW

303 Stainless Steel

SOLID PRECISION SHAFTING

- Precision Ground
- Chamfered Ends
- Straightness .0004 Per Inch



Catalog Number			L Length ±.010
D Diameter .3122	D Diameter .3747	D Diameter .4997	
BBSHAF-10030	BBSHAF-12030	BBSHAF-16030	3
BBSHAF-10035	BBSHAF-12035	BBSHAF-16035	3-1/2
BBSHAF-10040	BBSHAF-12040	BBSHAF-16040	4
BBSHAF-10045	BBSHAF-12045	BBSHAF-16045	4-1/2
BBSHAF-10050	BBSHAF-12050	BBSHAF-16050	5
BBSHAF-10055	BBSHAF-12055	BBSHAF-16055	5-1/2
BBSHAF-10060	BBSHAF-12060	BBSHAF-16060	6
BBSHAF-10065	BBSHAF-12065	BBSHAF-16065	6-1/2
BBSHAF-10070	BBSHAF-12070	BBSHAF-16070	7
BBSHAF-10075	BBSHAF-12075	BBSHAF-16075	7-1/2
BBSHAF-10080	BBSHAF-12080	BBSHAF-16080	8
BBSHAF-10085	BBSHAF-12085	BBSHAF-16085	8-1/2
BBSHAF-10090	BBSHAF-12090	BBSHAF-16090	9
BBSHAF-10095	BBSHAF-12095	BBSHAF-16095	9-1/2
BBSHAF-10100	BBSHAF-12100	BBSHAF-16100	10
BBSHAF-10120	BBSHAF-12120	BBSHAF-16120	12
BBSHAF-10140	BBSHAF-12140	BBSHAF-16140	14
BBSHAF-10160	BBSHAF-12160	BBSHAF-16160	16
BBSHAF-10180	BBSHAF-12180	BBSHAF-16180	18
BBSHAF-10200	BBSHAF-12200	BBSHAF-16200	20
BBSHAF-10220	BBSHAF-12220	BBSHAF-16220	22
BBSHAF-10240	BBSHAF-12240	BBSHAF-16240	24
BBSHAF-10260	BBSHAF-12260	BBSHAF-16260	26
BBSHAF-10280	BBSHAF-12280	BBSHAF-16280	28
BBSHAF-10300	BBSHAF-12300	BBSHAF-16300	30
BBSHAF-10320	BBSHAF-12320	BBSHAF-16320	32
BBSHAF-10340	BBSHAF-12340	BBSHAF-16340	34
BBSHAF-10360	BBSHAF-12360	BBSHAF-16360	36

NOTE: Grooving, other modifications and sizes available on special order.



NEW

Ceramic Coated Aluminum

SOLID AND PREDRILLED SHAFTING

- 6105-T6 Aluminum Base Material • Rc 70 Ceramic Coated Finish
- Nonmagnetic and Vibration-Resistant
- Weld Splatter, Paints and Contaminants Will Not Stick

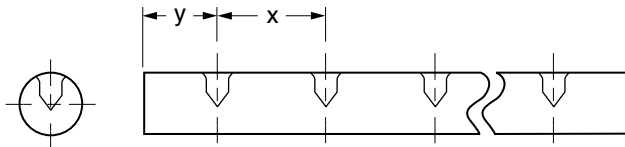


CERAMIC COATED ALUMINUM SOLID SHAFTING

Catalog Number	Nominal Shaft O.D.	Diameter Tolerance		Max. Length ft.	Weight Per Inch lbs.
		Min.	Max.		
BBSHAF-CC03-□□	3/16	.1863	.1871	12	.003
BBSHAF-CC04-□□	1/4	.2488	.2496		.005
BBSHAF-CC06-□□	3/8	.3738	.3746	12	.010
BBSHAF-CC08-□□	1/2	.4988	.4996		.019
BBSHAF-CC10-□□	5/8	.6238	.6246	12	.030
BBSHAF-CC12-□□	3/4	.7488	.7496		.043
BBSHAF-CC16-□□	1	.9988	.9996	12	.077
BBSHAF-CC20-□□	1-1/4	1.2488	1.2496		.120
BBSHAF-CC24-□□	1-1/2	1.4987	1.4995	12	.173
BBSHAF-CC32-□□	2	1.9985	1.9995		.308

Specify length in catalog number using inches.
 Example: for 1/2" shafting total length 36" long = **BBSHAF-CC08-36**.

Ends of cut-to-length shafting are not coated.
 Fully coated shafting is available on special request.



PREDRILLED & TAPPED SHAFTING

Catalog Number	Nominal Shaft O.D.	Diameter Tolerance		Hole Spacing		Thread	Max. Length ft.	Weight Per Inch lbs.
		Min.	Max.	x	y			
BBSHAF-CPDL08-□□	1/2	.4988	.4996	4	2	#6-32	12	.019
BBSHAF-CPDL10-□□	5/8	.6238	.6246	4	2	#8-32		.030
BBSHAF-CPDL12-□□	3/4	.7488	.7496	6	3	#10-32	12	.043
BBSHAF-CPDL16-□□	1	.9988	.9996	6	3	1/4-20		.077
BBSHAF-CPDL20-□□	1-1/4	1.2488	1.2496	6	3	5/16-18	12	.120
BBSHAF-CPDL24-□□	1-1/2	1.4987	1.4995	8	4	3/8-16		.173
BBSHAF-CPDL32-□□	2	1.9985	1.9995	8	4	1/2-13	.308	

Specify length in catalog number using inches.
 Example: for 1/2" shafting total length 36" long = **BBSHAF-CPDL08-36**.

For non-standard lengths, the "y" dimension will be held to one end. It may not be equal at both ends.

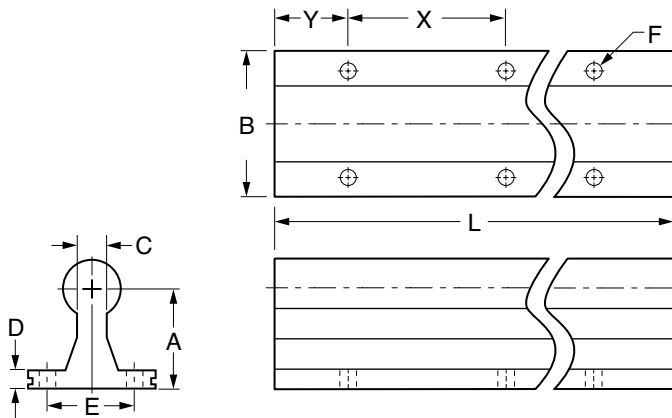
Ends of cut-to-length shafting are not coated.
 Fully coated shafting is available on special request.

Counterbore .063" from top.



NEW Ceramic Coated Aluminum PREDRILLED, ONE-PIECE SUPPORT RAIL

- 6105-T6 Aluminum Base Material
- Rc 70 Ceramic Coated Finish
- One-Piece Integrated Design Eliminates Assembly Time
- Weld Splatter, Paints and Other Contaminants Will Not Stick to the Shaft
- Nonmagnetic and Vibration-Resistant
- Economical, Weight-Saving Alternative to Traditional Steel Shafting



Maximum Rail Length: 4 ft.

Catalog Number	Nom. Shaft Size	Diameter Tolerance		A .002	B	C	D	E	F		Hole Spacing		L Standard Lengths in.	Weight Per Inch lbs.
		Min.	Max.						Bolt	Hole	X	Y		
BBSSUP-CCR08-□□	1/2	.4988	.4996	1.125	1.500	.250	.188	1.000	#6	.169	4	2	12, 24, 36, 48	.019
BBSSUP-CCR10-□□	5/8	.6238	.6246	1.125	1.625	.313	.250	1.125	#8	.193	4	2	12, 24, 36, 48	.030
BBSSUP-CCR12-□□	3/4	.7488	.7496	1.500	1.750	.375	.250	1.250	#10	.221	6	3	12, 24, 36, 48	.043
BBSSUP-CCR16-□□	1	.9988	.9996	1.750	2.125	.500	.250	1.500	1/4	.281	6	3	12, 24, 36, 48	.076
BBSSUP-CCR20-□□	1-1/4	1.2488	1.2496	2.125	2.500	.563	.313	1.875	5/16	.343	6	3	12, 24, 36, 48	.119
BBSSUP-CCR24-□□	1-1/2	1.4987	1.4995	2.500	3.000	.688	.375	2.250	5/16	.343	8	4	24, 48	.172
BBSSUP-CCR32-□□	2	1.9985	1.9995	3.250	3.750	.875	.500	2.750	3/8	.406	8	4	24, 48	.305

Specify length in catalog number using inches.

Example: for 1/2" shafting total length 36" long = **BBSSUP-CCR08-36**.

For nonstandard lengths, specify length in catalog number using inches.

Example: for 1/2" shafting total length 30" long = **BBSSUP-CCR08-30**.

All CCR shafting will be cut with bolt pattern centered to utilize maximum number of standard spacings. For all other lengths, the hole pattern will be centered to maximize the number of holes.

Special cut-to-length rails may not be coated on the ends.

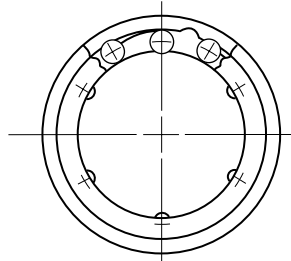
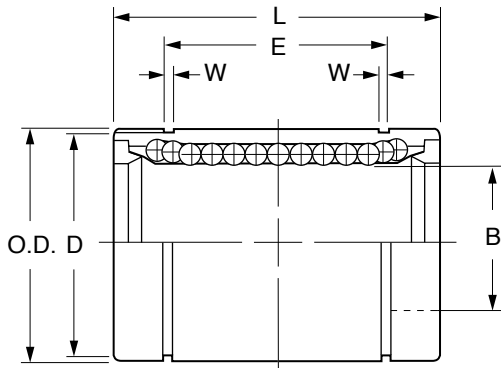


NEW

Resin Retainer

LINEAR BALL BEARINGS-CLOSED TYPE

• AISI 52100 Steel Shell Hardened to Rc 60-64



Catalog Number	Nominal Shaft Dia.	Ball Circuit	B* Bore	O.D.‡	L ^Δ Length	E [§] Groove Distance	W Groove Width	D Groove Dia.	Load Capacity	
									Dynamic lbf	Static lbf
BLXABX-SW4GCS	1/4	3	.2500	.5000	.750	.511	.039	.469	47	60
BLXABX-SW6GCS	3/8	4	.3750	.6250	.875	.636	.039	.588	50	70
BLXABX-SW8GCS	1/2	4	.5000	.8750	1.250	.963	.046	.821	115	176
BLXABX-SW10GCS	5/8	4	.6250	1.1250	1.500	1.104	.056	1.059	175	265
BLXABX-SW12GCS	3/4	5	.7500	1.2500	1.625	1.166	.056	1.176	194	308
BLXABX-SW16GCS	1	5	1.0000	1.5625	2.250	1.755	.068	1.469	220	353
BLXABX-SW20GCS	1-1/4	6	1.1250	2.0000	2.625	2.005	.068	1.886	353	616
BLXABX-SW24GCS	1-1/2	6	1.5000	2.3750	3.000	2.412	.086	2.239	490	905
BLXABX-SW32GCS	2	6	2.0000	3.0000	4.000	3.192	.103	2.838	860	1787

NOTE: To order bearings with seals on both ends, add **WW** to the end of the catalog number.

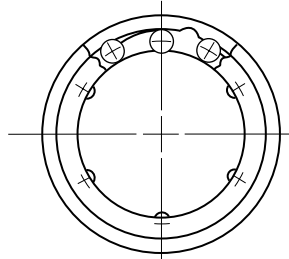
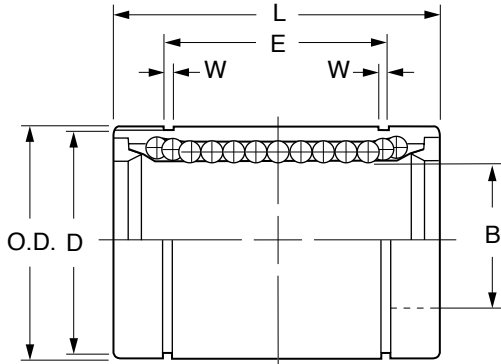
BEARING TOLERANCES

<p>* B Tolerance: .2500, .3750, .5000, .6250, .7500 & 1.0000 +.0000 / - .0004 1.2500, 1.5000 & 2.0000 +.0000 / - .0005</p>	<p>Δ L Tolerance: .750, .875, 1.250, 1.500 & 1.625 +.000 / - .008 2.250, 2.625, 3.000 & 4.000 +.000 / - .012</p>
<p>‡ O.D. Tolerance: .5000 +.0000 / - .00045 .6250, .8750 & 1.1250 +.0000 / - .00050 1.2500 & 1.5625 +.0000 / - .00065 2.0000 & 2.3750 +.0000 / - .00075 3.0000 +.0000 / - .00090</p>	<p>§ E Tolerance: .511, .636, .963, 1.104 & 1.166 +.000 / - .008 1.755, 2.005, 2.412 & 3.192 +.000 / - .012</p>



Steel Retainer LINEAR BALL BEARINGS-CLOSED TYPE

- Steel Shell Hardened to Rc 60-64



Catalog Number	Nominal Shaft Dia.	Ball Circuit	B* Bore	O.D.‡	L ^A Length	E [§] Groove Distance	W Groove Width	D Groove Dia.	Load Capacity	
									Dynamic lbf	Static lbf
BLXABX-SW4CS	1/4	4	.2500	.5000	.750	.511	.039	.469	46	59
BLXABX-SW6CS	3/8		.3750	.6250	.875	.636		.588	50	70
BLXABX-SW8CS	1/2	4	.5000	.8750	1.250	.963	.056	.821	114	176
BLXABX-SW10CS	5/8		.6250	1.1250	1.500	1.104		1.059	174	265
BLXABX-SW12CS	3/4	5	.7500	1.2500	1.625	1.166	.068	1.176	193	308
BLXABX-SW16CS	1		1.0000	1.5625	2.250	1.755		1.469	220	353
BLXABX-SW20CS	1-1/4	6	1.2500	2.0000	2.625	2.005	.068	1.886	353	616
BLXABX-SW24CS	1-1/2		1.5000	2.3750	3.000	2.412		2.239	490	903
BLXABX-SW32CS	2	6	2.0000	3.0000	4.000	3.192	.103	2.838	858	1785
BLXABX-SW40CS	2-1/2		2.5000	3.7500	5.000	3.976		3.552	1056	2248
BLXABX-SW48CS	3	6	3.0000	4.5000	6.000	4.726	.120	4.310	1652	3596
BLXABX-SW64CS	4		4.0000	6.0000	8.000	6.258		5.745	3169	7823

NOTE: 1. To order bearings with seals on both ends, add **WW** to the end of the catalog number.
2. 2-1/2", 3" and 4" sizes are nonseal type only.

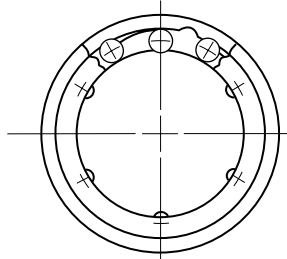
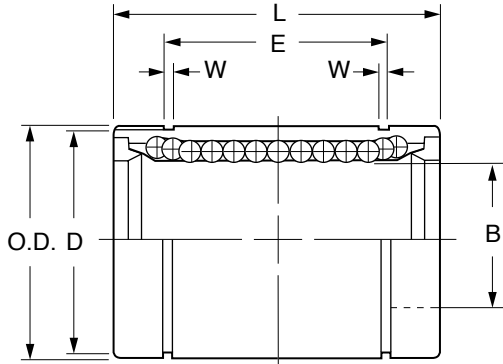
BEARING TOLERANCES

<p>* B Tolerance:</p> <p>.2500, .3750, .5000, .6250, .7500 & 1.0000 +.0000 / - .0004 1.2500, 1.5000 & 2.0000 +.0000 / - .0005 2.5000 & 3.0000 +.0000 / - .0006 4.0000 +.0000 / - .0008</p>	<p>^ L Tolerance: .750, .875, 1.250, 1.500 & 1.625 +.000 / - .008 2.250, 2.625, 3.000, 4.000 & 5.000 +.000 / - .012 6.000 & 8.000 +.000 / - .016</p>
<p>‡ O.D. Tolerance:</p> <p>.5000 +.0000 / - .00045 .6250, .8750 & 1.1250 +.0000 / - .00050 1.2500 & 1.5625 +.0000 / - .00065 2.0000 & 2.3750 +.0000 / - .00075 3.0000, 3.7500 & 4.5000 +.0000 / - .00090 6.0000 +.0000 / - .00100</p>	<p>§ E Tolerance: .511, .636, .963, 1.104 & 1.166 +.000 / - .008 1.755, 2.005, 2.412, 3.192 & 3.976 +.000 / - .012 4.726 & 6.258 +.000 / - .016</p>



Stainless Steel Retainer LINEAR BALL BEARINGS-CLOSED TYPE

- Stainless Steel Shell • Heat-Treated



Catalog Number	Nominal Shaft Dia.	Ball Circuit	B* Bore	O.D.‡	L ^Δ Length	E [§] Groove Distance	W Groove Width	D Groove Dia.	Load Capacity	
									Dynamic lbf	Static lbf
BLSABX-SWS4CS	1/4	4	.2500	.5000	.750	.511	.039	.469	46	60
BLSABX-SWS6CS	3/8	4	.3750	.6250	.875	.636	.039	.588	50	70
BLSABX-SWS8CS	1/2	4	.5000	.8750	1.250	.963	.046	.821	114	176
BLSABX-SWS10CS	5/8	4	.6250	1.1250	1.500	1.104	.056	1.059	174	265
BLSABX-SWS12CS	3/4	5	.7500	1.2500	1.625	1.166	.056	1.176	193	308
BLSABX-SWS16CS	1	6	1.0000	1.5625	2.250	1.755	.068	1.469	220	353
BLSABX-SWS20CS	1-1/4		1.2500	2.0000	2.625	2.005	.068	1.886	353	616
BLSABX-SWS24CS	1-1/2		1.5000	2.3750	3.000	2.412	.086	2.239	490	903
BLSABX-SWS32CS	2		2.0000	3.0000	4.000	3.192	.103	2.838	860	1785

NOTE: To order bearings with seals on both ends, add **WW** to the end of the catalog number.

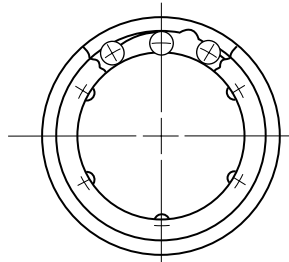
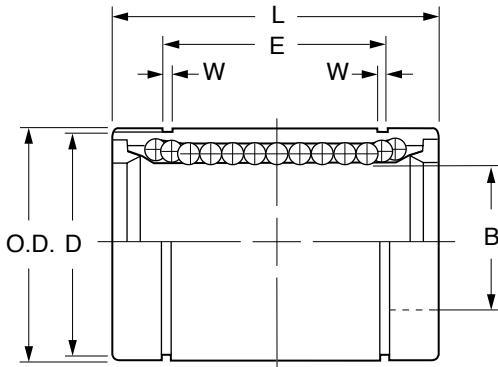
BEARING TOLERANCES

<p>* B Tolerance: .2500, .3750, .5000, .6250, .7500 & 1.0000 +.0000 / -.0004 1.2500, 1.5000 & 2.0000 +.0000 / -.0005</p>	<p>Δ L Tolerance: .750, .875, 1.250, 1.500 & 1.625 +.000 / -.008 2.250, 2.625, 3.000 & 4.000 +.000 / -.012</p>
<p>‡ O.D. Tolerance: .5000 +.0000 / -.00045 .6250, .8750 & 1.1250 +.0000 / -.00050 1.2500 & 1.5625 +.0000 / -.00065 2.0000 & 2.3750 +.0000 / -.00075 3.0000 +.0000 / -.00090</p>	<p>§ E Tolerance: .511, .636, .963, 1.104 & 1.166 +.000 / -.008 1.755, 2.005, 2.412 & 3.192 +.000 / -.012</p>



Resin Retainer LINEAR BALL BEARINGS-CLOSED TYPE

- Stainless Steel Shell • Heat-Treated

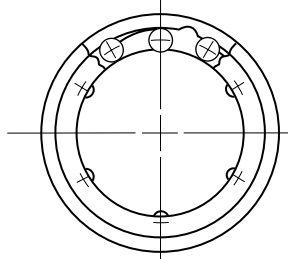
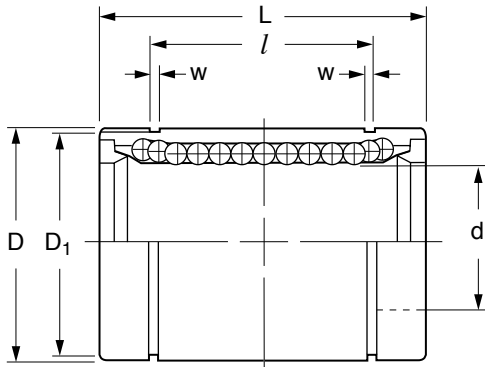


Catalog Number	Nominal Shaft Dia.	Ball Circuit	B* Bore	O.D.†	L ^A Length	E [§] Groove Distance	W Groove Width	D Groove Dia.	Load Capacity	
									Dynamic lbf	Static lbf
BLSABX-SWS4GCS	1/4	4	.2500	.5000	.750	.511	.039	.469	46	59
BLSABX-SWS6GCS	3/8		.3750	.6250	.875	.636		.588	51	70
BLSABX-SWS8GCS	1/2	4	.5000	.8750	1.250	.963	.046	.821	115	176
BLSABX-SWS10GCS	5/8		.6250	1.1250	1.500	1.104	.056	1.059	174	265
BLSABX-SWS12GCS	3/4	5	.7500	1.2500	1.625	1.166	.056	1.176	194	308
BLSABX-SWS16GCS	1		1.0000	1.5625	2.250	1.755	.068	1.469	220	353
BLSABX-SWS20GCS	1-1/4	6	1.1250	2.0000	2.625	2.005	.068	1.886	353	616
BLSABX-SWS24GCS	1-1/2		1.5000	2.3750	3.000	2.412	.086	2.239	490	904
BLSABX-SWS32GCS	2		2.0000	3.0000	4.000	3.192	.103	2.838	859	1785

NOTE: To order bearings with seals on both ends, add **WW** to the end of the catalog number.

BEARING TOLERANCES

<p>* B Tolerance: .2500, .3750, .5000, .6250, .7500 & 1.0000 +.0000 / - .0004 1.2500, 1.5000 & 2.0000 +.0000 / - .0005</p>	<p>† L Tolerance: .750, .875, 1.250, 1.500 & 1.625 +.000 / - .008 2.250, 2.625, 3.000 & 4.000 +.000 / - .012</p>
<p>‡ O.D. Tolerance: .5000 +.0000 / - .00045 .6250, .8750 & 1.1250 +.0000 / - .00050 1.2500 & 1.5625 +.0000 / - .00065 2.0000 & 2.3750 +.0000 / - .00075 3.0000 +.0000 / - .00090</p>	<p>§ E Tolerance: .511, .636, .963, 1.104 & 1.166 +.000 / - .008 1.755, 2.005, 2.412 & 3.192 +.000 / - .012</p>



Catalog Number	Ball Circuit	d* Bore	D ^Δ Outside Dia.	L** Length	l Groove Distance	w Groove Width	D ₁ Groove Dia.	Load Capacity	
								Dynamic N	Static N
BLXABXMSM3G	4	3	7	10	—	—	—	69	105
BLXABXMSM4G		4	8	12	—	—	—	88	127
BLXABXMSM5G		5	10	15	10.2	1.1	9.6	167	206
BLXABXMSM6G	4	6	12	19	13.5	1.1	11.5	206	265
BLXABXMSM8SG		8	15	17	11.5		14.3	176	216
BLXABXMSM8G		8	15	24	17.5		14.3	274	392
BLXABXMSM10G	4	10	19	29	22	1.3	18	372	549
BLXABXMSM12G		12	21	30	23		20	510	784
BLXABXMSM13G		13	23	32	23		22	510	784
BLXABXMSM16G	4	16	28	37	26.5	1.6	27	774	1180
BLXABXMSM20G	5	20	32	42	30.5	1.6	30.5	882	1370
BLXABXMSM25G	6	25	40	59	41	1.85	38	980	1570
BLXABXMSM30G	6	30	45	64	44.5	1.85	43	1570	2740
BLXABXMSM35G		35	52	70	49.5	2.1	49	1670	3140
BLXABXMSM40G		40	60	80	60.5	2.1	57	2160	4020
BLXABXMSM50G	6	50	80	100	74	2.6	76.5	3820	7940
BLXABXMSM60G		60	90	110	85	3.15	86.5	4700	10000
BLXABXMSM80G		80	120	140	105.5	4.15	116	7350	16000

NOTES: 1. To order bearings with seals on both ends, add **WW** to the end of the catalog number.
2. 3 mm and 4 mm sizes are nonseal type only.

BEARING TOLERANCES

*d Tolerance:	3, 4 & 5 mm	-0.008	**L Tolerance:	10, 12 & 15 mm	-0.12
	6 to 16 mm	-0.009		19 to 42 mm	-0.2
	20, 25 & 30 mm	-0.010		59 to 110 mm	-0.3
	35, 40 & 50 mm	-0.012		140 mm	-0.4
	60 & 80 mm	-0.015			
ΔD Tolerance:	7, 8 & 10 mm	-0.009			
	12 & 15 mm	-0.011			
	19 to 28 mm	-0.013			
	32, 40 & 45 mm	-0.016			
	52, 60 & 80 mm	-0.019			
	90 & 120 mm	-0.022			

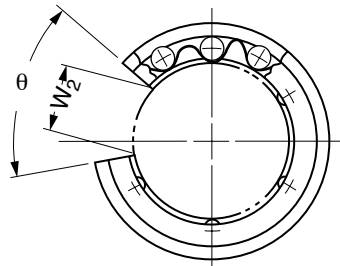
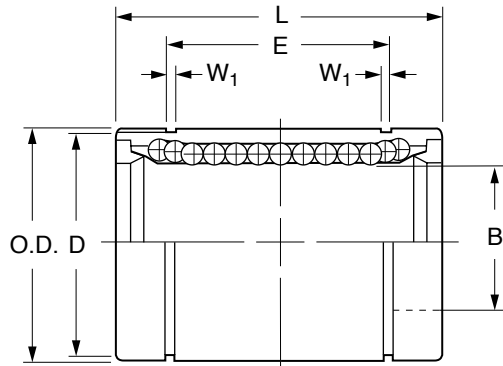


NEW

Resin Retainer

LINEAR BALL BEARINGS-OPEN TYPE

• AISI 52100 Steel Shell Hardened to Rc 60-64



Catalog Number	Nominal Shaft Dia.	Ball Circuit	B* Bore	O.D.‡	L ^A Length	E [§] Groove Distance	W ₁ Groove Width	D Groove Dia.	W ₂ Slot Width	θ Slot Angle	Load Capacity	
											Dynamic lbf	Static lbf
BLXABX-SW8GOS	1/2	3	.5000	.8750	1.250	.963	.046	.821	.340	80°	115	176
BLXABX-SW10GOS	5/8	3	.6250	1.1250	1.500	1.104	.056	1.059	.375	80°	174	265
BLXABX-SW12GOS	3/4	4	.7500	1.2500	1.625	1.166	.056	1.176	.4375	60°	194	308
BLXABX-SW16GOS	1	5	1.0000	1.5625	2.250	1.755	.068	1.469	.5625	50°	220	353
BLXABX-SW20GOS	1-1/4	5	1.2500	2.0000	2.625	2.005	.068	1.886	.625	50°	353	616
BLXABX-SW24GOS	1-1/2	5	1.5000	2.3750	3.000	2.412	.086	2.239	.750	50°	490	904
BLXABX-SW32GOS	2	5	2.0000	3.0000	4.000	3.192	.103	2.838	1.000	50°	859	1785

NOTE: To order bearings with seals on both ends, add **WW** to the end of the catalog number.

BEARING TOLERANCES

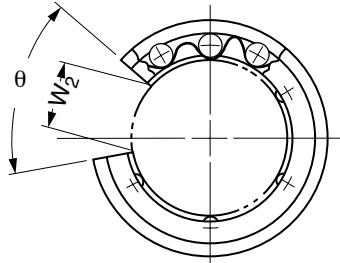
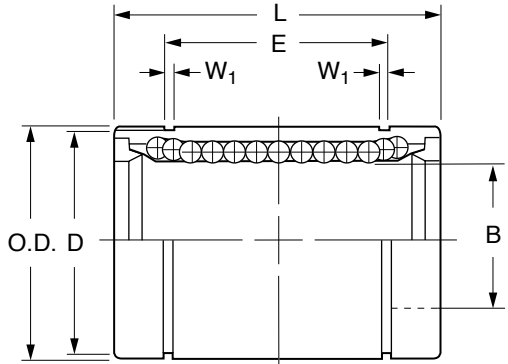
* B Tolerance:	.5000, .6250, .7500 & 1.0000 +.0000 / - .0004 1.2500, 1.5000 & 2.0000 +.0000 / - .0005
‡ O.D. Tolerance:	.8750 & 1.1250 +.0000 / - .00050 1.2500 & 1.5620 +.0000 / - .00065 2.0000 & 2.3750 +.0000 / - .00075 3.0000 +.0000 / - .00090

^A L Tolerance:	1.250, 1.500 & 1.625 +.000 / - .008 2.250, 2.625, 3.000 & 4.000 +.000 / - .012
[§] E Tolerance:	.963, 1.104 & 1.166 +.000 / - .008 1.755, 2.005, 2.412 & 3.192 +.000 / - .012



Steel Retainer LINEAR BALL BEARINGS-OPEN TYPE

- Steel Shell Hardened to Rc 60-64



Catalog Number	Nominal Shaft Dia.	Ball Circuit	B* Bore	O.D.†	L ^Δ Length	E [§] Groove Distance	W ₁ Groove Width	D Groove Dia.	W ₂ Slot Width	θ Slot Angle	Load Capacity	
											Dynamic lbf	Static lbf
BLXABX-SW8OS	1/2	3	.5000	.8750	1.250	.963	.046	.821	.340	80°	115	176
BLXABX-SW10OS	5/8	3	.6250	1.1250	1.500	1.104	.056	1.059	.375	80°	174	265
BLXABX-SW12OS	3/4	4	.7500	1.2500	1.625	1.166	.056	1.176	.4375	60°	194	308
BLXABX-SW16OS	1	4	1.0000	1.5625	2.250	1.755	.068	1.469	.5625	60°	220	353
BLXABX-SW20OS	1-1/4	5	1.2500	2.0000	2.625	2.005	.068	1.886	.625	50°	353	616
BLXABX-SW24OS	1-1/2	5	1.5000	2.3750	3.000	2.412	.086	2.239	.750	50°	490	904
BLXABX-SW32OS	2	5	2.0000	3.0000	4.000	3.192	.103	2.838	1.000	50°	859	1785
BLXABX-SW40OS	2-1/2	5	2.5000	3.7500	5.000	3.976	.120	3.552	1.250	50°	1057	2248
BLXABX-SW48OS	3	5	3.0000	4.5000	6.000	4.726	.120	4.310	1.500	50°	1653	3597
BLXABX-SW64OS	4	5	4.0000	6.0000	8.000	6.258	.139	5.745	2.000	50°	3169	7823

NOTES: 1. To order bearings with seals on both ends, add **WW** to the end of the catalog number.
2. 2-1/2", 3" and 4" sizes are nonseal type only.

BEARING TOLERANCES

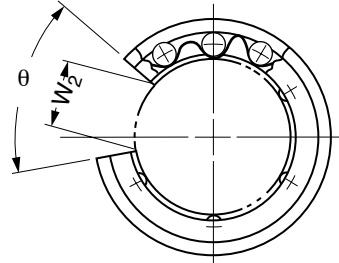
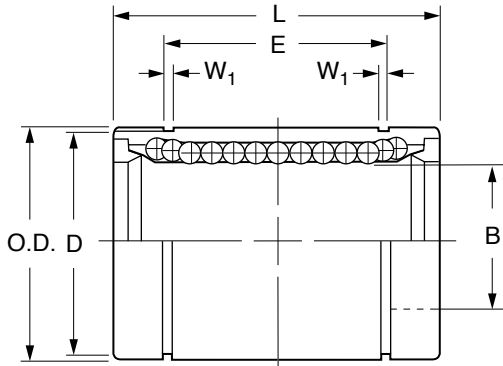
* B Tolerance:	.5000, .6250, .7500 & 1.0000 +.0000 / -.0004 1.2500, 1.5000 & 2.0000 +.0000 / -.0005 2.5000 & 3.0000 +.0000 / -.0006 4.0000 +.0000 / -.0008
† O.D. Tolerance:	.8750 & 1.1250 +.0000 / -.00050 1.2500 & 1.5620 +.0000 / -.00065 2.0000 & 2.3750 +.0000 / -.00075 3.0000, 3.7500, & 4.5000 +.0000 / -.00090 6.0000 +.0000 / -.00100

Δ L Tolerance:	1.250, 1.500 & 1.625 +.000 / -.008 2.250, 2.625, 3.000, 4.000 & 5.000 +.000 / -.012 6.000 & 8.000 +.000 / -.016
§ E Tolerance:	.963, 1.104 & 1.166 +.000 / -.008 1.755, 2.005, 2.412, 3.192 & 3.976 +.000 / -.012 4.726 & 6.258 +.000 / -.016



Stainless Steel Retainer LINEAR BALL BEARINGS-OPEN TYPE

- Stainless Steel Shell • Heat-Treated



Catalog Number	Nominal Shaft Dia.	Ball Circuit	B* Bore	O.D.‡	L ^A Length	E [§] Groove Distance	W ₁ Groove Width	D Groove Dia.	W ₂ Slot Width	θ Slot Angle	Load Capacity	
											Dynamic lbf	Static lbf
BLSABX-SWS8OS	1/2	3	.5000	.8750	1.250	.963	.046	.821	.340	80°	115	176
BLSABX-SWS10OS	5/8	3	.6250	1.1250	1.500	1.104	.056	1.059	.375	80°	174	265
BLSABX-SWS12OS	3/4	4	.7500	1.2500	1.625	1.166	.056	1.176	.4375	60°	194	308
BLSABX-SWS16OS	1	5	1.0000	1.5625	2.250	1.755	.068	1.469	.5625	50°	220	353
BLSABX-SWS20OS	1-1/4	5	1.2500	2.0000	2.625	2.005	.068	1.886	.625	50°	353	616
BLSABX-SWS24OS	1-1/2	5	1.5000	2.3750	3.000	2.412	.086	2.239	.750	50°	490	904
BLSABX-SWS32OS	2	5	2.0000	3.0000	4.000	3.192	.103	2.838	1.000	50°	859	1785

NOTE: To order bearings with seals on both ends, add **WW** to the end of the catalog number.

BEARING TOLERANCES

* B Tolerance:	.5000, .6250, .7500 & 1.0000 +.0000 / -.0004 1.2500, 1.5000 & 2.0000 +.0000 / -.0005
‡ O.D. Tolerance:	.8750 & 1.1250 +.0000 / -.00050 1.2500 & 1.5620 +.0000 / -.00065 2.0000 & 2.3750 +.0000 / -.00075 3.0000 +.0000 / -.00090

^A L Tolerance:	1.250, 1.500 & 1.625 +.000 / -.008 2.250, 2.625, 3.000 & 4.000 +.000 / -.012
[§] E Tolerance:	.963, 1.104 & 1.166 +.000 / -.008 1.755, 2.005, 2.412 & 3.192 +.000 / -.012

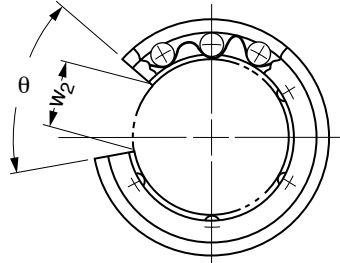
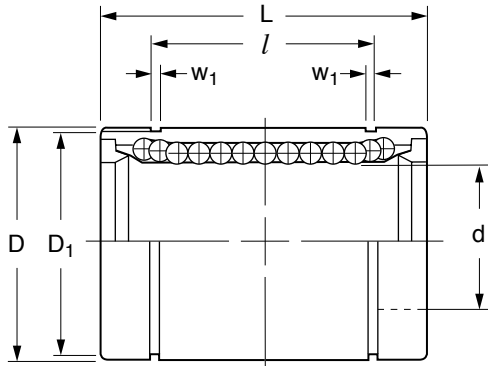


NEW

Resin Retainer | Sealed

LINEAR BALL BEARINGS-OPEN TYPE

- AISI 52100 Steel Shell Hardened to HRC 60-64
- Seals on Both Ends



Catalog Number	Ball Circuit	d* Bore	D ^Δ Outside Dia.	L** Length	l Groove Distance	w ₁ Groove Width	D ₁ Groove Dia.	w ₂ Slot Width	θ Slot Angle	Load Capacity	
										Dynamic N	Static N
BLXABXMSM10GOPWW	3	10	19	29	22	1.3	18	6.8	80°	372	549
BLXABXMSM12GOPWW		12	21	30	23		20	8		510	784
BLXABXMSM13GOPWW		13	23	32	23		22	9		510	784
BLXABXMSM16GOPWW	3	16	28	37	26.5	1.6	27	11	80°	774	1180
BLXABXMSM20GOPWW	4	20	32	42	30.5	1.6	30.5	11	60°	882	1370
BLXABXMSM25GOPWW	5	25	40	59	41	1.85	38	12	50°	980	1570
BLXABXMSM30GOPWW	5	30	45	64	44.5	1.85	43	15	50°	1570	2740
BLXABXMSM35GOPWW		35	52	70	49.5	2.1	49	17		1670	3140
BLXABXMSM40GOPWW		40	60	80	60.5	2.1	57	20		2160	4020
BLXABXMSM50GOPWW	5	50	80	100	74	2.6	76.5	25	50°	3820	7940
BLXABXMSM60GOPWW		60	90	110	85	3.15	86.5	30		4700	10000
BLXABXMSM80GOPWW		80	120	140	105.5	4.15	116	40		7350	16000

NOTE: Seals are not removable.

BEARING TOLERANCES

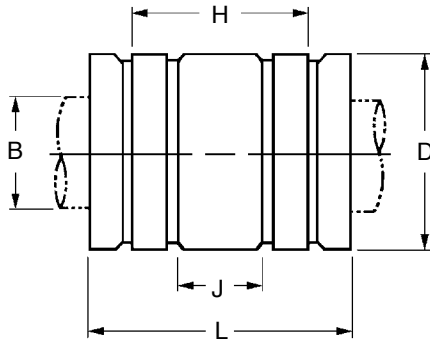
*d Tolerance:	10, 12, 13 & 16 mm -0.009 20, 25 & 30 mm -0.010 35, 40 & 50 mm -0.012 60 & 80 mm -0.015
^ΔD Tolerance:	19, 21, 23 & 28 mm -0.013 32, 40 & 45 mm -0.016 52, 60 & 80 mm -0.019 90 & 120 mm -0.022

**L Tolerance:	29 to 42 mm -0.2 59 to 110 mm -0.3 140 mm -0.4
-----------------------	--



Frelon® Lined | Precision Series LINEAR BEARINGS-CLOSED TYPE

• Self-Lubricated • Anodized Aluminum • Bonded Frelon® Liner



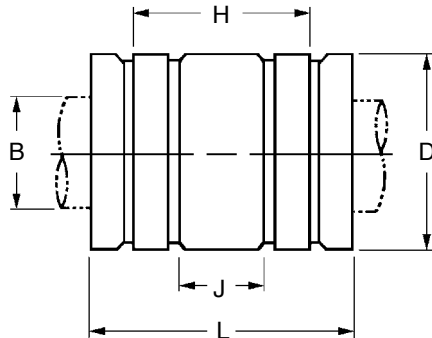
Catalog Number	Nominal I.D.	B Bearing I.D.		D Bearing O.D.		L* Length	H Retaining Ring Spacing	J O-Ring Spacing	Max. Load lbs.
		Min.	Max.	Min.	Max.				
BLAABX-FLX03CP	3/16	.1877	.1884	.3740	.3750	.562	.375	—	110
BLAABX-FLX04CP	1/4	.2502	.2511	.4990	.5000	.750	.437	.125	300
BLAABX-FLX06CP	3/8	.3752	.3761	.6240	.6250	.875	.562	.187	510
BLAABX-FLX08CP	1/2	.5002	.5013	.8740	.8750	1.250	.875	.250	975
BLAABX-FLX10CP	5/8	.6252	.6263	1.1240	1.1250	1.500	1.000	.312	1470
BLAABX-FLX12CP	3/4	.7503	.7516	1.2490	1.2500	1.625	1.062	.312	1905
BLAABX-FLX16CP	1	1.0003	1.0016	1.5613	1.5625	2.250	1.625	.500	3525
BLAABX-FLX20CP	1-1/4	1.2504	1.2519	1.9988	2.0000	2.625	1.875	.625	5145
BLAABX-FLX24CP	1-1/2	1.5004	1.5019	2.3738	2.3750	3.000	2.250	.750	7050
BLAABX-FLX32CP	2	2.0004	2.0022	2.9986	3.0000	4.000	3.000	1.000	12525
BLAABX-FLX40CP	2-1/2	2.5004	2.5022	3.7484	3.7500	5.000	3.750	1.250	19500
BLAABX-FLX48CP	3	3.0004	3.0022	4.4980	4.5000	6.000	4.500	1.500	28200
BLAABX-FLX64CP	4	4.0005	4.0026	5.9980	6.0000	8.000	6.000	2.000	50250

*L Tolerance:	.562 to 2.250	-.015
	2.625 to 4.000	-.020
	5.000	-.025
	6.000	-.030
	8.000	-.040



Frelon® Lined | Compensated I.D. Series LINEAR BEARINGS-CLOSED TYPE

- Self-Lubricated • Anodized Aluminum • Bonded Frelon® Liner



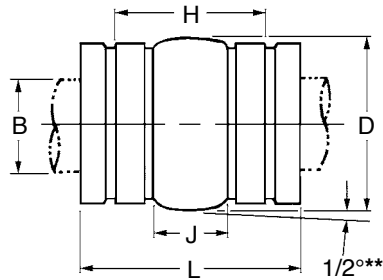
Catalog Number	Nominal I.D.	B Bearing I.D.		D Bearing O.D.		L* Length	H Retaining Ring Spacing	J O-Ring Spacing	Max. Load lbs.
		Min.	Max.	Min.	Max.				
BLAABX-FLC03CS	3/16	.1897	.1904	.3740	.3750	.562	.375	—	110
BLAABX-FLC04CS	1/4	.2522	.2531	.4990	.5000	.750	.437	.125	300
BLAABX-FLC06CS	3/8	.3772	.3781	.6240	.6250	.875	.562	.187	510
BLAABX-FLC08CS	1/2	.5022	.5033	.8740	.8750	1.250	.875	.250	975
BLAABX-FLC10CS	5/8	.6272	.6283	1.1240	1.1250	1.500	1.000	.312	1470
BLAABX-FLC12CS	3/4	.7533	.7546	1.2490	1.2500	1.625	1.062	.312	1905
BLAABX-FLC16CS	1	1.0033	1.0046	1.5613	1.5625	2.250	1.625	.500	3525
BLAABX-FLC20CS	1-1/4	1.2544	1.2559	1.9988	2.0000	2.625	1.875	.625	5145
BLAABX-FLC24CS	1-1/2	1.5044	1.5059	2.3738	2.3750	3.000	2.250	.750	7050
BLAABX-FLC32CS	2	2.0054	2.0072	2.9986	3.0000	4.000	3.000	1.000	12525
BLAABX-FLC40CS	2-1/2	2.5054	2.5072	3.7484	3.7500	5.000	3.750	1.250	19500
BLAABX-FLC48CS	3	3.0064	3.0082	4.4980	4.5000	6.000	4.500	1.500	28200
BLAABX-FLC64CS	4	4.0065	4.0086	5.9980	6.0000	8.000	6.000	2.000	50250

*L Tolerance:	.562 to 2.250	-.015
	2.625 to 4.000	-.020
	5.000	-.025
	6.000	-.030
	8.000	-.040



Frelon® Lined | Self-Aligning O.D. LINEAR BEARINGS-CLOSED TYPE

- Self-Lubricated • Anodized Aluminum
- Bonded Frelon® Liner



Catalog Number	Nominal I.D.	B Bearing I.D.		D Bearing O.D.		L* Length	H Retaining Ring Spacing	J O-Ring Spacing	Max. Load lbs.
		Min.	Max.	Min.	Max.				
BLAABX-FLA04CS	1/4	.2502	.2511	.4975	.4985	.750	.437	.125	300
BLAABX-FLA06CS	3/8	.3752	.3761	.6225	.6235	.875	.562	.187	510
BLAABX-FLA08CS	1/2	.5002	.5013	.8725	.8735	1.250	.875	.250	975
BLAABX-FLA10CS	5/8	.6252	.6263	1.1225	1.1235	1.500	1.000	.312	1470
BLAABX-FLA12CS	3/4	.7503	.7516	1.2475	1.2485	1.625	1.062	.312	1905
BLAABX-FLA16CS	1	1.0033	1.0016	1.5599	1.5609	2.250	1.625	.500	3525
BLAABX-FLA20CS	1-1/4	1.2504	1.2519	1.9974	1.9984	2.625	1.875	.625	5145
BLAABX-FLA24CS	1-1/2	1.5004	1.5019	2.3724	2.3734	3.000	2.250	.750	7050
BLAABX-FLA32CS	2	2.0004	2.0022	2.9614	2.9586	4.000	3.000	1.000	12525
BLAABX-FLA40CS	2-1/2	2.5004	2.5022	3.7472	3.7482	5.000	3.750	1.250	19500
BLAABX-FLA48CS	3	3.0004	3.0022	4.4970	4.4980	6.000	4.500	1.500	28200
BLAABX-FLA64CS	4	4.0005	4.0026	5.9970	5.9980	8.000	6.000	2.000	50250

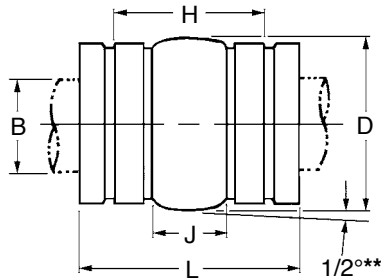
**Allows 1/2° of misalignment capability from centerline (1° overall).

*L Tolerance:	.750 to 2.250	-.015
	2.625 to 4.000	-.020
	5.000	-.025
	6.000	-.030
	8.000	-.040



Frelon® Lined | Self-Aligning O.D | Compensated I.D. LINEAR BEARINGS-CLOSED TYPE

- Self-Lubricated
- Anodized Aluminum
- Bonded Frelon® Liner
- Compensated Series



Catalog Number	Nominal I.D.	B Bearing I.D.		D Bearing O.D.		L* Length	H Retaining Ring Spacing	J O-Ring Spacing	Max. Load lbs.
		Min.	Max.	Min.	Max.				
BLAABX-FLAC04CS	1/4	.2522	.2531	.4975	.4985	.750	.437	.125	300
BLAABX-FLAC06CS	3/8	.3772	.3781	.6225	.6235	.875	.562	.187	510
BLAABX-FLAC08CS	1/2	.5022	.5033	.8725	.8735	1.250	.875	.250	975
BLAABX-FLAC10CS	5/8	.6272	.6283	1.1225	1.1235	1.500	1.000	.312	1470
BLAABX-FLAC12CS	3/4	.7533	.7546	1.2475	1.2485	1.625	1.062	.312	1905
BLAABX-FLAC16CS	1	1.0033	1.0046	1.5599	1.5609	2.250	1.625	.500	3525
BLAABX-FLAC20CS	1-1/4	1.2544	1.2559	1.9974	1.9984	2.625	1.875	.625	5145
BLAABX-FLAC24CS	1-1/2	1.5044	1.5059	2.3724	2.3734	3.000	2.250	.750	7050
BLAABX-FLAC32CS	2	2.0054	2.0072	2.9614	2.9586	4.000	3.000	1.000	12525
BLAABX-FLAC40CS	2-1/2	2.5054	2.5072	3.7472	3.7482	5.000	3.750	1.250	19500
BLAABX-FLAC48CS	3	3.0064	3.0082	4.4970	4.4980	6.000	4.500	1.500	28200
BLAABX-FLAC64CS	4	4.0065	4.0086	5.9970	5.9980	8.000	6.000	2.000	50250

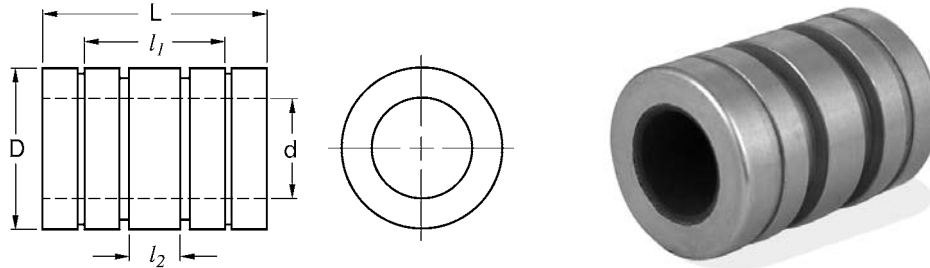
**Allows 1/2° of misalignment capability from centerline (1° overall).

*L Tolerance:	.750 to 2.250	-.015
	2.625 to 4.000	-.020
	5.000	-.025
	6.000	-.030
	8.000	-.040



Frelon® Lined | Precision I.D. Series LINEAR BEARINGS-CLOSED TYPE

- Self-Lubricating • Bonded Frelon® • Anodized Aluminum



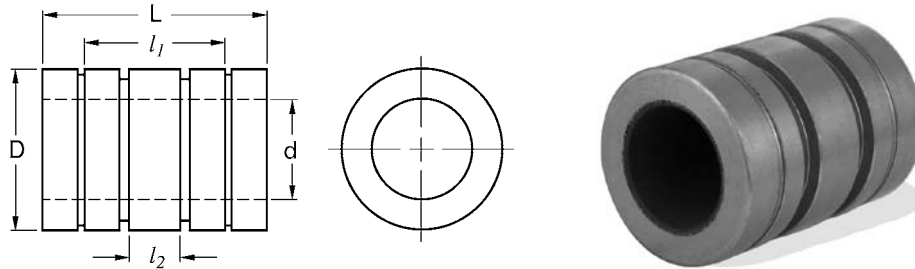
Catalog Number	d Bearing I.D.		D Bearing O.D.		L ^A	l ₁ Retaining Space	l ₂ O-Ring Spacing	Max. Load N
	Min.	Max.	Min.	Max.				
BLAUBXMFC05CP	5.010	5.028	11.982	12.000	22	12	5	2275
BLAUBXMFC08CP	8.013	8.035	15.982	16.000	25	14	5.33	4119
BLAUBXMFC10CP	10.013	10.035	18.979	19.000	29	19.4	5.63	5982
BLAUBXMFC12CP	12.016	12.043	21.979	22.000	32	20	6	7904
BLAUBXMFC16CP	16.016	16.043	25.979	26.000	36	22	8	11866
BLAUBXMFC20CP	20.020	20.053	31.975	32.000	45	28	10	18535
BLAUBXMFC25CP	25.020	25.053	39.975	40.000	58	40	12.5	29871
BLAUBXMFC30CP	30.020	30.053	46.975	47.000	68	48	15	42012
BLAUBXMFC40CP	40.025	40.064	61.970	62.000	80	56	20	65901
BLAUBXMFC50CP	50.025	50.064	74.970	75.000	100	72	25	102970
BLAUBXMFC60CP	60.030	60.076	89.965	90.000	125	95	30	154455
BLAUBXMFC80CP	80.030	80.076	119.965	120.000	165	125	40	271840

^AL Tolerance : 22 to 100 mm -0.254
125 & 165 mm -0.508



Frelon® Lined | Compensated I.D. Series LINEAR BEARINGS-CLOSED TYPE

- Self-Lubricating • Bonded Frelon® • Anodized Aluminum



Catalog Number	d Bearing I.D.		D Bearing O.D.		L ^A	l ₁ Retaining Space	l ₂ O-Ring Spacing	Max Load N
	Min.	Max.	Min.	Max.				
BLAUBXMFC05CS	5.060	5.078	11.982	12.000	22	12	5	2275
BLAUBXMFC08CS	8.063	8.085	15.982	16.000	25	14	5.33	4119
BLAUBXMFC10CS	10.063	10.085	18.979	19.000	29	19.4	5.63	5982
BLAUBXMFC12CS	12.066	12.093	21.979	22.000	32	20	6	7904
BLAUBXMFC16CS	16.066	16.093	25.979	26.000	36	22	8	11866
BLAUBXMFC20CS	20.096	20.129	31.975	32.000	45	28	10	18535
BLAUBXMFC25CS	25.096	25.129	39.975	40.000	58	40	12.5	29871
BLAUBXMFC30CS	30.096	30.129	46.975	47.000	68	48	15	42012
BLAUBXMFC40CS	40.127	40.166	61.970	62.000	80	56	20	65901
BLAUBXMFC50CS	50.127	50.166	74.970	75.000	100	72	25	102970
BLAUBXMFC60CS	60.182	60.228	89.965	90.000	125	95	30	154455
BLAUBXMFC80CS	80.128	80.228	119.965	120.000	165	125	40	271840

^AL Tolerance : 22 to 100 mm -0.254
125 & 165 mm -0.508

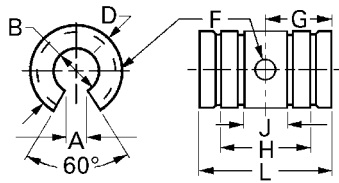


FIGURE 1

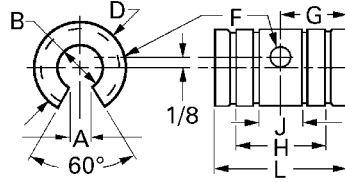


FIGURE 2

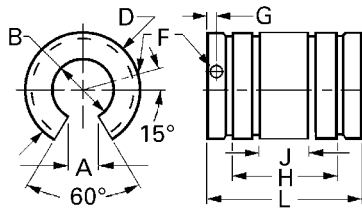


FIGURE 3

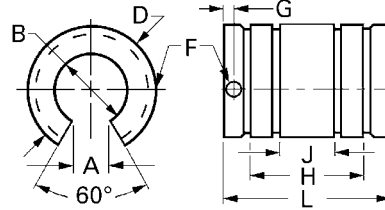


FIGURE 4



Catalog Number	Fig. No.	Nominal I.D.	B Bearing I.D.		D Bearing O.D.		L* Length	A Slot Width (min.)	F Retention Hole		H Retaining Ring Spacing	J O-Ring Spacing	Max. Load lbs.
			Min.	Max.	Min.	Max.			Dia.	G			
BLAABX-FLN03OP	1	3/16	.1877	.1884	.3740	.3750	.562	.125	.094	9/32	.375	—	110
BLAABX-FLN04OP		1/4	.2502	.2511	.4990	.5000	.750	.188		3/8	.437	.125	300
BLAABX-FLN06OP		3/8	.3752	.3761	.6240	.6250	.875	.250		7/16	.562	.187	510
BLAABX-FLN08OP	2	1/2	.5002	.5013	.8740	.8750	1.250	.312	.136	5/8	.875	.250	975
BLAABX-FLN10OP	3	5/8	.6252	.6263	1.1240	1.1250	1.500	.375		1/8	1.000	.312	1470
BLAABX-FLN12OP	4	3/4	.7503	.7516	1.2490	1.2500	1.625	.437		1/8	1.062	.312	1905
BLAABX-FLN16OP	4	1	1.0003	1.0016	1.5613	1.5625	2.250	.562		1/8	1.625	.500	3525
BLAABX-FLN20OP		1-1/4	1.2504	1.2519	1.9988	2.0000	2.625	.625	3/16	1.875	.625	5145	
BLAABX-FLN24OP		1-1/2	1.5004	1.5019	2.3738	2.3750	3.000	.750	3/16	2.250	.750	7050	
BLAABX-FLN32OP	4	2	2.0004	2.0022	2.9986	3.0000	4.000	1.000	.265	5/16	3.000	1.000	12525
BLAABX-FLN40OP		2-1/2	2.5004	2.5022	3.7484	3.7500	5.000	1.250			3.750	1.250	19500
BLAABX-FLN48OP		3	3.0004	3.0022	4.4980	4.5000	6.000	1.500			4.500	1.500	28200
BLAABX-FLN64OP		4	4.0005	4.0026	5.9980	6.0000	8.000	2.000			6.000	2.000	50250

*L Tolerance:	.562 to 2.250	-.015
	2.625 to 4.000	-.020
	5.000	-.025
	6.000	-.030
	8.000	-.040

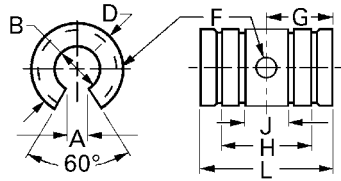


FIGURE 1

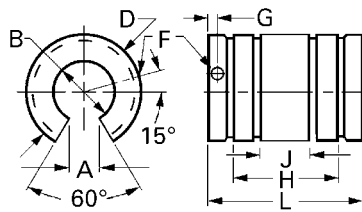


FIGURE 2

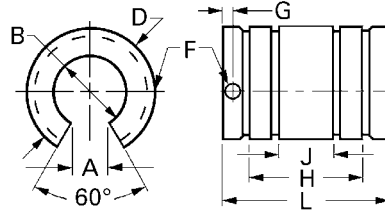
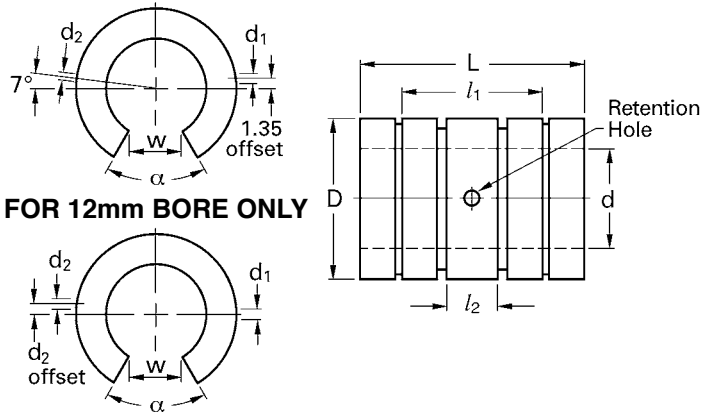


FIGURE 3



Catalog Number	Fig. No.	Nominal I.D.	B Bearing I.D.		D Bearing O.D.		L* Length	A Slot Width (min.)	F Retention Hole		H Retaining Ring Spacing	J O-Ring Spacing	Max. Load lbs.
			Min.	Max.	Min.	Max.			Dia.	G			
BLAABX-LCN08OS	1	1/2	.5022	.5033	.8740	.8750	1.250	.312		5/8	.875	.250	975
BLAABX-LCN10OS	2	5/8	.6272	.6283	1.1240	1.1250	1.500	.375	.136	1/8	1.000	.312	1470
BLAABX-LCN12OS	3	3/4	.7533	.7546	1.2490	1.2500	1.625	.437		1/8	1.062	.312	1905
BLAABX-LCN16OS	3	1	1.0033	1.0046	1.5613	1.5625	2.250	.562	.136	1/8	1.625	.500	3525
BLAABX-LCN20OS		1-1/4	1.2544	1.2559	1.9988	2.0000	2.625	.625	.201	3/16	1.875	.625	5145
BLAABX-LCN24OS		1-1/2	1.5044	1.5059	2.3738	2.3750	3.000	.750	.201	3/16	2.250	.750	7050
BLAABX-LCN32OS	3	2	2.0054	2.0072	2.9986	3.0000	4.000	1.000	.265	5/16	3.000	1.000	12525
BLAABX-LCN40OS		2-1/2	2.5054	2.5072	3.7484	3.7500	5.000	1.250			3.750	1.250	19500
BLAABX-LCN48OS		3	3.0064	3.0082	4.4980	4.5000	6.000	1.500			4.500	1.500	28200
BLAABX-LCN64OS		4	4.0065	4.0086	5.9980	6.0000	8.000	2.000			6.000	2.000	50250

*L Tolerance:	1.250 to 2.250	-.015
	2.625 to 4.000	-.020
	5.000	-.025
	6.000	-.030
	8.000	-.040



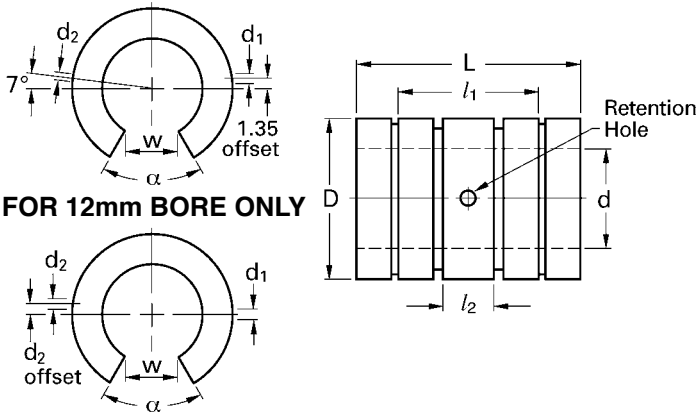
FOR 12mm BORE ONLY

FOR ALL OTHER BORES



Catalog Number	d Bearing I.D.		D Bearing O.D.		L ^Δ	l ₁ Retaining Ring Space	l ₂ O-Ring Spacing	w Slot Width	α Slot Angle	Retention Hole			Max Load N
	Min.	Max.	Min.	Max.						d ₁	d ₂	d ₂ Offset	
BLAUBXMFMN05OP	5.010	5.028	11.982	12.000	22	12	5	3.2		2.2			2275
BLAUBXMFMN08OP	8.013	8.035	15.982	16.000	25	14	5.33	5.1	60°	3	—	—	4119
BLAUBXMFMN10OP	10.013	10.035	18.979	19.000	29	19.4	5.63	6.4		3			5982
BLAUBXMFMN12OP	12.016	12.043	21.979	22.000	32	20	6	7.6	78°	3		7°	7904
BLAUBXMFMN16OP	16.016	16.043	25.979	26.000	36	22	8	10.4	78°	2.2	3	0	11866
BLAUBXMFMN20OP	20.020	20.053	31.975	32.000	45	28	10	10.8	60°	2.2		0	18535
BLAUBXMFMN25OP	25.020	30.053	39.975	40.000	58	40	12.5	13.2	60°			-1.51	29871
BLAUBXMFMN30OP	30.020	25.053	46.975	47.000	68	48	15	14.2	72°	3	3	2	42012
BLAUBXMFMN40OP	40.025	40.064	61.970	62.000	80	56	20	19.5	72°			1.5	65901
BLAUBXMFMN50OP	50.025	50.064	74.970	75.000	100	72	25	24		3	5	2.5	102970
BLAUBXMFMN60OP	60.030	60.076	89.965	90.000	125	95	30	29.6	72°	—	6	0	154455
BLAUBXMFMN80OP	80.030	80.076	119.965	120.000	165	125	40	39		—	8	0	271840

^ΔL Tolerance : 22 to 100 mm -0.254
125 & 165 mm -0.508



FOR 12mm BORE ONLY

FOR ALL OTHER BORES



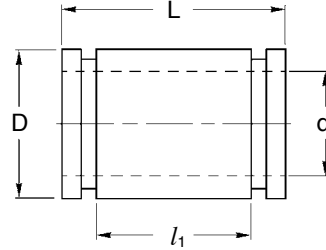
Catalog Number	d Bearing I.D.		D Bearing O.D.		L ^Δ	l ₁ Retaining Ring Space	l ₂ O-Ring Spacing	W Slot Width	α Slot Angle	Retention Hole			Max Load N
	Min.	Max.	Min.	Max.						d ₁	d ₂	d ₂ Offset	
BLAUBXMFMN05OS	5.060	5.078	11.982	12.000	22	12	5	3.2		2.2	—	—	2275
BLAUBXMFMN08OS	8.063	8.085	15.982	16.000	25	14	5.33	5.1	60°	3	—	—	4119
BLAUBXMFMN10OS	10.063	10.085	18.979	19.000	29	19.4	5.63	6.4		3			5982
BLAUBXMFMN12OS	12.066	12.093	21.979	22.000	32	20	6	7.6	78°	3		7°	7904
BLAUBXMFMN16OS	16.066	16.093	25.979	26.000	36	22	8	10.4	78°	2.2	3	0	11866
BLAUBXMFMN20OS	20.096	20.129	31.975	32.000	45	28	10	10.8	60°	2.2		0	18535
BLAUBXMFMN25OS	25.096	25.129	39.975	40.000	58	40	12.5	13.2	60°			-1.51	29871
BLAUBXMFMN30OS	30.096	30.129	46.975	47.000	68	48	15	14.2	72°	3	3	2	42012
BLAUBXMFMN40OS	40.127	40.166	61.970	62.000	80	56	20	19.5	72°			1.5	65901
BLAUBXMFMN50OS	50.127	50.166	74.970	75.000	100	72	25	24		3	5	2.5	102970
BLAUBXMFMN60OS	60.182	60.228	89.965	90.000	125	95	30	29.6	72°	—	6	0	154455
BLAUBXMFMN80OS	80.182	80.228	119.965	120.000	165	125	40	39		—	8	0	271840

ΔL Tolerance (h13) :
 22 to 29 mm -0.33
 32 to 45 mm -0.39
 58 to 80 mm -0.46
 100 mm -0.54
 125 & 165 mm -0.63



Frelon® Lined | Precision Series LINEAR BEARINGS-THIN WALL

- Self-Lubricating • Bonded Frelon® • Anodized Aluminum

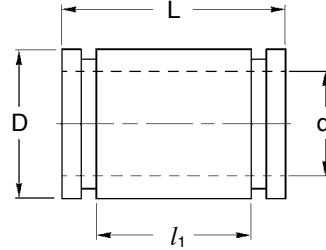


Catalog Number	Nominal I.D.	d Bearing I.D.		D Bearing O.D.		L -0.254	l ₁ O-Ring Spacing	Max. Load N
		Min.	Max.	Min.	Max.			
BLAUBXMFMT06CP	6	6.010	6.028	11.982	12.000	22	—	2726
BLAUBXMFMT08CP	8	8.013	8.035	14.982	15.000	24	10	3961
BLAUBXMFMT10CP	10	10.013	10.035	16.982	17.000	26	12	5354
BLAUBXMFMT12CP	12	12.016	12.043	18.979	19.000	28	14	6923
BLAUBXMFMT14CP	14	14.016	14.043	20.979	21.000	28	14	8080
BLAUBXMFMT16CP	16	16.016	16.043	23.979	24.000	30	14	9885
BLAUBXMFMT20CP	20	20.020	20.053	27.979	28.000	30	14	12356
BLAUBXMFMT25CP	25	25.020	25.053	34.975	35.000	40	22	20593
BLAUBXMFMT30CP	30	30.020	30.053	39.975	40.000	50	30	30890
BLAUBXMFMT40CP	40	40.025	40.064	51.970	52.000	60	40	49425
BLAUBXMFMT50CP	50	50.025	50.064	61.970	62.000	70	50	72078



Frelon® Lined | Compensated Series LINEAR BEARINGS-THIN WALL

- Self-Lubricating • Bonded Frelon® • Anodized Aluminum

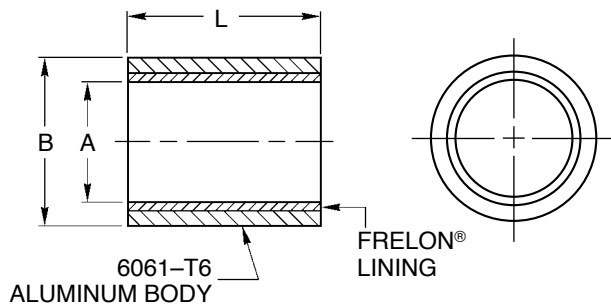


Catalog Number	Nominal I.D.	d Bearing I.D.		D Bearing O.D.		L -0.254	l ₁ O-Ring Spacing	Max. Load N
		Min.	Max.	Min.	Max.			
BLAUBXMMTC06CS	6	6.060	6.078	11.982	12.000	22	—	2726
BLAUBXMMTC08CS	8	8.063	8.085	14.982	15.000	24	10	3961
BLAUBXMMTC10CS	10	10.063	10.085	16.982	17.000	26	12	5354
BLAUBXMMTC12CS	12	12.066	12.093	18.979	19.000	28	14	6923
BLAUBXMMTC14CS	14	14.066	14.093	20.979	21.000	28	14	8080
BLAUBXMMTC16CS	16	16.066	16.093	23.979	24.000	30	14	9885
BLAUBXMMTC20CS	20	20.096	20.129	27.979	28.000	30	14	12356
BLAUBXMMTC25CS	25	25.096	25.129	34.975	35.000	40	22	20593
BLAUBXMMTC30CS	30	30.090	30.129	39.975	40.000	50	30	30890
BLAUBXMMTC40CS	40	40.127	40.166	51.970	52.000	60	40	49425
BLAUBXMMTC50CS	50	50.127	50.166	61.970	62.000	70	50	72078



Frelon® Lined SLEEVE BEARINGS-PLAIN

- Self-Lubricating • Frelon® Liner
- Replaces Sintered and Plastic Bearings



Catalog Number	Nominal Bearing Size			A Bearing I.D.		B Bearing O.D.		L Length		Max. Static Load lbs.	Bearing Weight oz.	Recommended Housing Bore			
	I.D.	O.D.	Length	Min.	Max.	Min.	Max.	Min.	Max.			Min.	Max.	Min.	Max.
BSLPLN-PS03052 BSLPLN-PS03054	3/16	5/16	1/4 1/2	.189	.190	.3135	.3145	.230 .480	.250 .500	130 272	.02 .04	.3145	.3155	.3125	.3130
BSLPLN-PS04062 BSLPLN-PS04063 BSLPLN-PS04064	1/4	3/8	1/4 3/8 1/2	.2515	.2525	.376	.377	.230 .355 .480	.250 .375 .500	174 268 362	.03 .04 .05	.377	.378	.3750	.3755
BSLPLN-PS06104 BSLPLN-PS06106	3/8	5/8	1/2 3/4	.3765	.3775	.626	.627	.480 .730	.500 .750	542 824	.14 .20	.627	.628	.6250	.6255
BSLPLN-PS07106	7/16	5/8	3/4	.439	.440	.626	.627	.730	.750	962	.23	.627	.628	.6250	.6255
BSLPLN-PS08124 BSLPLN-PS08126 BSLPLN-PS08128	1/2	3/4	1/2 3/4 1	.5015	.5025	.751	.752	.480 .730 .980	.500 .750 1.000	722 1098 1474	.15 .25 .35	.752	.753	.7500	.7505
BSLPLN-PS10146 BSLPLN-PS10148	5/8	7/8	3/4 1	.6265	.6275	.876	.877	.730 .980	.750 1.000	1372 1842	.30 .45	.877	.878	.8750	.8755
BSLPLN-PS12168 BSLPLN-P162012	3/4 1	1 1-1/4	1 1-1/2	.7515 1.0015	.7525 1.0025	1.001 1.251	1.002 1.252	.980 1.480	1.000 1.500	2210 4446	.50 .95	1.002 1.252	1.003 1.253	.9995 1.249	1.0000 1.250
BSLPLN-P202416 BSLPLN-P242816 BSLPLN-P283224	1-1/4 1-1/2 1-3/4	1-1/2 1-3/4 2	2 2 3	1.2515 1.5015 1.7515	1.2525 1.5025 1.7525	1.501 1.751	1.502 1.752	1.980 1.980	2.000 2.000	7434 8918	1.55 1.80	1.502 1.752	1.503 1.753	1.499 1.749	1.500 1.750
BSLPLN-P323624 BSLPLN-P404424 BSLPLN-P485228	2 2-1/2 3	2-1/4 2-3/4 3-1/4	3 3 3-1/2	2.0015 2.5015 3.0025	2.0025 2.5025 3.0025	2.251 2.751 3.251	2.252 2.752 3.252	2.980 2.980 3.480	3.000 3.000 3.500	17894 22364 31336	3.55 4.85 6.10	2.252 2.752 3.252	2.253 2.753 3.253	2.249 2.749 3.2485	2.250 2.750 3.2495

Installation Instructions:

Option 1 – Slip Fit

Slip the bearing sleeve into the housing and epoxy into place with Loctite™ or a similar type of bonding agent.

CAUTION: DO NOT let any of the adhesive touch the bearing liner.

It will harden and interfere with the running clearance.

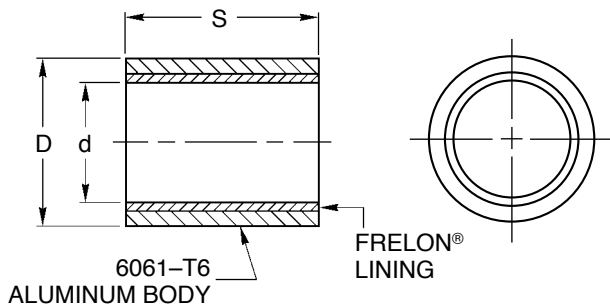
Option 2 – Press Fit

Freeze the bearings at 0°F (-17.75°C) for 30–45 minutes. Using gloves, remove from the freezer and slip the bearings into the housing. As they heat to room temperature, full contact between the bearing and housing will be achieved. The greatest advantage to this technique over traditional pressing is greater accuracy in alignment.



Frelon® Lined SLEEVE BEARINGS-PLAIN

- Self-Lubricating • Frelon® Liner
- Replaces Sintered and Plastic Bearings



Catalog Number	Nominal Bearing Size			d Bearing I.D.		D Bearing O.D. (s7)		S Length		Max. Static Load kg	Bearing Weight kg	Recommended Housing Bore			
	I.D.	O.D.	Length	Min.	Max.	Min.	Max.	Min.	Max.			Min.	Max.	Min.	Max.
BSLPLNMM061006	6	10	6	6.028	6.058	10.023	10.038	5.75	6.00	76	0.00084	10.038	10.063	10.000	10.015
BSLPLNMM061010			10					9.75	10.00	126	0.0014				
BSLPLNMM081208	8	12	8	8.033	8.066	12.028	12.046	7.75	8.00	134	0.0014	12.046	12.071	12.000	12.018
BSLPLNMM081212			12					11.75	12.00	202	0.0021				
BSLPLNMM081408			14					7.75	8.00	134	0.00231				
BSLPLNMM081412			12			14.028	14.046	11.75	12.00	202	0.00347	14.046	14.071	14.000	14.018
BSLPLNMM101410	10	14	10	10.033	10.066	14.028	14.046	9.75	10.00	210	0.0021	14.046	14.071	14.000	14.018
BSLPLNMM101416			16					15.75	16.00	336	0.00336				
BSLPLNMM121612	12	16	12	12.034	12.070	16.028	16.046	11.75	12.00	302	0.00294	16.046	16.071	16.000	16.018
BSLPLNMM121616			16					15.75	16.00	404	0.00392				
BSLPLNMM151916			19					15.75	16.00	504	0.00476				
BSLPLNMM162012	16	20	12	16.041	16.080	20.035	20.056	11.50	12.00	404	0.00378	20.056	20.081	20.000	20.021
BSLPLNMM162016			16					15.50	16.00	538	0.00505				
BSLPLNMM162025			25					24.50	25.00	840	0.00788				
BSLPLNMM202516	20	25	16	20.042	20.084	25.035	25.056	15.50	16.00	672	0.00787	25.056	25.081	25.000	25.021
BSLPLNMM202520			20					19.50	20.00	840	0.00984				
BSLPLNMM202525			25					24.50	25.00	1050	0.0123				
BSLPLNMM202530			30					29.50	30.00	1260	0.01476				
BSLPLNMM253020			20					19.50	20.00	1050	0.01202				
BSLPLNMM253025	25	30	25	25.042	25.084	30.035	30.056	24.50	25.00	1312	0.01503	30.056	30.081	30.000	30.021
BSLPLNMM253030			30					29.50	30.00	1576	0.01803				
BSLPLNMM253525			25					24.50	25.00	1312	0.03276				
BSLPLNMM253535	25	35	25	25.050	25.096	35.035	35.068	34.50	35.00	1838	0.04586	35.068	35.093	35.000	35.021
BSLPLNMM303525			25					24.50	25.00	1576	0.01777				
BSLPLNMM303530			30					29.50	30.00	1890	0.02133				
BSLPLNMM304035	30	40	35	30.050	30.096	40.043	40.068	34.50	35.00	2206	0.05349	40.068	40.093	40.000	40.025
BSLPLNMM304050			50					49.50	50.00	3150	0.07641				
BSLPLNMM354525			25					24.50	25.00	1838	0.04365				
BSLPLNMM354540	35	45	40	35.052	35.102	45.043	45.068	39.50	40.00	2940	0.06983	45.068	45.093	45.000	45.025
BSLPLNMM354550			50					49.50	50.00	3676	0.08729				
BSLPLNMM405030			30					29.50	30.00	2520	0.05891				
BSLPLNMM405040	40	50	40	40.052	40.102	50.043	50.068	39.50	40.00	3360	0.07855	50.068	50.093	50.000	50.025
BSLPLNMM506035			35					34.50	35.00	3676	0.08419				
BSLPLNMM506050			50					49.50	50.00	5250	0.12027				
BSLPLNMM607060	60	59.50	60.00	7560	0.17052	70.099	70.124	70.000	70.030						

Installation Instructions:

Option 1 – Slip Fit

Slip the bearing sleeve into the housing and epoxy into place with Loctite™ or a similar type of bonding agent.

CAUTION: DO NOT let any of the adhesive touch the bearing liner. It will harden and interfere with the running clearance.

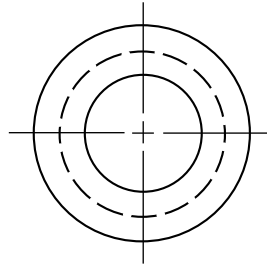
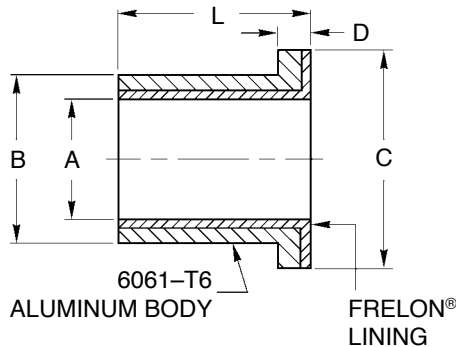
Option 2 – Press Fit

Freeze the bearings at 0°F (-17.75°C) for 30–45 minutes. Using gloves, remove from the freezer and slip the bearings into the housing. As they heat to room temperature, full contact between the bearing and housing will be achieved. The greatest advantage to this technique over traditional pressing is greater accuracy in alignment.



Frelon® Lined SLEEVE BEARINGS-FLANGED

- Self-Lubricating • Frelon® Liner
- Replaces Sintered and Plastic Bearings



Catalog Number	Nominal Bearing Size			A Bearing I.D.		B Bearing O.D.		C Flange O.D.	D Flange Width	L Length		Max. Static Load lbs.	Bearing Weight oz.	Recommended Housing Bore			
	I.D.	O.D.	Length	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Max.			Slip Fit and Epoxy		Press Fit	
														Min.	Max.	Min.	Max.
BSLFLN-PF03052 BSLFLN-PF03054	3/16	5/16	1/4 1/2	.1890	.1900	.3135	.3145	.4370	.0625	.230 .480	.250 .500	130 272	.023 .044	.3145	.3155	.3125	.3130
BSLFLN-PF04062 BSLFLN-PF04063 BSLFLN-PF04064	1/4	3/8	1/4 3/8 1/2	.2515	.2525	.3760	.3770	.5000	.0625	.230 .355 .480	.250 .375 .500	174 268 362	.031 .044 .055	.3770	.3780	.3750	.3755
BSLFLN-PF06104 BSLFLN-PF06106	3/8	5/8	1/2 3/4	.3765	.3775	.6260	.6270	.8750	.1250	.480 .730	.500 .750	542 824	.200 .250	.6270	.6280	.6250	.6255
BSLFLN-PF07106	7/16	5/8	3/4	.4390	.4400	.6260	.6270	.9375	.1250	.730	.750	962	.200	.6270	.6280	.6250	.6255
BSLFLN-PF08124 BSLFLN-PF08126 BSLFLN-PF08128	1/2	3/4	1/2 3/4 1	.5015	.5025	.7510	.7520	1.0000	.1250	.480 .730 .980	.500 .750 1.000	722 1098 1474	.250 .300 .400	.7520	.7530	.7500	.7505
BSLFLN-PF10146 BSLFLN-PF10148	5/8	7/8	3/4 1	.6265	.6275	.8760	.8770	1.0000	.1250	.730 .980	.750 1.000	1372 1842	.350 .450	.8770	.8780	.8750	.8755
BSLFLN-PF12168 BSLFLN-F162012	3/4 1	1 1-1/4	1 1-1/2	.7515 1.0015	.7525 1.0025	1.0010 1.2510	1.0020 1.2520	1.2500 1.5000	.1250	.980 1.480	1.000 1.500	2210 4446	.550 1.050	1.0020 1.2520	1.0030 1.2530	.9995 1.2490	1.0000 1.2500
BSLFLN-F202416 BSLFLN-F242816	1-1/4 1-1/2	1-1/2 1-3/4	2	1.2515 1.5015	1.2525 1.5025	1.5010 1.7510	1.5020 1.7520	1.7500 2.0000	.1250	1.980	2.000	7434 8918	1.800 2.160	1.5020 1.7520	1.5030 1.7530	1.4990 1.7490	1.5000 1.7500
BSLFLN-F283224 BSLFLN-F323624 BSLFLN-F404424	1-3/4 2 2-1/2	2 2-1/4 2-3/4	3	1.7515 2.0015 2.5015	1.7525 2.0025 2.5025	2.0010 2.2510 2.7510	2.0020 2.2520 2.7520	2.2500 2.5000 3.0000	.1250	2.980	3.000	15658 17894 22364	3.300 3.750 4.600	2.0020 2.2520 2.7520	2.0030 2.2530 2.7530	1.9990 2.2490 2.7490	2.0000 2.2500 2.7500
BSLFLN-F485228	3	3-1/4	3-1/2	3.0015	3.0025	3.2510	3.2520	3.5000	.1250	3.480	3.500	31336	6.300	3.2520	3.2530	3.2485	3.2495

Installation Instructions:

Option 1 – Slip Fit

Slip the bearing sleeve into the housing and epoxy into place with Loctite™ or a similar type of bonding agent.

CAUTION: DO NOT let any of the adhesive touch the bearing liner. It will harden and interfere with the running clearance.

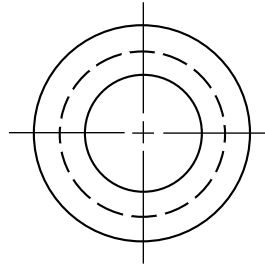
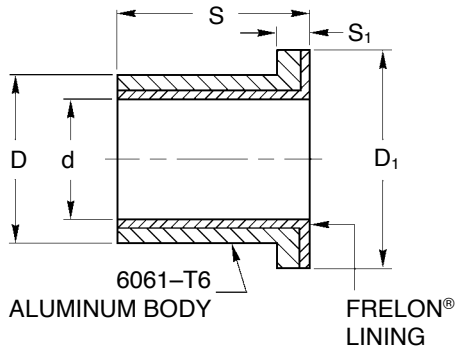
Option 2 – Press Fit

Freeze the bearing at 0°F (-17.75°C) for 30–45 minutes. Using gloves, remove from the freezer and slip the bearing into the housing. As it heats to room temperature, full contact between the bearing and housing will be achieved. The greatest advantage to this technique over traditional pressing is greater accuracy in alignment.



Frelon® Lined SLEEVE BEARINGS-FLANGED

- Self-Lubricating • Frelon® Liner
- Replaces Sintered and Plastic Bearings



Catalog Number	Nominal Bearing Size			d Bearing I.D.		D Bearing O.D.		D ₁ Flange O.D.	S ₁ Flange Width	S Length		Max. Static Load kg	Bearing Weight kg	Recommended Housing Bore			
	I.D.	O.D.	Length	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Max.			Slip Fit and Epoxy		Press Fit	
														Min.	Max.	Min.	Max.
BSLFLNMS061006 BSLFLNMS061010	6	10	6 10	6.028	6.058	10.023	10.038	14	2	5.75 9.75	6.00 10.00	76 126	0.00126 0.00182	10.038	10.063	10.000	10.015
BSLFLNMS081206 BSLFLNMS081208 BSLFLNMS081212	8	12	6 8 12	8.033	8.066	12.028	12.046	16	2	5.75 7.75 11.75	6.00 8.00 12.00	100 134 202	0.00153 0.00189 0.00259	12.046	12.071	12.000	12.018
BSLFLNMS101608 BSLFLNMS101610 BSLFLNMS101616	10	16	8 10 16	10.033	10.066	16.028	16.046	22	3	7.75 9.75 15.75	8.00 10.00 16.00	168 210 336	0.00421 0.00498 0.00694	16.046	16.071	16.000	16.018
BSLFLNMS121808 BSLFLNMS121812	12	18	8 12	12.034	12.070	18.028	18.046	24	3	7.75 11.75	8.00 12.00	202 302	0.00478 0.00636	18.046	18.071	18.000	18.018
BSLFLNMS151916	15	19	16	15.034	15.070	19.028	19.046	25	3	15.50	16.00	504	0.00647	19.046	19.071	19.000	19.018
BSLFLNMS162016 BSLFLNMS162020 BSLFLNMS162025	16	20	16 20 25	16.041	16.080	20.035	20.056	27	3	15.50 19.50 24.50	16.00 20.00 25.00	538 672 840	0.00718 0.00844 0.01002	20.056	20.081	20.000	20.021
BSLFLNMS202620 BSLFLNMS202630	20	26	20 30	20.042	20.084	26.035	26.056	32	3	19.50 29.50	20.00 30.00	840 1260	0.01432 0.02035	26.056	26.081	26.000	26.021
BSLFLNMS253020 BSLFLNMS253025 BSLFLNMS253032	25	30	20 25 32	25.042	25.084	30.035	30.056	39	3.5	19.50 24.50 31.50	20.00 25.00 32.00	1050 1312 1680	0.01672 0.01973 0.02394	30.056	30.081	30.000	30.021
BSLFLNMS303830	30	38	30	30.050	30.096	38.043	38.068	46	4	29.50	30.00	1890	0.04145	38.068	38.093	38.000	38.021
BSLFLNMS354535	35	45	35	35.052	35.102	45.043	45.068	55	5	34.50	35.00	2572	0.07192	45.068	45.093	45.000	45.025
BSLFLNMS405040	40	50	40	40.052	40.102	50.043	50.068	60	5	39.50	40.00	3360	0.09044	50.068	50.093	50.000	50.025
BSLFLNMS506050	50	60	50	50.062	50.133	60.053	60.099	70	5	49.50	50.00	5250	0.13429	60.099	60.124	60.000	60.030

Installation Instructions:

Option 1 – Slip Fit

Slip the bearing sleeve into the housing and epoxy into place with Loctite™ or a similar type of bonding agent.

CAUTION: DO NOT let any of the adhesive touch the bearing liner. It will harden and interfere with the running clearance.

Option 2 – Press Fit

Freeze the bearing at 0°F (-17.75°C) for 30–45 minutes. Using gloves, remove from the freezer and slip the bearing into the housing. As it heats to room temperature, full contact between the bearing and housing will be achieved. The greatest advantage to this technique over traditional pressing is greater accuracy in alignment.

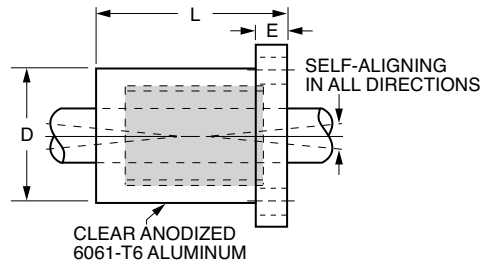
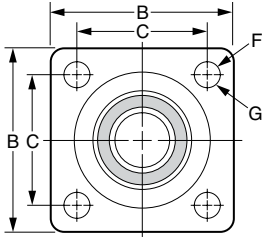


NEW

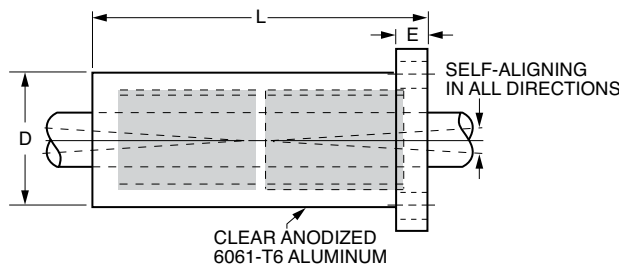
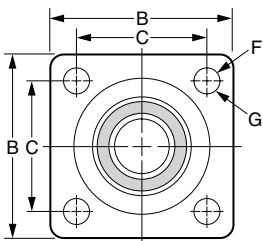
Frelon® Lined

FLANGE-MOUNTED SLEEVE BEARINGS

- Self-Lubricating
- Frelon® Liner
- 6061-T6 Aluminum Housing
- Self-Aligning



Catalog Number	Bearing Nominal Size	B Flange Square	C Hole Spacing	ØD Barrel	E Flange Length	F Bolt Size	G Hole Size	L Length Overall	Max. Static Load lbs.	Weight lbs.
BLAFMT-SFP08	1/2	1.63	1.25	1.25	.250	#8	.187	1.687	1950	.175
BLAFMT-SFP12	3/4	2.38	1.75	1.75	.375	#10	.219	2.067	2940	.463
BLAFMT-SFP16	1	2.75	2.125	2.25	.500	1/4	.281	2.812	3810	1.206



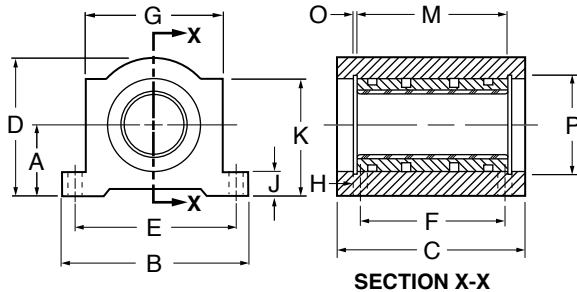
Catalog Number	Bearing Nominal Size	B Flange Square	C Hole Spacing	ØD Barrel	E Flange Length	F Bolt Size	G Hole Size	L Length Overall	Max. Static Load lbs.	Weight lbs.
BLAFMT-DFP08	1/2	1.63	1.25	1.25	.250	#8	.187	3.375	3900	.325
BLAFMT-DFP12	3/4	2.38	1.75	1.75	.375	#10	.219	4.188	5880	.825
BLAFMT-DFP16	1	2.75	2.125	2.25	.500	1/4	.281	5.625	7620	1.750

NOTE: All standard mounted units include a standard self-lubricating bearing **BLAABX-FLX..CP** series found on page 100.



Frelon® Lined PILLOW BLOCKS-CLOSED TYPE

- Self-Aligning • Anodized 6061-T6 Aluminum Body
- Frelon® Lined Aluminum Bearing • Self-Lubricating



PRECISION SERIES

Operating Temperature: -400°F to +500°F

Catalog Number	Bore [§] Dia.	A ±.001	B Base Width	C Length	D Height ±.010	E ±.010	F ±.010	G Body Width	H		J	K	M Groove Spacing	O Groove Width	P Groove Dia.	Max.* Load Rating lbs.
									Bolt	Hole						
BLAABX-PX04XCP	.2500	.437	1.625	1.188	.813	1.312	.750	1.000			.188	.750	.750	.039	.532	600
BLAABX-PX06XCP	.3750	.500	1.750	1.313	.938	1.437	.875	1.125	#6	5/32	.188	.875	.875	.039	.665	1020
BLAABX-PX08XCP	.5000	.687	2.000	1.688	1.250	1.688	1.000	1.375			.250	1.125	1.250	.046	.931	1950
BLAABX-PX10XCP	.6250	.875	2.500	1.938	1.625	2.125	1.125	1.750	#8	3/16	.281	1.438	1.500	.056	1.197	2940
BLAABX-PX12XCP	.7500	.937	2.750	2.063	1.750	2.375	1.250	1.875	#8	3/16	.313	1.563	1.625	.056	1.330	3810
BLAABX-PX16XCP	1.0000	1.187	3.250	2.813	2.188	2.875	1.750	2.375	#10	7/32	.375	1.938	2.250	.068	1.671	7050
BLAABX-PX20XCP	1.2500	1.500	4.000	3.625	2.813	3.500	2.000	3.000	#10	7/32	.438	2.500	2.625	.068	2.122	10290
BLAABX-PX24XCP	1.5000	1.750	4.750	4.000	3.250	4.125	2.500	3.500	1/4	9/32	.500	2.875	3.000	.086	2.519	14100
BLAABX-PX32XCP	2.0000	2.125	6.000	5.000	4.063	5.250	3.250	4.500	3/8	13/32	.625	3.625	4.000	.103	3.182	25050

COMPENSATED SERIES

Operating Temperature: -400°F to +500°F

Catalog Number	Bore [§] Dia.	A ±.001	B Base Width	C Length	D Height ±.010	E ±.010	F ±.010	G Body Width	H		J	K	M Groove Spacing	O Groove Width	P Groove Dia.	Max.* Load Rating lbs.
									Bolt	Hole						
BLAABX-PX04CCS	.2500	.437	1.625	1.188	.813	1.312	.750	1.000			.188	.750	.750	.039	.532	600
BLAABX-PX06CCS	.3750	.500	1.750	1.313	.938	1.437	.875	1.125	#6	5/32	.188	.875	.875	.039	.665	1020
BLAABX-PX08CCS	.5000	.687	2.000	1.688	1.250	1.688	1.000	1.375			.250	1.125	1.250	.046	.931	1950
BLAABX-PX10CCS	.6250	.875	2.500	1.938	1.625	2.125	1.125	1.750	#8	3/16	.281	1.438	1.500	.056	1.197	2940
BLAABX-PX12CCS	.7500	.937	2.750	2.063	1.750	2.375	1.250	1.875	#8	3/16	.313	1.563	1.625	.056	1.330	3810
BLAABX-PX16CCS	1.0000	1.187	3.250	2.813	2.188	2.875	1.750	2.375	#10	7/32	.375	1.938	2.250	.068	1.671	7050
BLAABX-PX20CCS	1.2500	1.500	4.000	3.625	2.813	3.500	2.000	3.000	#10	7/32	.438	2.500	2.625	.068	2.122	10290
BLAABX-PX24CCS	1.5000	1.750	4.750	4.000	3.250	4.125	2.500	3.500	1/4	9/32	.500	2.875	3.000	.086	2.519	14100
BLAABX-PX32CCS	2.0000	2.125	6.000	5.000	4.063	5.250	3.250	4.500	3/8	13/32	.625	3.625	4.000	.103	3.182	25050

NOTE: For parallel shaft applications, use Compensated Series bearings.

*Maximum speed is 400 ft/min.; maximum PV is 10000 dry.

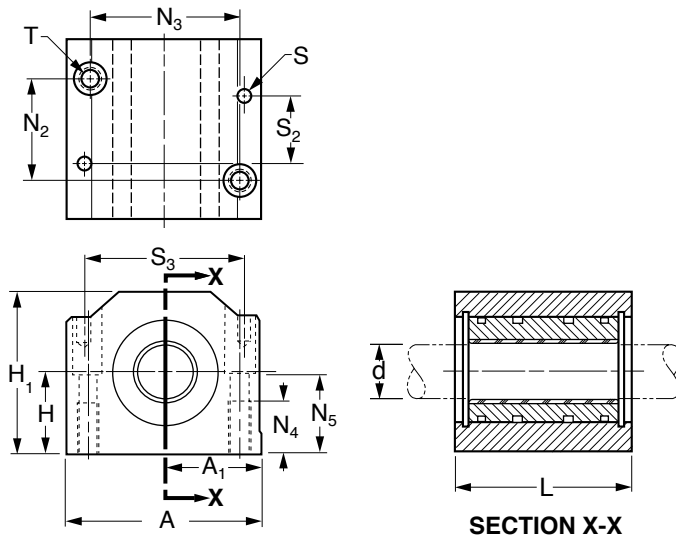
§Bore Tolerance for Precision Series :
 .2500 to 1.2500 +.0010 / -.0000
 1.5000 +.0012 / -.0000
 2.0000 +.0014 / -.0000

§Bore Tolerance for Compensated Series :
 .2500 to 1.2500 +.0020 / +.0030
 1.5000 +.0040 / +.0052
 2.0000 +.0050 / +.0064



Frelon® Lined PILLOW BLOCKS-CLOSED TYPE

- Self-Aligning • Anodized Aluminum Body 6061-T6
- Frelon® Lined Aluminum Bearing • Self-Lubricating



PRECISION SERIES

Catalog Number	d* Nom. Bore Size	H ± 0.015	H ₁ Height	A Width	A ₁ ± 0.013	L Length	T	N ₂ ± 0.15	N ₃ ± 0.15	N ₄	N ₅	S	S ₂	S ₃	Maximum Static Load N
BLAUBXMPMX08CP	8	15	28	35	17.5	32	M4 X 0.7	20	25	9	14.5	—	—	—	—
BLAUBXMPMX10CP	10	16	31.5	40	20	36	M5 X 0.8	20	29	11	15	4	29	31	5978
BLAUBXMPMX12CP	12	18	35	43	21.5	39	M5 X 0.8	23	32	11	16.5	4	32	34	7898
BLAUBXMPMX16CP	16	22	42	53	26.5	43	M6 X 1	26	40	13	21	4	35	42	11858
BLAUBXMPMX20CP	20	25	50	60	30	54	M8 X 1.25	32	45	18	24	5	45	50	18522
BLAUBXMPMX25CP	25	30	60	78	39	67	M10 X 1.5	40	60	22	29	6	20	64	29850
BLAUBXMPMX30CP	30	35	71	87	43.5	79	M10 X 1.5	45	68	22	34	6	30	72	41983
BLAUBXMPMX40CP	40	45	91	108	54	91	M12 X 1.75	58	86	26	44	8	35	90	65856
BLAUBXMPMX50CP	50	50	105	132	66	113	M16 X 2	50 ^Δ	108 ^Δ	34	49	10	42	108	102900

COMPENSATED SERIES

Catalog Number	d* Nom. Bore Size	H ± 0.015	H ₁ Height	A Width	A ₁ ± 0.013	L Length	T	N ₂ ± 0.15	N ₃ ± 0.15	N ₄	N ₅	S	S ₂	S ₃	Maximum Static Load N
BLAUBXMPMX08CCS	8	15	28	35	17.5	32	M4 X 0.7	20	25	9	14.5	—	—	—	—
BLAUBXMPMX10CCS	10	16	31.5	40	20	36	M5 X 0.8	20	29	11	15	4	29	31	5978
BLAUBXMPMX12CCS	12	18	35	43	21.5	39	M5 X 0.8	23	32	11	16.5	4	32	34	7898
BLAUBXMPMX16CCS	16	22	42	53	26.5	43	M6 X 1	26	40	13	21	4	35	42	11858
BLAUBXMPMX20CCS	20	25	50	60	30	54	M8 X 1.25	32	45	18	24	5	45	50	18522
BLAUBXMPMX25CCS	25	30	60	78	39	67	M10 X 1.5	40	60	22	29	6	20	64	29850
BLAUBXMPMX30CCS	30	35	71	87	43.5	79	M10 X 1.5	45	68	22	34	6	30	72	41983
BLAUBXMPMX40CCS	40	45	91	108	54	91	M12 X 1.75	58	86	26	44	8	35	90	65856
BLAUBXMPMX50CCS	50	50	105	132	66	113	M16 X 2	50 ^Δ	108 ^Δ	34	49	10	42	108	102900

*Bore Tolerance for Precision Series

8 & 10 mm	+0.035, +0.013
12 & 16 mm	+0.043, +0.016
20, 25 & 30 mm	+0.053, +0.020
40 & 50 mm	+0.064, +0.025

*Bore Tolerance for Compensated Series

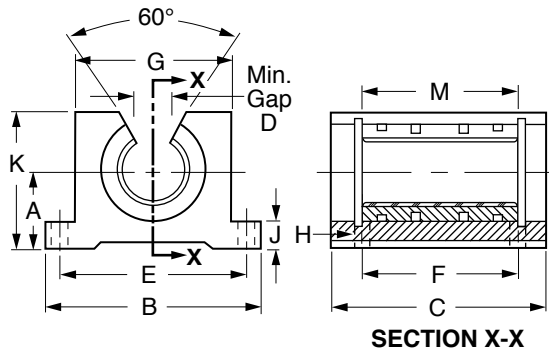
8 & 10 mm	+0.085, +0.063
12 & 16 mm	+0.093, +0.066
20, 25 & 30 mm	+0.129, +0.096
40 & 50 mm	+0.166, +0.127

^Δ Tolerance: ± 0.2



Frelon® Lined PILLOW BLOCKS-OPEN TYPE

- Self-Aligning • Anodized 6061-T6 Aluminum Body
- Frelon® Lined Aluminum Bearing • Self-Lubricating



PRECISION SERIES

Operating Temperature: -400°F to +500°F

Catalog Number	Bore [§] Dia.	A ± .001	B Base Width	C Length	D Min.	E ± .010	F ± .010	G Body Width	H		J	K Height	M Groove Spacing	Max.* Load Rating lbs.
									Bolt	Hole				
BLAABX-PN08XOP	.5000	.687	2.000	1.50	.313	1.688	1.000	1.375	#6	5/32	.250	1.125	1.250	1950
BLAABX-PN10XOP	.6250	.875	2.500	1.75	.375	2.125	1.125	1.750	#8	3/16	.281	1.438	1.500	2940
BLAABX-PN12XOP	.7500	.937	2.750	1.88	.438	2.375	1.250	1.875	#8	3/16	.313	1.563	1.625	3810
BLAABX-PN16XOP	1.0000	1.187	3.250	2.63	.563	2.875	1.750	2.375	#10	7/32	.375	1.938	2.250	7050
BLAABX-PN20XOP	1.2500	1.500	4.000	3.38	.625	3.500	2.000	3.000	#10	7/32	.438	2.500	2.625	10290
BLAABX-PN24XOP	1.5000	1.750	4.750	3.75	.750	4.125	2.500	3.500	1/4	9/32	.500	2.875	3.000	14100
BLAABX-PN32XOP	2.0000	2.125	6.000	4.75	1.000	5.250	3.250	4.500	3/8	13/32	.625	3.625	4.000	25050

COMPENSATED SERIES

Operating Temperature: -400°F to +500°F

Catalog Number	Bore [§] Dia.	A ± .001	B Base Width	C Length	D Min.	E ± .010	F ± .010	G Body Width	H		J	K Height	M Groove Spacing	Max.* Load Rating lbs.
									Bolt	Hole				
BLAABX-PN08COS	.5000	.687	2.000	1.50	.313	1.688	1.000	1.375	#6	5/32	.250	1.125	1.250	1950
BLAABX-PN10COS	.6250	.875	2.500	1.75	.375	2.125	1.125	1.750	#8	3/16	.281	1.438	1.500	2940
BLAABX-PN12COS	.7500	.937	2.750	1.88	.438	2.375	1.250	1.875	#8	3/16	.313	1.563	1.625	3810
BLAABX-PN16COS	1.0000	1.187	3.250	2.63	.563	2.875	1.750	2.375	#10	7/32	.375	1.938	2.250	7050
BLAABX-PN20COS	1.2500	1.500	4.000	3.38	.625	3.500	2.000	3.000	#10	7/32	.438	2.500	2.625	10290
BLAABX-PN24COS	1.5000	1.750	4.750	3.75	.750	4.125	2.500	3.500	1/4	9/32	.500	2.875	3.000	14100
BLAABX-PN32COS	2.0000	2.125	6.000	4.75	1.000	5.250	3.250	4.500	3/8	13/32	.625	3.625	4.000	25050

NOTE: For parallel shaft applications, use Compensated Series.

*Maximum speed is 400 ft/min.; maximum PV is 10000 dry.
Maximum load must be reduced by 1/2 when load is applied to the open half of the bearing.

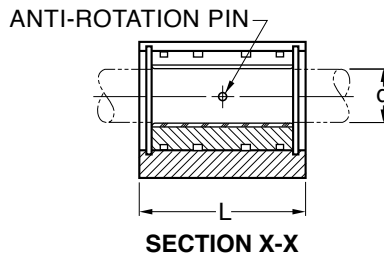
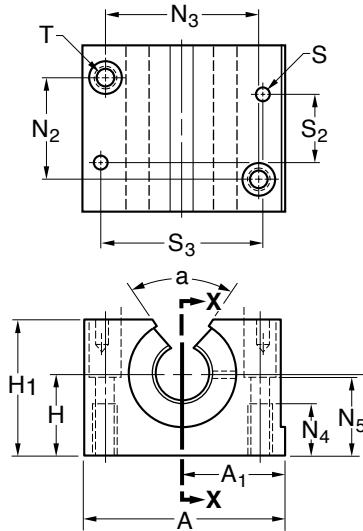
§Bore Tolerance for Precision Series :
 .5000 to 1.2500 +.0010 / -.0000
 1.5000 +.0012 / -.0000
 2.0000 +.0014 / -.0000

§Bore Tolerance for Compensated Series :
 .5000 to 1.2500 +.0020 / +.0030
 1.5000 +.0040 / +.0052
 2.0000 +.0050 / +.0064



Frelon® Lined PILLOW BLOCKS-OPEN TYPE

- Self-Aligning • Anodized Aluminum Body 6061-T6
- Frelon® Lined Aluminum Bearing • Self-Lubricating



PRECISION SERIES

Catalog Number	d* Nom. Bore Size	H ± 0.015	H ₁ Height	A Width	A ₁ ± 0.013	L Length	T	N ₂ ± 0.15	N ₃ ± 0.15	N ₄	N ₅	S	S ₂	S ₃	a deg.	Maximum Static Load N
BLAUBXMPMN12OP	12	18	28	43	21.5	39	M5 X 0.8	23	32	11	16.5	4	32	34	66°	7898
BLAUBXMPMN16OP	16	22	35	53	26.5	43	M6 X 1	26	40	13	21	4	35	42	68°	11858
BLAUBXMPMN20OP	20	25	42	60	30	54	M8 X 1.25	32	45	18	24	5	45	50	60°	18522
BLAUBXMPMN25OP	25	30	51	78	39	67	M10 X 1.5	40	60	22	29	6	20	64	60°	29850
BLAUBXMPMN30OP	30	35	60	87	43.5	79	M10 X 1.5	45	68	22	34	6	30	72		41983
BLAUBXMPMN40OP	40	45	77	108	54	91	M12 X 1.75	58	86	26	44	8	35	90		65856
BLAUBXMPMN50OP	50	50	88	132	66	113	M16 X 2	50 ^Δ	108 ^Δ	34	49	10	42	108		102900

COMPENSATED SERIES

Catalog Number	d* Nom. Bore Size	H ± 0.015	H ₁ Height	A Width	A ₁ ± 0.013	L Length	T	N ₂ ± 0.15	N ₃ ± 0.15	N ₄	N ₅	S	S ₂	S ₃	a deg.	Maximum Static Load N
BLAUBXMPMN12COS	12	18	28	43	21.5	39	M5 X 0.8	23	32	11	16.5	4	32	34	66°	7898
BLAUBXMPMN16COS	16	22	35	53	26.5	43	M6 X 1	26	40	13	21	4	35	42	68°	11858
BLAUBXMPMN20COS	20	25	42	60	30	54	M8 X 1.25	32	45	18	24	5	45	50	60°	18522
BLAUBXMPMN25COS	25	30	51	78	39	67	M10 X 1.5	40	60	22	29	6	20	64	60°	29850
BLAUBXMPMN30COS	30	35	60	87	43.5	79	M10 X 1.5	45	68	22	34	6	30	72		41983
BLAUBXMPMN40COS	40	45	77	108	54	91	M12 X 1.75	58	86	26	44	8	35	90		65856
BLAUBXMPMN50COS	50	50	88	132	66	113	M16 X 2	50 ^Δ	108 ^Δ	34	49	10	42	108		102900

*Bore Tolerance for Precision Series

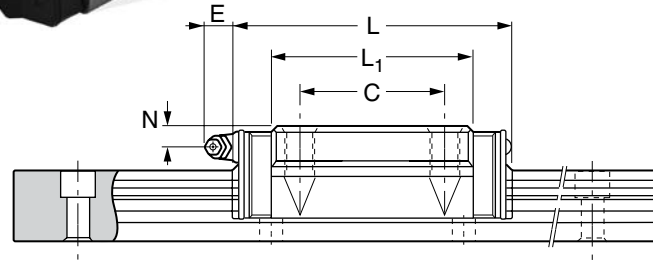
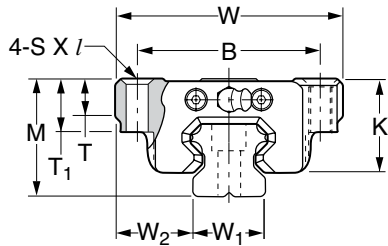
12 & 16 mm +0.043, +0.016
 20, 25 & 30 mm +0.053, +0.020
 40 & 50 mm +0.064, +0.025

*Bore Tolerance for Compensated Series

12 & 16 mm +0.093, +0.066
 20, 25 & 30 mm +0.129, +0.096
 40 & 50 mm +0.166, +0.127

^Δ Tolerance: ± 0.2

- Tapped Screw Holes • Four-Bolt Type
- Heavy Load and Ultraheavy Load Types

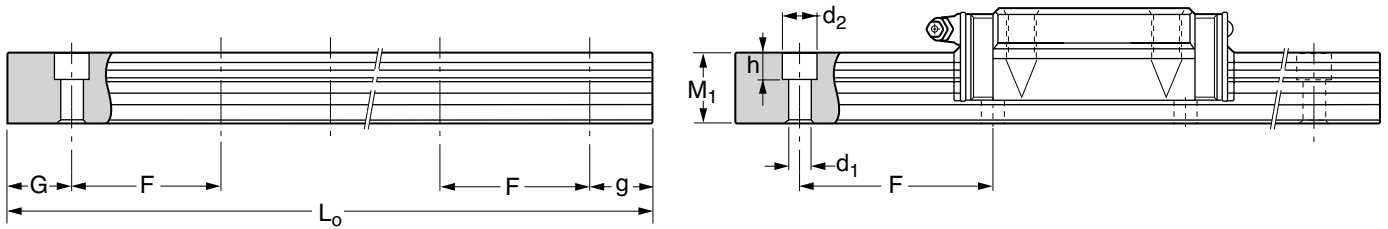


Catalog Number	Outline Dimensions			B	C	S X l	L ₁	W ₁ Width ±0.05	W ₂
	M	W	L						
BBXBLKMHSR15A	24	47	56.5	38	30	M5X11	38.8	15	16
BBXBLKMHSR20A	30	63	74	53	40	M6X10	50.8	20	21.5
BBXBLKMHSR20LA			90				66.8		
BBXBLKMHSR25A	36	70	83	57	45	M8X16	59.5	23	23.5
BBXBLKMHSR25LA			102.5				78.6		
BBXBLKMHSR30A	42	90	98	72	52	M10X18	70.4	28	31
BBXBLKMHSR30LA			120.5				93		
BBXBLKMHSR35A	48	100	109.5	82	62	M10X21	80.4	34	33
BBXBLKMHSR35LA			135				105.8		
BBXBLKMHSR45A	60	120	139	100	80	M12X15	98	45	37.5
BBXBLKMHSR45LA			171				129.6		
BBXBLKMHSR55A	70	140	163	116	95	M14X17	118	53	43.5
BBXBLKMHSR55LA			201				156.1		
BBXBLKMHSR65A	90	170	186	142	110	M16X23	147	63	53.5
BBXBLKMHSR65LA			246				206.5		

Catalog Number	T	T ₁	K	N	E	Basic Load Ratings		Weight Block kg
						C kN	C ₀ kN	
BBXBLKMHSR15A	7	11	20.5	4.5	5.5	8.33	13.5	0.2
BBXBLKMHSR20A	10	10	26	5	12	13.8	23.8	0.35
BBXBLKMHSR20LA						21.3	31.8	0.47
BBXBLKMHSR25A	10	16	30.5	6	12	19.9	34.4	0.59
BBXBLKMHSR25LA						27.2	45.9	0.75
BBXBLKMHSR30A	10	18	35	7	12	28	46.8	1.1
BBXBLKMHSR30LA						37.3	62.5	1.3
BBXBLKMHSR35A	13	21	40	8	12	37.3	61.1	1.6
BBXBLKMHSR35LA						50.2	81.5	2
BBXBLKMHSR45A	14	25	50	10	16	60	95.6	2.8
BBXBLKMHSR45LA						80.4	127	3.3
BBXBLKMHSR55A	15	29	57	11	16	88.5	137	4.5
BBXBLKMHSR55LA						119	183	5.7
BBXBLKMHSR65A	23	37	76	19	16	141	215	8.5
BBXBLKMHSR65LA						192	286	10.7

A = Heavy Load
LA = Ultraheavy Load

See page 122 for rail information.



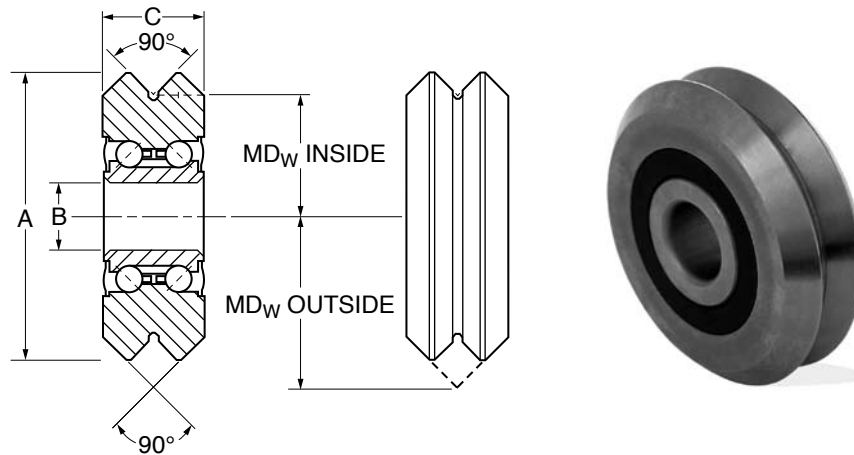
Catalog Number	Standard Length (L_0)	G/g	Max. Length	Rail Width ± 0.05	M_1 Height	F Spacing	$d_1 \times d_2 \times h$	Rail Weight kg/m
BBRAILMHSR15	160, 220, 280, 340, 460, 640 & 820	20	1600	15	15	60	4.5 X 7.5 X 5.3	1.5
BBRAILMHSR20	220, 280, 340, 460, 640, 820, 1000 & 1240	20	2200	20	18	60	6 X 9.5 X 8.5	2.3
BBRAILMHSR25	220, 280, 340, 460, 640, 820, 1000, 1240, 1600 & 3000	20	2500	23	22	60	7 X 11 X 9	3.3
BBRAILMHSR30	280, 440, 600, 760, 1000, 1240, 1640, 2040, 2520 & 3000	20	3000	28	26	80	9 X 14 X 12	4.8
BBRAILMHSR35	280, 440, 600, 760, 1000, 1240, 1640, 2040, 2520 & 3000	20	3000	34	29	80	9 X 14 X 12	6.6
BBRAILMHSR45	570, 885, 1200, 1620, 2040, 2460 & 2985	22.5	3000	45	38	105	14 X 20 X 17	11
BBRAILMHSR55	780, 1020, 1260, 1500, 1980, 2580 & 2940	30	3000	53	44	120	16 X 23 X 20	15.1
BBRAILMHSR65	1270, 1570, 2020 & 2620	35	—	63	53	150	18 X 26 X 22	22.5

NOTES: 1. To complete the catalog number, add the standard length (L_0) to the end.
(i.e., for 160mm length **BBRAILMHSR15160**)
2. See page 121 for matching blocks.



"V" Groove GUIDE WHEELS

• 52100 Chrome Steel • 440C Stainless Steel



AISI 52100 Chrome Steel, Rc 60-62 • Nylon Retainer

Catalog Number	A O.D.	B I.D.	C Width	MD _w INSIDE	MD _w OUTSIDE	Radial Load lbs.	Axial Load lbs.
BGXCOM-0□	.584	.1575	.250	.234	.359	146	28
BGXCOM-1□	.771	.1875	.310	.313	.468	274	57
BGXCOM-2□	1.210	.3750	.438	.500	.719	596	141
BGXCOM-3□	1.803	.4724	.625	.750	1.063	1326	382
BGXCOM-4□	2.360	.5906	.750	1.000	1.375	2181	900

TYPE:

- X Shielded
- S Sealed

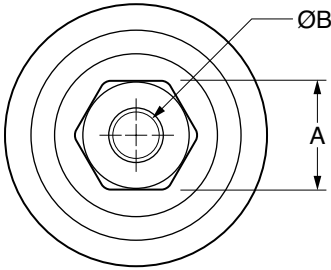
AISI 440C Stainless Steel, Rc 58-60 • 304 Stainless Steel Retainer

Catalog Number	A O.D.	B I.D.	C Width	MD _w INSIDE	MD _w OUTSIDE	Radial Load lbs.	Axial Load lbs.
BGSCOM-1S	.771	.1875	.310	.313	.468	274	57
BGSCOM-2S	1.210	.3750	.438	.500	.719	596	141
BGSCOM-3S	1.803	.4724	.625	.750	1.063	1326	382
BGSCOM-4S	2.360	.5906	.750	1.000	1.375	2181	900

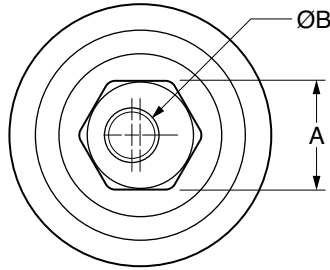
AISI 440C Wheels only available sealed.

NEW
"V" Groove
INTEGRAL BUSHING-GUIDE WHEELS

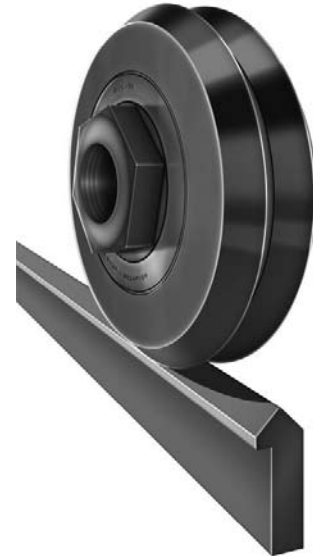
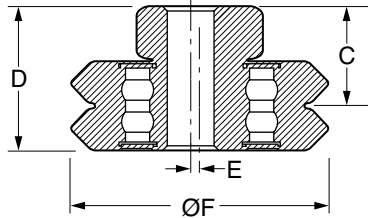
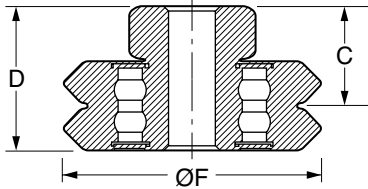
• 52100 Chrome Steel • Nylon Retainer • Shielded Type



CONCENTRIC BUSHING



ECCENTRIC BUSHING



CONCENTRIC TYPE

Catalog Number	A	B	C	D	F	Radial Load N (lbf)	Axial Load N (lbf)
BGXCOMMBWIC2	14	8	9.63	15.19	30.73	2650 (596)	625 (141)
BGXCOMMBWIC3	19	10	13.63	21.56	45.8	5900 (1326)	1701 (382)
BGXCOMMBWIC4	22	12	16.36	25.88	59.94	9700 (2181)	4001 (899)

ECCENTRIC TYPE

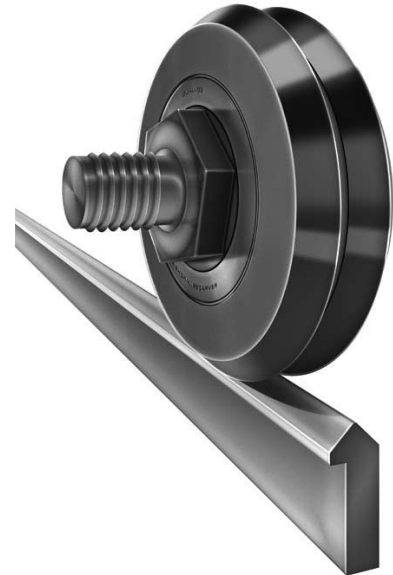
Catalog Number	A	B	C	D	E	F	Radial Load N (lbf)	Axial Load N (lbf)
BGXCOMMBWIE2	14	8	9.63	15.19	0.76	30.73	2650 (596)	625 (141)
BGXCOMMBWIE3	19	10	13.63	21.56	1.5	45.8	5900 (1326)	1701 (382)
BGXCOMMBWIE4	22	12	16.36	25.88	2.01	59.94	9700 (2181)	4001 (899)

NEW

"V" Groove

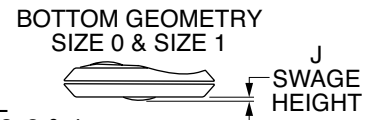
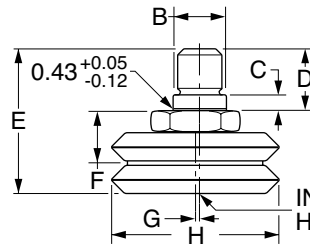
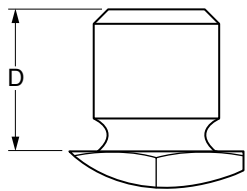
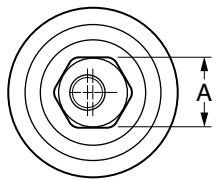
INTEGRAL STUDDED GUIDE WHEELS

• 52100 Chrome Steel • Nylon Retainer • Shielded Type



CONCENTRIC STUD

ECCENTRIC STUD

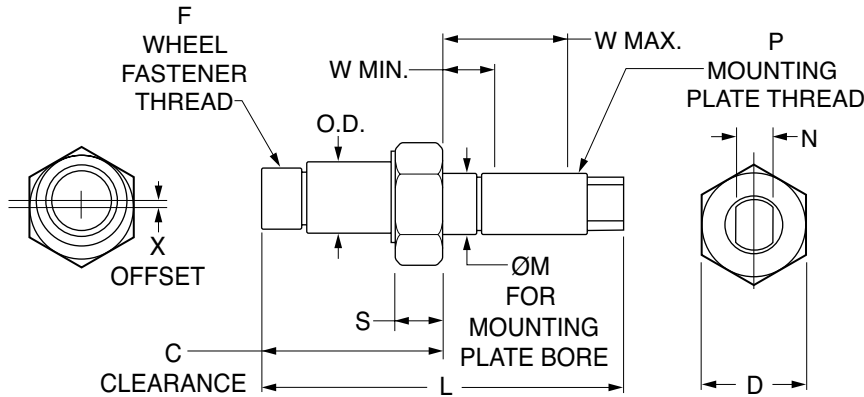


CONCENTRIC TYPE

Catalog Number	A	B	C	D	E	F	G	Stud Thread	H	Internal Hex	J Max.	Load N (lbf)	
												Radial	Axial
BGXCOMMSWIC0	11	5.56	2.16	7.62	16.95	6.15	0.46	M6 X 1	14.83	—	0.43	650 (146)	123 (28)
BGXCOMMSWIC1	12	6.3		8.1	19.33	7.3	0.61	M8 X 1.25	19.58			1220 (274)	252 (57)
BGXCOMMSWIC2	14	9.53	2.79	11.38	26.57	9.63	0.76	M10 X 1.5	30.73	6	—	2650 (596)	625 (141)
BGXCOMMSWIC3	19	10.72	4.32	15.11	36.68	13.63	1.5	M12 X 1.75	45.8			8	5900 (1326)
BGXCOMMSWIC4	22	12.7	4.5	19	44.89	16.36	2.01	M14 X 2	59.94	10	—	9700 (2181)	4001 (900)

ECCENTRIC TYPE

Catalog Number	A	B	C	D	E	F	G	Stud Thread	H	Internal Hex	J Max.	Load N (lbf)	
												Radial	Axial
BGXCOMMSWIE0	11	5.56	2.16	7.62	16.95	6.15	0.46	M5 X 0.8	14.83	—	0.43	650 (146)	123 (28)
BGXCOMMSWIE1	12	6.3		8.1	19.33	7.3	0.61	M6 X 1	19.58			1220 (274)	252 (57)
BGXCOMMSWIE2	14	9.53	2.79	11.38	26.57	9.63	0.76	M8 X 1.25	30.73	6	—	2650 (596)	625 (141)
BGXCOMMSWIE3	19	10.72	4.32	15.11	36.68	13.63	1.5	M10 X 1.5	45.8			8	5900 (1326)
BGXCOMMSWIE4	22	12.7	4.5	19	44.89	16.36	2.01	M12 X 1.75	59.94	10	—	9700 (2181)	4001 (900)



Catalog Number	X	S	C	L	O.D. +.0000 -.0007	M +.000 -.002	P	F	N Adjust. Flat Width	D	W Mounting Plate Width	
											Min.	Max.
*BASCOM-BJ0 *BASCOM-BCC0	.010 —	.250	.635	1.38	.1570	.250	1/4-28	8-32	.125	3/8	.125	.375
BASCOM-BJ1 BASCOM-BCC1	.012 —	.250	.695	1.44	.1873	.250	1/4-28	10-32	.125	7/16	.125	.375
BASCOM-BJ2 BASCOM-BCC2	.024 —	.281	.966	2.03	.3748	.375	3/8-24	5/16-24	.250	9/16	.187	.500
BASCOM-BJ3 BASCOM-BCC3	.042 —	.375	1.275	2.53	.4722	.437	7/16-20	7/16-20	.250	3/4	.250	.625
BASCOM-BJ4 BASCOM-BCC4	.060 —	.437	1.537	3.04	.5904	.500	1/2-20	1/2-20	.312	7/8	.375	.750

*O.D. tolerance: for size 0: +.0000, -.0005.

Catalog number with suffix **BJ** indicates eccentric (adjustable) bushing; rotation of eccentric allows fit up adjustment between track and guide wheels.

Catalog number with suffix **BCC** indicates concentric (stationary) journal; since concentrically mounted wheels have a fixed position, these journals set the alignment of the carriage assembly to the rail. Concentrically mounted wheels should be configured to carry the majority of the load whenever possible.



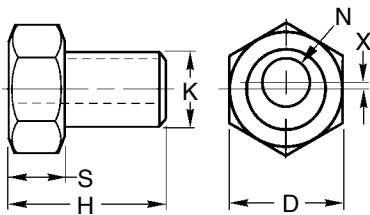
"V" Groove SUPPORT BUSHINGS ECCENTRIC & CONCENTRIC

- Carbon Steel, Electroless Nickel Plated
- 303 Stainless Steel

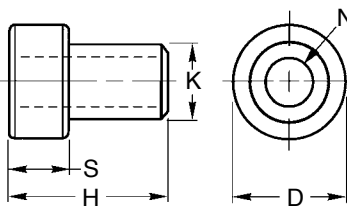
Specifications:

BA = Eccentric bushing. Eccentric mounting hole. By rotating the bushing on its mounting bolt, the clearance between the wheel and track can be adjusted.

BC = Concentric bushing. Concentric mounting hole. The major load should be carried on the stationary bushing.



ECCENTRIC



CONCENTRIC

Catalog Number		H	S	K*	D	N Dia.	X**	Recommended Fastener Size
Steel	Stainless Steel							
ECCENTRIC BUSHINGS								
BADCOM-BA1	BASCOM-BA1	.550	.250	.1873	.44	.138	.012	#6
BADCOM-BA2	BASCOM-BA2	.706	.281	.3748	.56	.250	.024	1/4
BADCOM-BA3	BASCOM-BA3	.990	.375	.4722	.75	.3125	.042	5/16
BADCOM-BA4	BASCOM-BA4	1.177	.437	.5904	.88	.375	.060	3/8
CONCENTRIC BUSHINGS								
BADCOM-BC1	BASCOM-BC1	.550	.250	.1873	.44	.138	-	#6
BADCOM-BC2	BASCOM-BC2	.706	.281	.3748	.56	.250		1/4
BADCOM-BC3	BASCOM-BC3	.990	.375	.4722	.75	.3125		5/16
BADCOM-BC4	BASCOM-BC4	1.177	.437	.5904	.88	.375		3/8

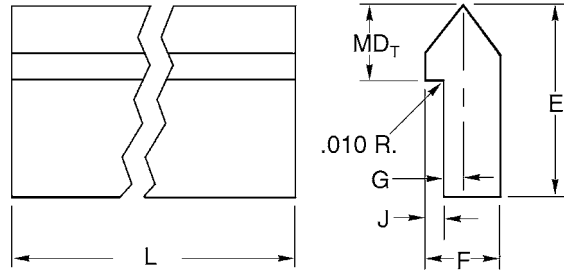
*Fits corresponding wheel bore.

All mounting information assumes a "central" position of the **BA bushing, allowing an adjustment from plus "X" to minus "X".



"V" Groove TRACK-UNDRILLED

- Carbon Steel
- Stainless Steel
- Hardened
- Unhardened
- Single Edge



Catalog Number	L in.	E	F	G	J	MD _T	WT. lbs. / ft.
BK <input type="checkbox"/> COM-T178000X	78	.437	.187	.031	.062	.125	.183
BK <input type="checkbox"/> COM-T278000X		.625	.250	.031	.093	.187	.343
BK <input type="checkbox"/> COM-T378000X		.875	.343	.062	.109	.250	.690
BK <input type="checkbox"/> COM-T478000X		1.062	.437	.093	.125	.312	1.100

MATERIAL:

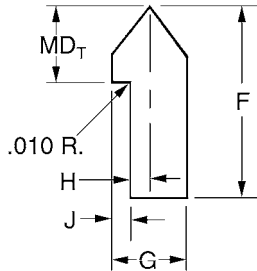
- D** AISI 1045 carbon steel running surface unhardened (Rc 22-25), as formed, oiled
- H** AISI 1045 carbon steel running surface hardened Rc 53, polished and oiled
- S** AISI 420 stainless steel running surface unhardened (Rc 20-22), as formed, oiled
- Y** AISI 420 stainless steel running surface hardened Rc 40, polished and oiled

- NOTES:**
1. Lengths up to 20 feet for hardened, 22 feet for unhardened, are available on special order. Lengths over 10 feet will require a cutting charge.
 2. The portion below indexing shoulder is left soft so it may be drilled for mounting.
 3. Track can be easily butt-jointed for stroke lengths exceeding maximum single-piece lengths of 20 feet plus.
 4. The overall length tolerance is $\pm 1/16"$.

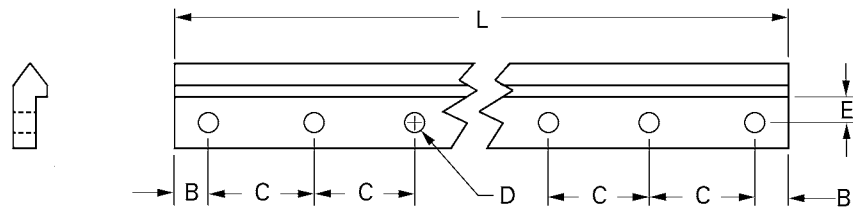


"V" Groove TRACK-PREDRILLED

- Carbon Steel • Stainless Steel
- Hardened • Unhardened
- Single Edge



STANDARD DRILLED TRACK HOLE SPACING AND SIZE



Catalog Number	L ±.015	# of holes	B ±.005	C ±.005	D ±.005	E ±.005	F	G	H	J	MD _T
BK □ COM-T101250D	12.50	7	.250	2.000	.156	.156	.437	.187	.031	.062	.125
BK □ COM-T102450D	24.50	13									
BK □ COM-T103650D	36.50	19									
BK □ COM-T104850D	48.50	25									
BK □ COM-T106050D	60.50	31									
BK □ COM-T107250D	72.50	37	.310	3.000	.203	.219	.625	.250	.031	.093	.187
BK □ COM-T201263D	12.63	5									
BK □ COM-T202463D	24.63	9									
BK □ COM-T203663D	36.63	13									
BK □ COM-T204863D	48.63	17									
BK □ COM-T206063D	60.63	21	.380	3.000	.281	.313	.875	.343	.062	.109	.250
BK □ COM-T207263D	72.63	25									
BK □ COM-T301275D	12.75	5									
BK □ COM-T302475D	24.75	9									
BK □ COM-T303675D	36.75	13									
BK □ COM-T304875D	48.75	17	.500	4.000	.344	.375	1.062	.437	.093	.125	.312
BK □ COM-T306075D	60.75	21									
BK □ COM-T307275D	72.75	25									
BK □ COM-T401300D	13.00	4									
BK □ COM-T402500D	25.00	7									
BK □ COM-T403700D	37.00	10	.500	4.000	.344	.375	1.062	.437	.093	.125	.312
BK □ COM-T404900D	49.00	13									
BK □ COM-T406100D	61.00	16									
BK □ COM-T407300D	73.00	19									

MATERIAL:

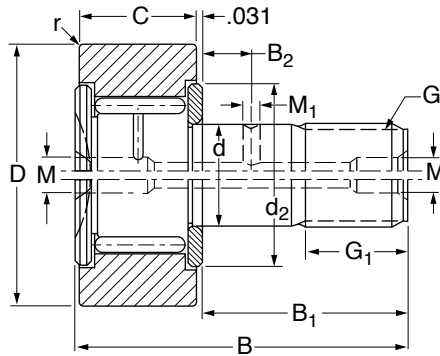
- D AISI 1045 carbon steel running surface unhardened (Rc 22-25), as formed, oiled
- H AISI 1045 carbon steel running surface hardened Rc 53, polished and oiled
- S AISI 420 stainless steel running surface unhardened (Rc 20-22), as formed, oiled
- Y AISI 420 stainless steel running surface hardened Rc 40, polished and oiled

NOTE: Track can be easily butt-jointed for stroke lengths exceeding maximum single piece length.



Needle Bearing CAM FOLLOWERS-STUD TYPE

- 52100 Steel
- Cage-Guided
- Full-Complement
- Needle Bearings
- Slotted Head



Materials

ROLLER & NEEDLES	STUD
52100 Steel	1055 Steel

Catalog Number	B ₁ Stud Length	ØD Roller +.0000 -.0010	Ød Stud +.0010 -.0000	C Roller Width +.000 -.005	B Length	G UNF Thread	G ₁ Thread Length	Lubrication Holes		B ₂	r Corner Radius
								ØM	ØM ₁		
BBXCAM-CF12 BBXCAM-CF14	.875	.7500 .8750	.3750	.500	1.406	3/8-24	.375	.188	.125	.250	.020 .039
BBXCAM-CF16 BBXCAM-CF18	1.000	1.0000 1.1250	.4375	.625	1.656	7/16-20	.500	.188	.125	.250	.039
BBXCAM-CF20 BBXCAM-CF22	1.250	1.2500 1.3750	.5000	.750	2.031	1/2-20	.625	.188	.125	.312	.039

Catalog Number	Load Ratings* lbs				Max. Speed** rpm	Stud Housing Diameter		Ød ₂ Clamp. Min.	Max. Clamp. Torque*** lb·in
	C Dyn.	C ₀ Stat.	C _w Dyn.	C _{0w} Stat.		Min.	Max.		
BBXCAM-CF12 BBXCAM-CF14	1830	2900	1140 1120	1650 2220	6000	.3750	.3755	.500	65
BBXCAM-CF16 BBXCAM-CF18	2700	4300	1950 2190	3000 3550	5000	.4375	.4380	.594	105
BBXCAM-CF20 BBXCAM-CF22	4300	6300	3300 3600	4800 5400	4400	.5000	.5005	.750	165

NOTE: All versions available with seals.

To order with seals, add **PP** to the end of catalog number. Example: **BBXCAM-CF16PP**

*The basic load ratings **C** and **C₀** apply if the bearing outer ring (with cylindrical outside surface) is mounted into a housing with standard bearing fit; when used as track roller, the load ratings **C_w** and **C_{0w}** apply.

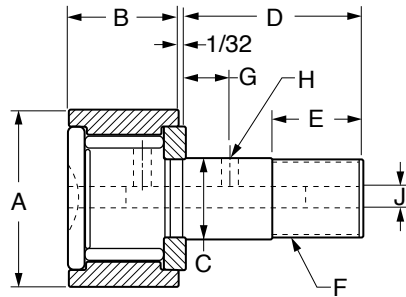
**Maximum speeds shown are for grease lubrication. With oil lubrication, the speed can be increased by approximately 30% except for sealed versions.

***Clamping torque is based on lubricated threads. If threads are dry, double the values shown.



NEW Needle Bearing CAM FOLLOWERS-SEALED

- High-Carbon Steel Through-Hardened and Ground Outer Race
- Low-Carbon Alloy Steel Hardened Studs and Inner Races



Catalog Number	Nom. I.D.	Roller		Stud			Lubrication			
		A O.D. +.000 -.001	B Width +.000 -.005	ØC +.001 -.000	D Length ±.010	E Min. Eff. Thread Length ±.030	F Thread Class 2A	G Oil Hole Center	ØH Oil Hole	J Lube Fitting Size
BBXCAM-CN16 <input type="checkbox"/>	1/2	.500	.375	.190	.625	.250	#10-32	—	—	Δ1/8
BBXCAM-CN20 <input type="checkbox"/>	5/8	.625	.4375	.250	.750	.312	1/4-28	—	—	Δ1/8
BBXCAM-CN22 <input type="checkbox"/>	11/16	.6875	.4375	.250	.750	.312	1/4-28	—	—	Δ1/8
BBXCAM-CN24 <input type="checkbox"/>	3/4	.750	.500	.375	.875	.375	3/8-24	1/4	3/32	3/16
BBXCAM-CN28 <input type="checkbox"/>	7/8	.875	.500	.375	.875	.375	3/8-24	1/4	3/32	3/16
BBXCAM-CN32 <input type="checkbox"/>	1	1.000	.625	.4375	1.000	.500	7/16-20	1/4	3/32	3/16
BBXCAM-CN36 <input type="checkbox"/>	1-1/8	1.125	.625	.4375	1.000	.500	7/16-20	1/4	3/32	3/16
BBXCAM-CN40 <input type="checkbox"/>	1-1/4	1.250	.750	.500	1.250	.625	1/2-20	5/16	3/32	3/16
BBXCAM-CN44 <input type="checkbox"/>	1-3/8	1.375	.750	.500	1.250	.625	1/2-20	5/16	3/32	3/16
BBXCAM-CN48 <input type="checkbox"/>	1-1/2	1.500	.875	.625	1.500	.750	5/8-18	3/8	3/32	3/16
BBXCAM-CN52 <input type="checkbox"/>	1-5/8	1.625	.875	.625	1.500	.750	5/8-18	3/8	3/32	3/16

Catalog Number	Other Specs.				
	Min. Boss Dia.	Recom. Bore +.0005 -.0000	Recom.* Torque lb. in.	Max. Static Capacity lbs.	Basic Dyn. Rating lbs.
BBXCAM-CN16 <input type="checkbox"/>	19/64	.1900	15	1085	930
BBXCAM-CN20 <input type="checkbox"/>	23/64	.2500	35	1215	955
BBXCAM-CN22 <input type="checkbox"/>		.2500	35	1215	955
BBXCAM-CN24 <input type="checkbox"/>	1/2	.3750	95	2065	1660
BBXCAM-CN28 <input type="checkbox"/>		.3750	95	2065	1660
BBXCAM-CN32 <input type="checkbox"/>	5/8	.4375	250	3060	2225
BBXCAM-CN36 <input type="checkbox"/>		.4375	250	3060	2225
BBXCAM-CN40 <input type="checkbox"/>	3/4	.5000	350	4250	3930
BBXCAM-CN44 <input type="checkbox"/>		.5000	350	4250	3930
BBXCAM-CN48 <input type="checkbox"/>	57/64	.6250	650	5640	4840
BBXCAM-CN52 <input type="checkbox"/>		.6250	650	5640	4840

Continued on the next page

HEAD:
S Slotted
H Hex

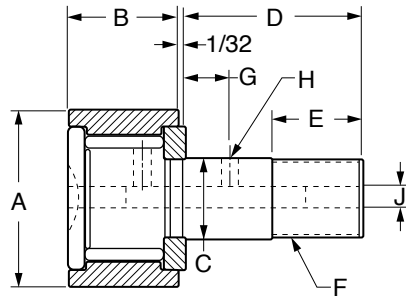
NOTE: ΔRelubricate through head end only.

*Clamping torque is based on dry threads. If threads are lubricated, use half of values shown.



NEW Needle Bearing CAM FOLLOWERS-SEALED

- High-Carbon Steel Through-Hardened and Ground Outer Race
- Low-Carbon Alloy Steel Hardened Studs and Inner Races



Catalog Number	Nom. I.D.	Roller		Stud			Lubrication			
		A O.D +.000 -.001	B Width +.000 -.005	ØC +.001 -.000	D Length ±.010	E Min. Eff. Thread Length ±.030	F Thread Class 2A	G Oil Hole Center	ØH Oil Hole	J Lube Fitting Size
BBXCAM-CN56 <input type="checkbox"/>	1-3/4	1.750	1.000	.750	1.750	.875	3/4-16	7/16	3/32	3/16
BBXCAM-CN60 <input type="checkbox"/>	1-7/8	1.875	1.000	.750	1.750	.875	3/4-16	7/16	3/32	3/16
BBXCAM-CN64 <input type="checkbox"/>	2	2.000	1.250	.875	2.000	1.000	7/8-14	1/2	1/8	3/16
BBXCAM-CN72 <input type="checkbox"/>	2-1/4	2.250	1.250	.875	2.000	1.000	7/8-14	1/2	1/8	3/16
BBXCAM-CN80 <input type="checkbox"/>	2-1/2	2.500	1.500	1.000	2.250	1.125	1-14	9/16	1/8	3/16
BBXCAM-CN88 <input type="checkbox"/>	2-3/4	2.750	1.500	1.000	2.250	1.125	1-14	9/16	1/8	3/16
BBXCAM-CN96 <input type="checkbox"/>	3	3.000	1.750	1.250	2.500	1.250	1-1/4-12	5/8	1/8	1/4
BBXCAM-CN104 <input type="checkbox"/>	3-1/4	3.250	1.750	1.250	2.500	1.250	1-1/4-12	5/8	1/8	1/4
BBXCAM-CN112 <input type="checkbox"/>	3-1/2	3.500	2.000	1.375	2.750	1.375	1-3/8-12	11/16	1/8	1/4
BBXCAM-CN128 <input type="checkbox"/>	4	4.000	2.250	1.500	3.500	1.500	1-1/2-12	3/4	1/8	1/4

Catalog Number	Other Specs.				
	Min. Boss Dia.	Recom. Bore +.0005 -.0000	Recom.* Torque lb. in.	Max. Static Capacity lbs.	Basic Dyn. Rating lbs.
BBXCAM-CN56 <input type="checkbox"/>	1-3/64	.7500	1250	7920	6385
BBXCAM-CN60 <input type="checkbox"/>	1-3/64	.7500	1250	7920	6385
BBXCAM-CN64 <input type="checkbox"/>	1-13/64	.8750	1500	10570	8090
BBXCAM-CN72 <input type="checkbox"/>	1-13/64	.8750	1500	10570	8090
BBXCAM-CN80 <input type="checkbox"/>	1-5/16	1.0000	2250	16450	11720
BBXCAM-CN88 <input type="checkbox"/>	1-5/16	1.0000	2250	16450	11720
BBXCAM-CN96 <input type="checkbox"/>	1-3/4	1.2500	3450	24910	15720
BBXCAM-CN104 <input type="checkbox"/>	1-3/4	1.2500	3450	24910	15720
BBXCAM-CN112 <input type="checkbox"/>	1-59/64	1.3750	4200	31625	22800
BBXCAM-CN128 <input type="checkbox"/>	2-9/32	1.5000	5000	44770	29985

HEAD:
S Slotted
H Hex

*Clamping torque is based on dry threads. If threads are lubricated, use half of values shown.

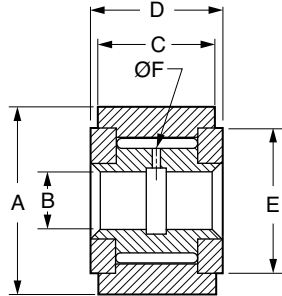


NEW

Needle Bearing

CAM YOKE ROLLERS-SEALED

- High-Carbon Steel Through-Hardened and Ground Outer Race
- Low-Carbon Alloy Steel Induction Hardened Inner Races
- Shafts should be hardened to Rc 58 min.

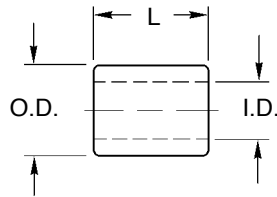


Catalog Number	Nom. I.D.	A O.D. +.000 -.001	B Bore +.0002 -.0004	C Width +.000 -.005	D Overall Width +.005 -.010	E Flange O.D. Ref.	F Oil Hole	Recom. Shaft Dia. ±.0002	Max. Static Load Rating lbs.	Basic Dyn. Load Rating lbs.
BBXCAM-YN24	3/4	.750	.250	.500	.5625	5/8	3/32	.2497	4130	1660
BBXCAM-YN28	7/8	.875	.250	.500	.5625	5/8	3/32	.2497	4130	1660
BBXCAM-YN32	1	1.000	.3125	.625	.6875	23/32	3/32	.3122	6120	2225
BBXCAM-YN36	1-1/8	1.125	.3125	.625	.6875	23/32	3/32	.3122	6120	2225
BBXCAM-YN40	1-1/4	1.250	.375	.750	.8125	1	3/32	.3747	8500	3930
BBXCAM-YN44	1-3/8	1.375	.375	.750	.8125	1	3/32	.3747	8500	3930
BBXCAM-YN48	1-1/2	1.500	.4375	.875	.9375	1-1/8	3/32	.4372	11280	4840
BBXCAM-YN52	1-5/8	1.625	.4375	.875	.9375	1-1/8	3/32	.4372	11280	4840
BBXCAM-YN56	1-3/4	1.750	.500	1.000	1.0625	1-1/4	3/32	.4997	15840	6385
BBXCAM-YN60	1-7/8	1.875	.500	1.000	1.0625	1-1/4	3/32	.4997	15840	6385
BBXCAM-YN64	2	2.000	.625	1.250	1.3125	1-1/2	3/32	.6247	21140	8090
BBXCAM-YN72	2-1/4	2.250	.625	1.250	1.3125	1-1/2	3/32	.6247	21140	8090
BBXCAM-YN80	2-1/2	2.500	.750	1.500	1.5625	1-3/4	1/8	.7497	32900	11720
BBXCAM-YN88	2-3/4	2.750	.750	1.500	1.5625	1-3/4	1/8	.7497	32900	11720
BBXCAM-YN96	3	3.000	1.000	1.750	1.8125	2-1/4	1/8	.9996	49820	15720
BBXCAM-YN104	3-1/4	3.250	1.000	1.750	1.8125	2-1/4	1/8	.9996	49820	15720
BBXCAM-YN112	3-1/2	3.500	1.125	2.000	2.0625	2-7/16	1/8	1.1246	63250	22800

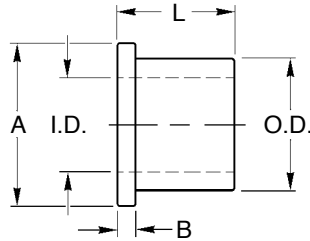


Nonmetallic SLEEVE BEARINGS-PLAIN | FLANGED

• Machined Ertalyte Polyester • Self-Lubricating



PLAIN



FLANGED



PLAIN BEARINGS

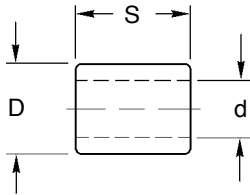
Temperature Range: 32°F to +210°F

Catalog Number	I.D. +.0015 -.0000	O.D. +.002 -.000	L Length ±.005
BSPPLN-040800E	.128	.252	1/4
BSPPLN-041200E			3/8
BSPPLN-060800E	.190	.315	1/4
BSPPLN-061200E			3/8
BSPPLN-080800E			1/4
BSPPLN-081200E	.253	.377	3/8
BSPPLN-081600E			1/2
BSPPLN-101200E	.316	.503	3/8
BSPPLN-101600E			1/2
BSPPLN-121200E	.379	.503	3/8
BSPPLN-121600E			1/2
BSPPLN-161600E	.504	.753	1/2
BSPPLN-162400E			3/4

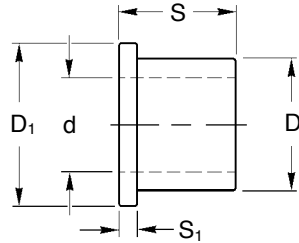
FLANGED BEARINGS

Temperature Range: 32°F to +210°F

Catalog Number	I.D. +.0015 -.0000	O.D. +.002 -.000	L Length ±.005	A Flange Diameter ±.005	B Flange Width ±.003
BSPFLN-060802E	.190	.315	1/4	7/16	1/16
BSPFLN-061202E			3/8		
BSPFLN-081202E	.253	.377	3/8	1/2	1/16
BSPFLN-081602E			1/2		
BSPFLN-101202E	.316	.440	3/8	9/16	1/16
BSPFLN-101602E			1/2		
BSPFLN-121202E	.379	.503	3/8	5/8	1/16
BSPFLN-121602E			1/2		
BSPFLN-161603E	.504	.753	1/2	1	3/32
BSPFLN-162403E			3/4		



PLAIN



FLANGED



PLAIN BEARINGS Temperature Range: -40°C to +121°C

Catalog Number	d +0.04	D +0.05	S Length ±0.13
BSPPLNM030400E	3.06	6.05	4
BSPPLNM030600E			6
BSPPLNM040400E	4.06	8.06	4
BSPPLNM040600E			6
BSPPLNM050600E			6
BSPPLNM050800E	5.06	10.05	8
BSPPLNM051000E			10
BSPPLNM060800E	6.07	10.05	8
BSPPLNM061200E			12
BSPPLNM080800E	8.08	12.07	8
BSPPLNM081200E			12
BSPPLNM101200E	10.1	16.07	12
BSPPLNM101600E			16

FLANGED BEARINGS

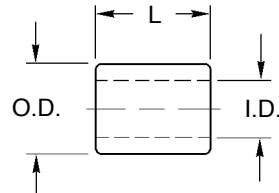
Temperature Range: -40°C to +121°C

Catalog Number	d +0.04	D +0.05	S Length ±0.13	D ₁ Flange Diameter ±0.13	S ₁ Flange Width ±0.08
BSPFLNM040402E	4.06	8.06	4	10	2
BSPFLNM040602E			6		
BSPFLNM050802E	5.06	10.05	8	12	2
BSPFLNM051002E			10		
BSPFLNM060802E	6.07	10.05	8	14	2
BSPFLNM061202E			12		
BSPFLNM080802E	8.08	12.07	8	15.8	2
BSPFLNM081202E			12		
BSPFLNM101203E	10.1	16.07	12	20	3
BSPFLNM101603E			16		



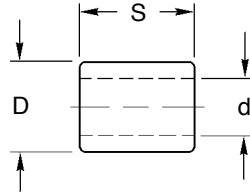
Nonmetallic SLEEVE BEARINGS-PLAIN

- Machined Teflon



Catalog Number	Shaft Size (Ref.)	I.D. +.005 -.000	O.D. +.005 -.000	L ±.010
BSPPLN-040804T	1/8	.126	.252	.125
BSPPLN-040806T				.187
BSPPLN-040808T				.250
BSPPLN-040812T				.375
BSPPLN-061004T	3/16	.188	.315	.125
BSPPLN-061008T				.250
BSPPLN-061012T				.375
BSPPLN-061016T				.500
BSPPLN-081208T	1/4	.251	.377	.250
BSPPLN-081212T				.375
BSPPLN-081216T				.500
BSPPLN-081220T				.625
BSPPLN-101408T				.250
BSPPLN-101412T	5/16	.313	.439	.375
BSPPLN-101416T				.500
BSPPLN-101420T				.625
BSPPLN-101424T				.750
BSPPLN-121612T				.375
BSPPLN-121616T	3/8	.376	.502	.500
BSPPLN-121620T				.625
BSPPLN-121624T				.750
BSPPLN-162016T				.500
BSPPLN-162020T	1/2	.501	.628	.625
BSPPLN-162024T				.750
BSPPLN-162032T				1.000

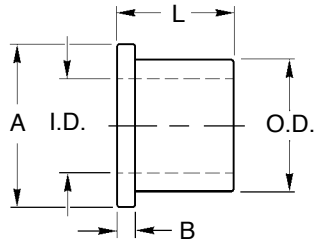
- Machined Teflon



Catalog Number	Shaft Size (Ref.)	d +0.13	D ±0.13	S ±0.12
BSPPLNM030604T	3	3.018	6.04	4
BSPPLNM030606T				6
BSPPLNM030610T				10
BSPPLNM050804T	5	5.018	8.04	4
BSPPLNM050808T				8
BSPPLNM050812T				12
BSPPLNM061006T	6	6.018	10.04	6
BSPPLNM061010T				10
BSPPLNM061012T				12
BSPPLNM061016T				16
BSPPLNM081208T	8	8.018	12.05	8
BSPPLNM081212T				12
BSPPLNM081216T				16
BSPPLNM101308T	10	10.018	13.05	8
BSPPLNM101310T				10
BSPPLNM101316T				16
BSPPLNM101320T				20
BSPPLNM121610T	12	12.018	16.05	10
BSPPLNM121612T				12
BSPPLNM121620T				20
BSPPLNM121625T				25

Nonmetallic SLEEVE BEARINGS-FLANGED

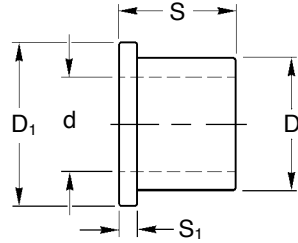
- Machined Teflon



Catalog Number	Shaft Size (Ref.)	I.D. +.005 -.000	O.D. +.005 -.000	L ±.010	A ±.010	B ±.005
BSPFLN-040804T	1/8	.126	.252	.125	.312	.047
BSPFLN-040806T				.187		
BSPFLN-040808T				.250		
BSPFLN-040812T				.375		
BSPFLN-061004T	3/16	.188	.315	.125	.375	.047
BSPFLN-061008T				.250		
BSPFLN-061012T				.375		
BSPFLN-061016T				.500		
BSPFLN-081208T	1/4	.251	.377	.250	.500	.047
BSPFLN-081212T				.375		
BSPFLN-081216T				.500		
BSPFLN-081220T				.625		
BSPFLN-101408T	5/16	.313	.439	.250	.562	.093
BSPFLN-101412T				.375		
BSPFLN-101416T				.500		
BSPFLN-101420T				.625		
BSPFLN-101424T				.750		
BSPFLN-121612T	3/8	.376	.502	.375	.687	.093
BSPFLN-121616T				.500		
BSPFLN-121620T				.625		
BSPFLN-121624T				.750		
BSPFLN-162016T	1/2	.501	.628	.500	.875	.125
BSPFLN-162020T				.625		
BSPFLN-162024T				.750		
BSPFLN-162032T				1.000		

Nonmetallic SLEEVE BEARINGS-FLANGED

- Machined Teflon



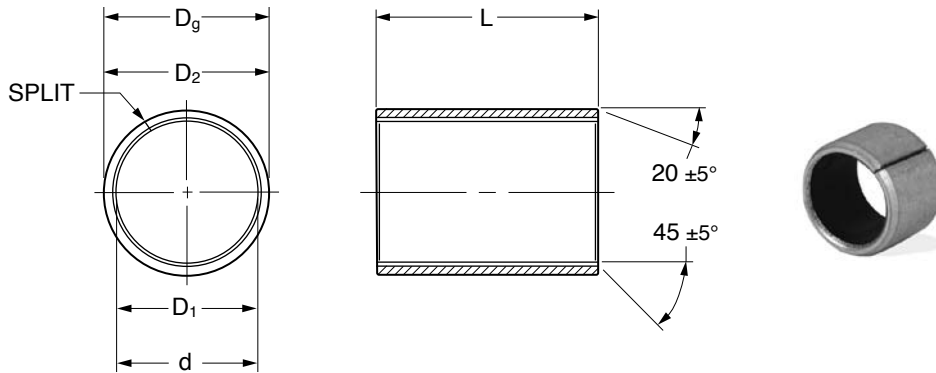
Catalog Number	Shaft Size (Ref.)	d +0.13	D ±0.13	S ±0.12	D ₁ ±0.25	S ₁ ±0.13
BSPFLNM030604T	3	3.018	6.04	4	8	1.2
BSPFLNM030606T				6		
BSPFLNM030610T				10		
BSPFLNM050804T	5	5.018	8.04	4	10	1.2
BSPFLNM050808T				8		
BSPFLNM050812T				12		
BSPFLNM061006T	6	6.018	10.04	6	12	1.2
BSPFLNM061010T				10		
BSPFLNM061012T				12		
BSPFLNM061016T				16		
BSPFLNM081208T	8	8.018	12.05	8	16	1.5
BSPFLNM081212T				12		
BSPFLNM081216T				16		
BSPFLNM101308T	10	10.018	13.05	8	16	1.5
BSPFLNM101310T				10		
BSPFLNM101316T				16		
BSPFLNM101320T				20		
BSPFLNM121610T	12	12.018	16.05	10	19	1.5
BSPFLNM121612T				12		
BSPFLNM121620T				20		
BSPFLNM121625T				25		



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D _{1E} Installed I.D.			
BSNPLN-02TH02	.1250	.1875	.1250	.1243	.1878	.1268			
BSNPLN-02TH03			.1875	.1236	.1873	.1243			
BSNPLN-025TH025	.1563	.2188	.1563	.1554	.2191	.1581			
BSNPLN-025TH04			.2500	.1547	.2186	.1556			
BSNPLN-03TH03	.1875	.2500	.1875	.1865	.2503	.1893			
BSNPLN-03TH04			.2500	.1858	.2497	.1867			
BSNPLN-03TH06			.3750						
BSNPLN-04TH04	.2500	.3125	.2500	.2490	.3128	.2518			
BSNPLN-04TH06			.3750	.2481	.3122	.2492			
BSNPLN-05TH06	.3125	.3750	.3750	.3115	.3753	.3143			
BSNPLN-05TH08			.5000	.3106	.3747	.3117			
BSNPLN-06TH03	.3750	.4688	.1875	.3740	.4691	.3769			
BSNPLN-06TH04			.2500						
BSNPLN-06TH06			.3750						
BSNPLN-06TH08			.5000				.3731	.4684	.3742
BSNPLN-06TH10			.6250						
BSNPLN-06TH12			.7500						
BSNPLN-07TH08	.4375	.5313	.5000	.4365	.5316	.4394			
BSNPLN-07TH12			.7500	.4355	.5309	.4367			
BSNPLN-08TH04	.5000	.5938	.2500	.4990	.5941	.5019			
BSNPLN-08TH06			.3750						
BSNPLN-08TH08			.5000				.4980	.5934	.4992
BSNPLN-08TH10			.6250						
BSNPLN-08TH12			.7500						
BSNPLN-08TH14			.8750						
BSNPLN-09TH06	.5625	.6563	.3750	.5615	.6566	.5644			
BSNPLN-09TH08			.5000						
BSNPLN-09TH10			.6250				.5605	.6559	.5617
BSNPLN-09TH12			.7500						
BSNPLN-10TH04	.6250	.7188	.2500	.6240	.7192	.6270			
BSNPLN-10TH08			.5000	.6230	.7184	.6242			
BSNPLN-10TH10			.6250						

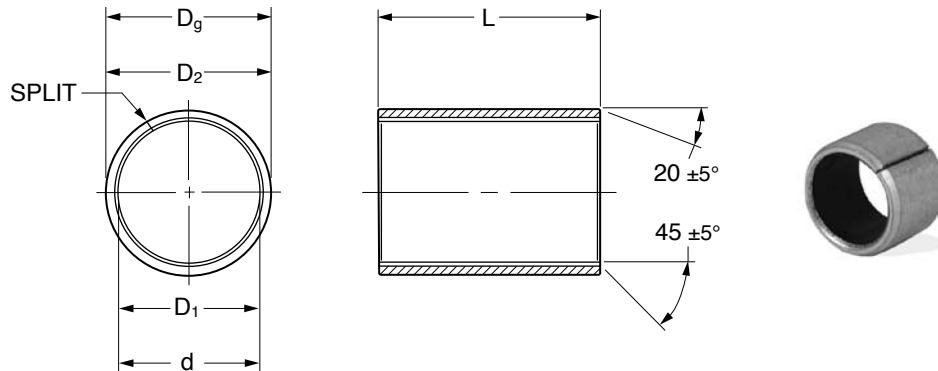
NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

Continued on the next page

NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLN-10TH12	.6250	.7188	.7500	.6240	.7192	.6270
BSNPLN-10TH14			.8750	.6230	.7184	.6242
BSNPLN-10TH16			1.0000			
BSNPLN-11TH14	.6875	.7813	.8750	.6865 .6855	.7817 .7809	.6895 .6867
BSNPLN-12TH04	.7500	.8750	.2500	.7491 .7479	.8755 .8747	.7525 .7493
BSNPLN-12TH06			.3750			
BSNPLN-12TH08			.5000			
BSNPLN-12TH10			.6250			
BSNPLN-12TH12			.7500			
BSNPLN-12TH16	1.0000					
BSNPLN-13TH12	.8125	.9375	.7500	.8116	.9380	.8150
BSNPLN-13TH18			1.1250	.8104	.9372	.8118
BSNPLN-14TH04	.8750	1.0000	.2500	.8741 .8729	1.0005 .9997	.8775 .8743
BSNPLN-14TH06			.3750			
BSNPLN-14TH12			.7500			
BSNPLN-14TH14			.8750			
BSNPLN-14TH16			1.0000			
BSNPLN-14TH20	1.2500					
BSNPLN-16TH06	1.0000	1.1250	.3750	.9991 .9979	1.1256 1.1246	1.0026 .9992
BSNPLN-16TH08			.5000			
BSNPLN-16TH12			.7500			
BSNPLN-16TH16			1.0000			
BSNPLN-16TH20			1.2500			
BSNPLN-16TH24	1.5000					
BSNPLN-18TH06	1.1250	1.2813	.3750	1.1238 1.1226	1.2818 1.2808	1.1278 1.1240
BSNPLN-18TH10			.6250			
BSNPLN-18TH12			.7500			
BSNPLN-18TH16			1.0000			
BSNPLN-20TH06	1.2500	1.4063	.3750	1.2488 1.2472	1.4068 1.4058	1.2528 1.2490
BSNPLN-20TH12			.7500			
BSNPLN-20TH14			.8750			

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

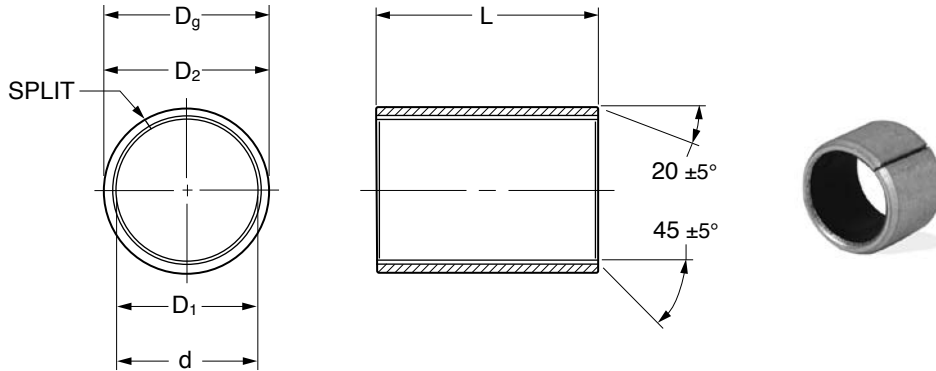
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D _{1E} Installed I.D.			
BSNPLN-20TH16	1.2500	1.4063	1.0000	1.2488	1.4068	1.2528			
BSNPLN-20TH20			1.2500	1.2472	1.4058	1.2490			
BSNPLN-20TH28			1.7500						
BSNPLN-22TH12	1.3750	1.5313	.7500	1.3738	1.5318	1.3778			
BSNPLN-22TH16			1.0000				1.3722	1.5308	1.3740
BSNPLN-22TH22			1.3750						
BSNPLN-22TH24			1.5000						
BSNPLN-22TH28			1.7500						
BSNPLN-24TH08			1.5000	1.6563	.5000	1.4988	1.6568	1.5028	
BSNPLN-24TH16	1.0000	1.4972			1.6558				1.4990
BSNPLN-24TH18	1.1250								
BSNPLN-24TH20	1.2500								
BSNPLN-24TH24	1.5000								
BSNPLN-24TH32	2.0000								
BSNPLN-26TH16	1.6250	1.7813	1.0000	1.6238	1.7818	1.6278			
BSNPLN-26TH24			1.5000	1.6222	1.7808	1.6240			
BSNPLN-28TH16	1.7500	1.9375	1.0000	1.7487	1.9381	1.7535			
BSNPLN-28TH24			1.5000				1.7471	1.9371	1.7489
BSNPLN-28TH28			1.7500						
BSNPLN-28TH32			2.0000						
BSNPLN-30TH12	1.8750	2.0625	.7500	1.8737	2.0633	1.8787			
BSNPLN-30TH16			1.0000				1.8721	2.0621	1.8739
BSNPLN-30TH30			1.8750						
BSNPLN-30TH36			2.2500						
BSNPLN-32TH08	2.0000	2.1875	.5000	1.9987	2.1883	2.0037			
BSNPLN-32TH16			1.0000	1.9969	2.1871	1.9989			
BSNPLN-32TH24			1.5000						

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

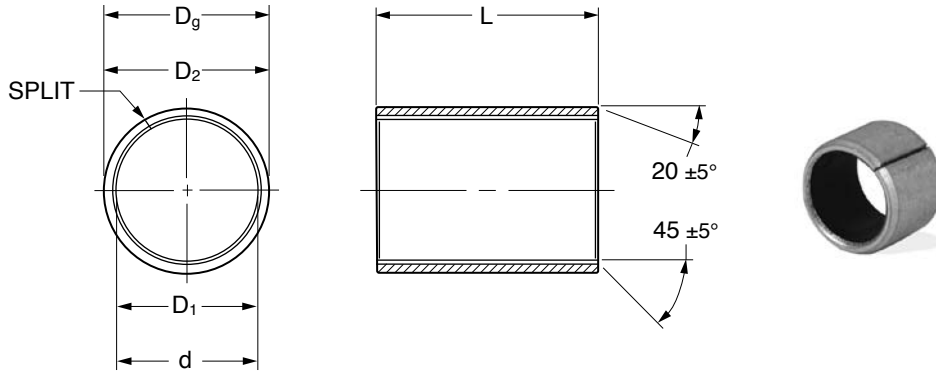
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLN-32TH28	2.0000	2.1875	1.7500	1.9987	2.1883	2.0037
BSNPLN-32TH32			2.0000			
BSNPLN-32TH40			2.5000			
BSNPLN-34TH48	2.1250	2.3125	3.0000	2.1257 2.1239	2.3127 2.3115	2.1323 2.1259
BSNPLN-36TH28	2.2500	2.4375	1.7500	2.2507 2.2489	2.4377 2.4365	2.2573 2.2509
BSNPLN-36TH32			2.0000			
BSNPLN-36TH36			2.2500			
BSNPLN-36TH40			2.5000			
BSNPLN-36TH48			3.0000			
BSNPLN-36TH56			3.5000			
BSNPLN-36TH60			3.7500			
BSNPLN-36TH64	4.0000					
BSNPLN-36TH72	4.5000					
BSNPLN-40TH16	2.5000	2.6875	1.0000	2.5011 2.4993	2.6881 2.6869	2.5077 2.5013
BSNPLN-40TH26			1.6250			
BSNPLN-40TH32			2.0000			
BSNPLN-40TH40			2.5000			
BSNPLN-40TH48			3.0000			
BSNPLN-40TH56			3.5000			
BSNPLN-40TH60			3.7500			
BSNPLN-40TH64			4.0000			
BSNPLN-40TH72			4.5000			
BSNPLN-40TH76			4.7500			
BSNPLN-44TH32	2.7500	2.9375	2.0000	2.7500 2.7482	2.9370 2.9358	2.7566 2.7502
BSNPLN-44TH36			2.2500			
BSNPLN-44TH40			2.5000			
BSNPLN-44TH48			3.0000			

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

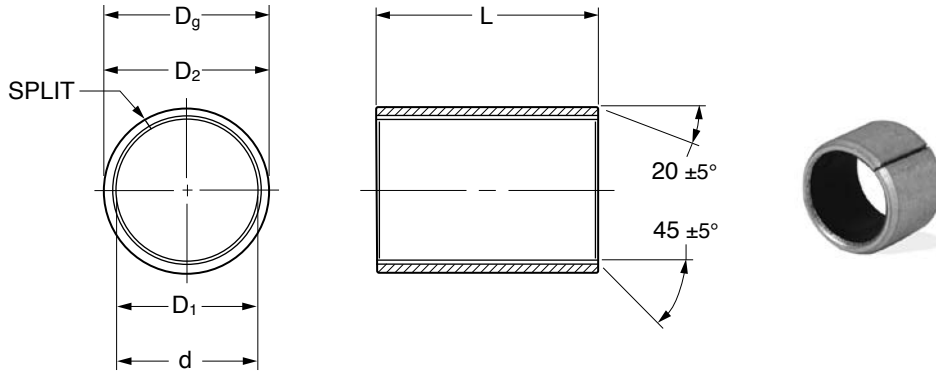
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLN-44TH56	2.7500	2.9375	3.5000	2.7500	2.9370	2.7566
BSNPLN-44TH60			3.7500			
BSNPLN-44TH64			4.0000			
BSNPLN-44TH72			4.5000			
BSNPLN-44TH76			4.7500			
BSNPLN-44TH80			5.0000	2.7482	2.9358	2.7502
BSNPLN-46TH32	2.8750	3.0625	2.0000	2.8752	3.0623	2.8819
BSNPLN-46TH36			2.2500			
BSNPLN-46TH40			2.5000			
BSNPLN-46TH48			3.0000			
BSNPLN-46TH56			3.5000			
BSNPLN-46TH60			3.7500			
BSNPLN-46TH64			4.0000			
BSNPLN-46TH72			4.5000			
BSNPLN-46TH76			4.7500			
BSNPLN-46TH80			5.0000			
BSNPLN-48TH32	3.0000	3.1875	2.0000	3.0000	3.1872	3.0068
BSNPLN-48TH36			2.2500			
BSNPLN-48TH40			2.5000			
BSNPLN-48TH48			3.0000			
BSNPLN-48TH56			3.5000			
BSNPLN-48TH60			3.7500			
BSNPLN-48TH64			4.0000			
BSNPLN-48TH72			4.5000			
BSNPLN-48TH76			4.7500			
BSNPLN-48TH80			5.0000			

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

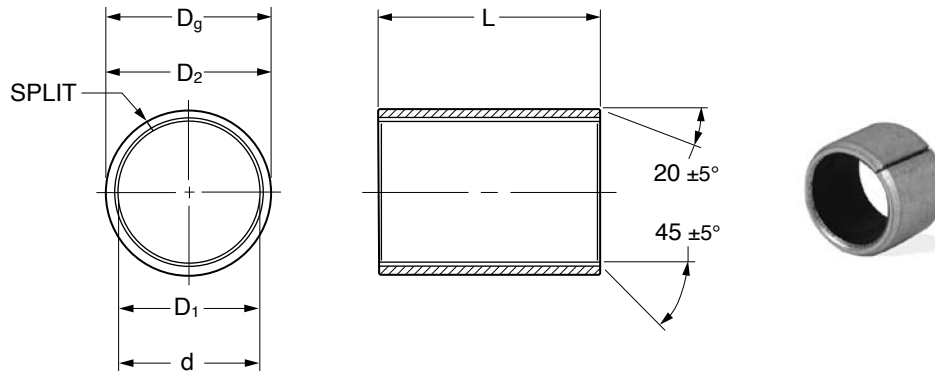
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.				
BSNPLN-52TH32	3.2500	3.4375	2.0000	3.2500	3.4372	3.2568				
BSNPLN-52TH38			2.3750							
BSNPLN-52TH40			2.5000							
BSNPLN-52TH48			3.0000							
BSNPLN-52TH56			3.5000							
BSNPLN-52TH60			3.7500							
BSNPLN-52TH64			4.0000							
BSNPLN-52TH72			4.5000							
BSNPLN-52TH76	3.5000	3.6875	4.7500	3.5000	3.6872	3.5068				
BSNPLN-52TH80			5.0000							
BSNPLN-56TH32			2.0000				3.6250	3.8122	3.8108	3.6318
BSNPLN-56TH38			2.3750							
BSNPLN-56TH40			2.5000							
BSNPLN-56TH48			3.0000							
BSNPLN-56TH56			3.5000							
BSNPLN-56TH60			3.7500							
BSNPLN-56TH64	4.0000									
BSNPLN-56TH72	4.5000									
BSNPLN-56TH76	3.6250	3.8125	4.7500	3.6228	3.8108	3.6258				
BSNPLN-56TH80			5.0000							
BSNPLN-58TH32			2.0000				3.6250	3.8122	3.8108	3.6318
BSNPLN-58TH36			2.2500							
BSNPLN-58TH40			2.5000							
BSNPLN-58TH48			3.0000							
BSNPLN-58TH56			3.5000							
BSNPLN-58TH60			3.7500							
BSNPLN-58TH64	4.0000									

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

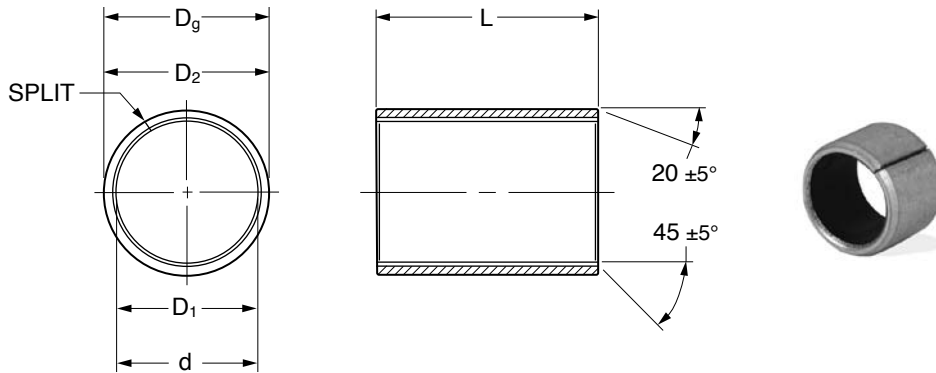
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLN-58TH72	3.6250	3.8125	4.5000	3.6250	3.8122	3.6318
BSNPLN-58TH76			4.7500			
BSNPLN-58TH80			5.0000			
BSNPLN-60TH32	3.7500	3.9375	2.0000	3.7500	3.9372	3.7568
BSNPLN-60TH36			2.2500			
BSNPLN-60TH40			2.5000			
BSNPLN-60TH48			3.0000			
BSNPLN-60TH56			3.5000			
BSNPLN-60TH60			3.7500			
BSNPLN-60TH64			4.0000			
BSNPLN-60TH72			4.5000			
BSNPLN-60TH76			4.7500			
BSNPLN-60TH80			5.0000			
BSNPLN-64TH32	4.0000	4.1875	2.0000	4.0000	4.1872	4.0068
BSNPLN-64TH36			2.2500			
BSNPLN-64TH40			2.5000			
BSNPLN-64TH48			3.0000			
BSNPLN-64TH56			3.5000			
BSNPLN-64TH60			3.7500			
BSNPLN-64TH64			4.0000			
BSNPLN-64TH72			4.5000			
BSNPLN-64TH76			4.7500			
BSNPLN-64TH80			5.0000			
BSNPLN-68TH32	4.2500	4.4375	2.0000	4.2500	4.4372	4.2568
BSNPLN-68TH36			2.2500			
BSNPLN-68TH40			2.5000			
BSNPLN-68TH48			3.0000			
				4.2478	4.4358	4.2502

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

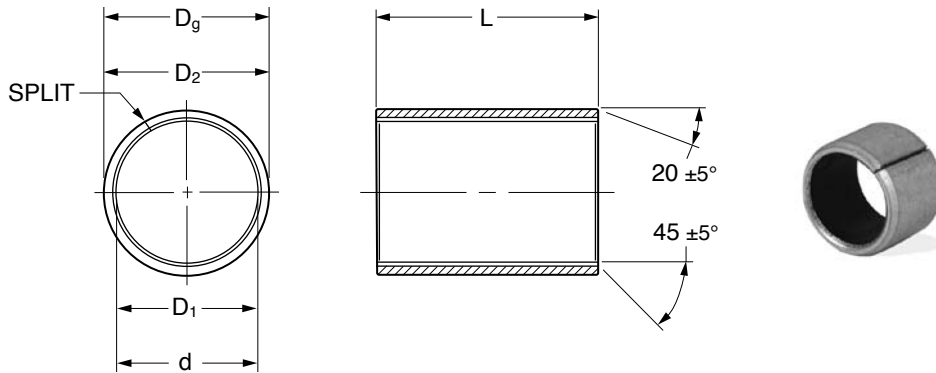
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLN-68TH56	4.2500	4.4375	3.5000	4.2500	4.4372	4.2568
BSNPLN-68TH60			3.7500			
BSNPLN-68TH64			4.0000			
BSNPLN-68TH72			4.5000			
BSNPLN-68TH76			4.7500			
BSNPLN-68TH80			5.0000			
BSNPLN-70TH32	4.3750	4.5625	2.0000	4.3750	4.5622	4.3818
BSNPLN-70TH36			2.2500			
BSNPLN-70TH40			2.5000			
BSNPLN-70TH48			3.0000			
BSNPLN-70TH56			3.5000			
BSNPLN-70TH60			3.7500			
BSNPLN-70TH64			4.0000			
BSNPLN-70TH72			4.5000			
BSNPLN-70TH76			4.7500			
BSNPLN-70TH80			5.0000			
BSNPLN-72TH32	4.5000	4.6875	2.0000	4.5000	4.6872	4.5068
BSNPLN-72TH36			2.2500			
BSNPLN-72TH40			2.5000			
BSNPLN-72TH48			3.0000			
BSNPLN-72TH56			3.5000			
BSNPLN-72TH60			3.7500			
BSNPLN-72TH64			4.0000			
BSNPLN-72TH72			4.5000			
BSNPLN-72TH76			4.7500			
BSNPLN-72TH80	5.0000					

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

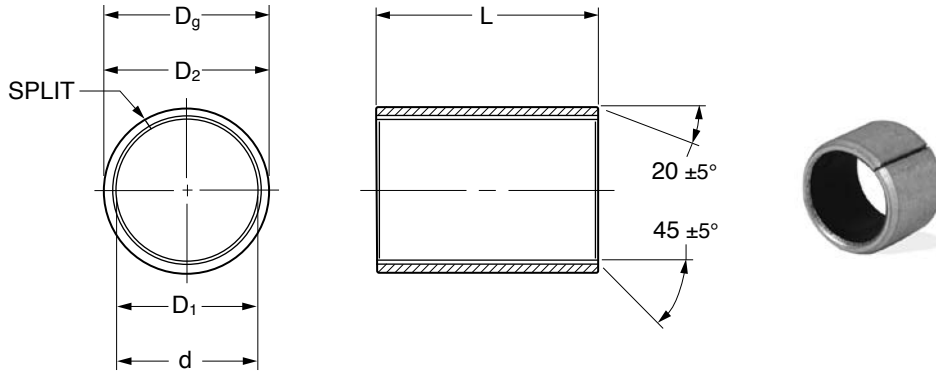
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLN-76TH32	4.7500	4.9375	2.0000	4.7500	4.9374	4.7570
BSNPLN-76TH36			2.2500			
BSNPLN-76TH40			2.5000			
BSNPLN-76TH48			3.0000			
BSNPLN-76TH56			3.5000			
BSNPLN-76TH60			3.7500			
BSNPLN-76TH64			4.0000			
BSNPLN-76TH72			4.5000			
BSNPLN-76TH76			4.7500			
BSNPLN-76TH80			5.0000			
BSNPLN-80TH32	5.0000	5.1875	2.0000	4.9986	5.1860	5.0056
BSNPLN-80TH36			2.2500			
BSNPLN-80TH40			2.5000			
BSNPLN-80TH48			3.0000			
BSNPLN-80TH56			3.5000			
BSNPLN-80TH60			3.7500			
BSNPLN-80TH64			4.0000			
BSNPLN-80TH72			4.5000			
BSNPLN-80TH76			4.7500			
BSNPLN-80TH80			5.0000			
BSNPLN-84TH32	5.2500	5.4375	2.0000	5.2500	5.4374	5.2570
BSNPLN-84TH36			2.2500			
BSNPLN-84TH40			2.5000			
BSNPLN-84TH48			3.0000			
BSNPLN-84TH56			3.5000			
BSNPLN-84TH60			3.7500			
BSNPLN-84TH64			4.0000			
			5.2475			

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

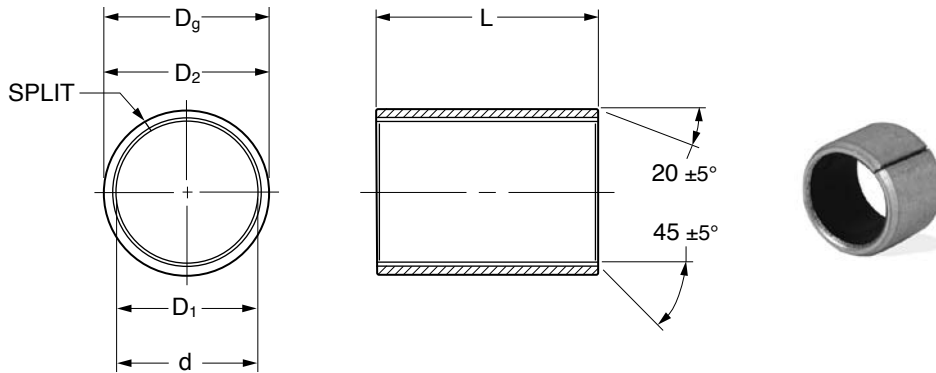
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing
- Self-Lubricated Liner
- Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.	
BSNPLN-84TH72	5.2500	5.4375	4.5000	5.2500	5.4374	5.2570	
BSNPLN-84TH76			4.7500				5.4358
BSNPLN-84TH80			5.0000				
BSNPLN-88TH32	5.5000	5.6875	2.0000	5.5000	5.6874	5.5070	
BSNPLN-88TH36			2.2500				
BSNPLN-88TH40			2.5000				
BSNPLN-88TH48			3.0000				
BSNPLN-88TH56			3.5000				
BSNPLN-88TH60			3.7500				
BSNPLN-88TH64			4.0000				
BSNPLN-88TH72			4.5000				
BSNPLN-88TH76			4.7500				
BSNPLN-88TH80			5.0000				
BSNPLN-92TH32	5.7500	5.9375	2.0000	5.7500	5.9374	5.7570	
BSNPLN-92TH36			2.2500				
BSNPLN-92TH40			2.5000				
BSNPLN-92TH48			3.0000				
BSNPLN-92TH56			3.5000				
BSNPLN-92TH60			3.7500				
BSNPLN-92TH64			4.0000				
BSNPLN-92TH72			4.5000				
BSNPLN-92TH76			4.7500				
BSNPLN-92TH80			5.0000				
BSNPLN-96TH32	6.0000	6.1875	2.0000	6.0000	6.1874	6.0070	
BSNPLN-96TH36			2.2500				
BSNPLN-96TH40			2.5000				
BSNPLN-96TH48			3.0000				

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

Continued on the next page

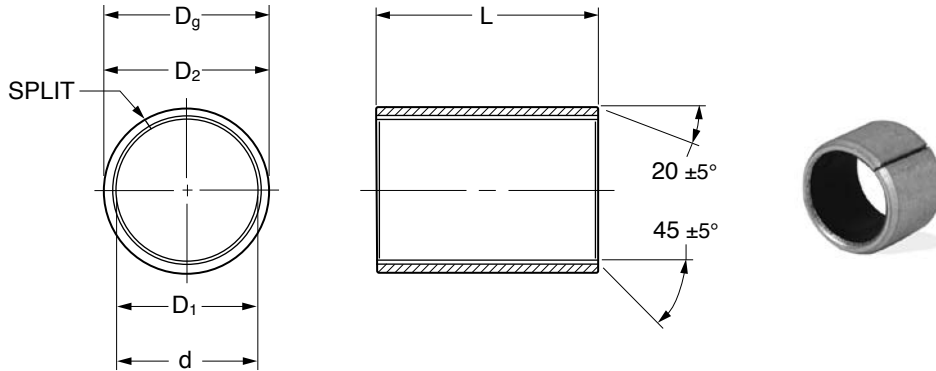


NEW

Self-Lubricating | Split-Type

PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



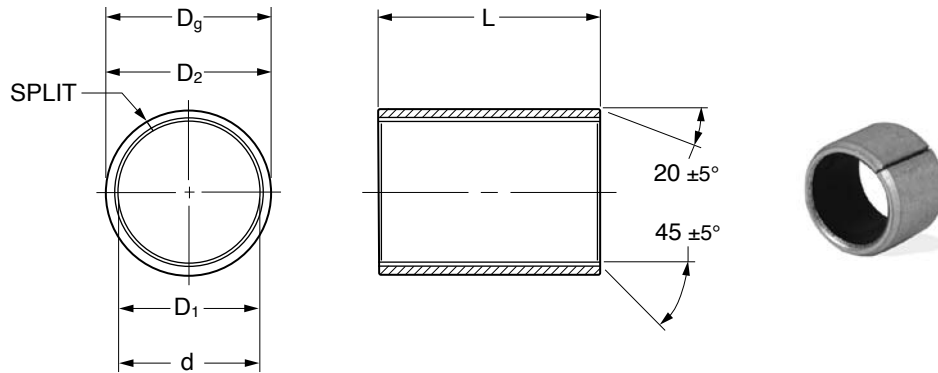
Catalog Number	D ₁	D ₂	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D _{1E} Installed I.D.
BSNPLN-96TH56	6.0000	6.1875	3.5000	6.0000	6.1874	6.0070
BSNPLN-96TH60			3.7500			
BSNPLN-96TH64			4.0000			
BSNPLN-96TH72			4.5000			
BSNPLN-96TH76			4.7500			
BSNPLN-96TH80			5.0000			
BSNPLN-100TH32	6.2500	6.4375	2.0000	6.2500	6.4374	6.2570
BSNPLN-100TH36			2.2500			
BSNPLN-100TH40			2.5000			
BSNPLN-100TH48			3.0000			
BSNPLN-100TH56			3.5000			
BSNPLN-100TH60			3.7500			
BSNPLN-100TH64			4.0000			
BSNPLN-100TH72			4.5000			
BSNPLN-100TH76			4.7500			
BSNPLN-100TH80			5.0000			
BSNPLN-104TH32	6.5000	6.6875	2.0000	6.5000	6.6874	6.5070
BSNPLN-104TH36			2.2500			
BSNPLN-104TH40			2.5000			
BSNPLN-104TH48			3.0000			
BSNPLN-104TH56			3.5000			
BSNPLN-104TH60			3.7500			
BSNPLN-104TH64			4.0000			
BSNPLN-104TH72			4.5000			
BSNPLN-104TH76			4.7500			
BSNPLN-104TH80			5.0000			

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±0.25	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLNMMB030453	3	4.5	3	2.994	4.500	3.000
BSNPLNMMB030454			4			
BSNPLNMMB030455			5			
BSNPLNMMB030456			6			
BSNPLNMMB040553	4	5.5	3	3.992	5.008	4.000
BSNPLNMMB040554			4			
BSNPLNMMB040556			6			
BSNPLNMMB0405510			10			
BSNPLNMMB05075	5	7	5	4.978	7.015	4.990
BSNPLNMMB05078			8			
BSNPLNMMB050710			10			
BSNPLNMMB06084	6	8	4	5.978	8.015	5.990
BSNPLNMMB06086			6			
BSNPLNMMB06088			8			
BSNPLNMMB060810			10			
BSNPLNMMB070910	7	9	10	6.972 6.987	9.000 9.015	6.990 7.055
BSNPLNMMB08106	8	10	6	7.972	10.015	7.990
BSNPLNMMB08108			8			
BSNPLNMMB081010			10			
BSNPLNMMB081012			12			
BSNPLNMMB10128	10	12	8	9.972 9.987	12.000 12.018	9.990 10.058

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

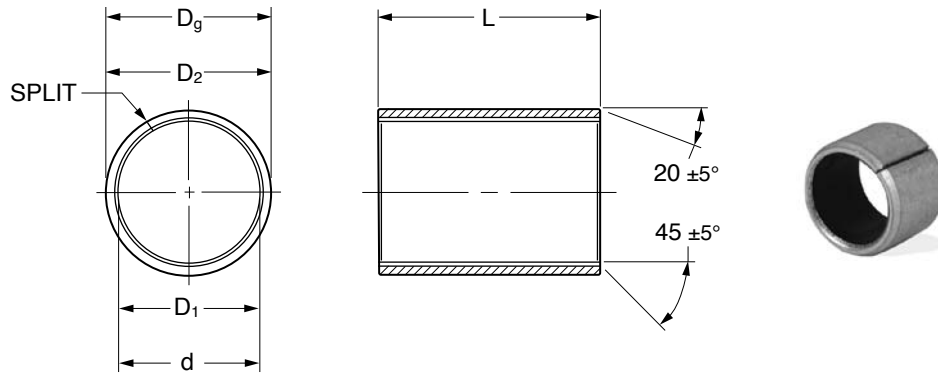
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±0.25	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLNMMB101210	10	12	10	9.972	12.000	9.990
BSNPLNMMB101212			12			
BSNPLNMMB101215			15			
BSNPLNMMB101220			20			
BSNPLNMMB12148	12	14	8	11.966	14.000	11.990
BSNPLNMMB121410			10			
BSNPLNMMB121412			12			
BSNPLNMMB121415			15			
BSNPLNMMB121420			20			
BSNPLNMMB121425	25					
BSNPLNMMB131510	13	15	10	12.966	15.000	12.990
BSNPLNMMB131520			20	12.984	15.018	13.058
BSNPLNMMB14165	14	16	5	13.966	16.000	13.990
BSNPLNMMB141610			10			
BSNPLNMMB141612			12			
BSNPLNMMB141615			15			
BSNPLNMMB141620			20			
BSNPLNMMB141625	25					
BSNPLNMMB151710	15	17	10	14.966	17.000	14.990
BSNPLNMMB151712			12	14.984	17.018	15.058
BSNPLNMMB151715			15			

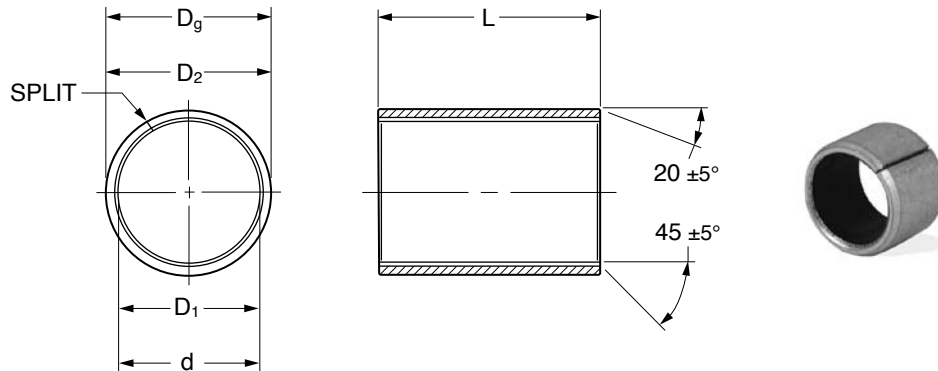
NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

Continued on the next page

NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±0.25	d Shaft Dia.	D _g Housing Bore	D _{1E} Installed I.D.
BSNPLNMMB151720	15	17	20	14.966	17.000	14.990
BSNPLNMMB151725			25	19.984	17.018	15.058
BSNPLNMMB161810	16	18	10	15.966	18.000	15.990
BSNPLNMMB161812			12			
BSNPLNMMB161815			15			
BSNPLNMMB161820			20			
BSNPLNMMB161825			25			
BSNPLNMMB171915	17	19	15	16.966	19.000	16.990
BSNPLNMMB171920			20	16.984	19.021	17.061
BSNPLNMMB182010	18	20	10	17.966	20.000	17.990
BSNPLNMMB182015			15			
BSNPLNMMB182020			20			
BSNPLNMMB182025			25			
BSNPLNMMB202210	20	22	10	19.959	22.000	19.990
BSNPLNMMB202215			15	19.980	22.021	20.061
BSNPLNMMB202220			20			
BSNPLNMMB202310	20	23	10	19.959	23.000	19.990
BSNPLNMMB202315			15			
BSNPLNMMB202320			20			
BSNPLNMMB202325			25			
BSNPLNMMB202330			30			

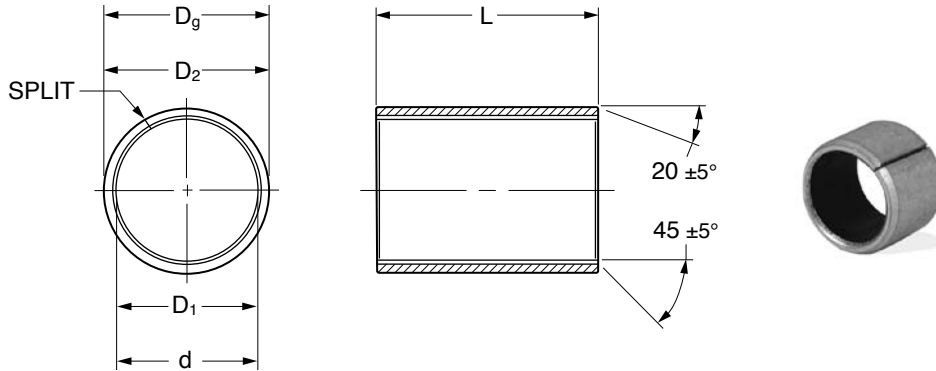
NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

Continued on the next page

NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



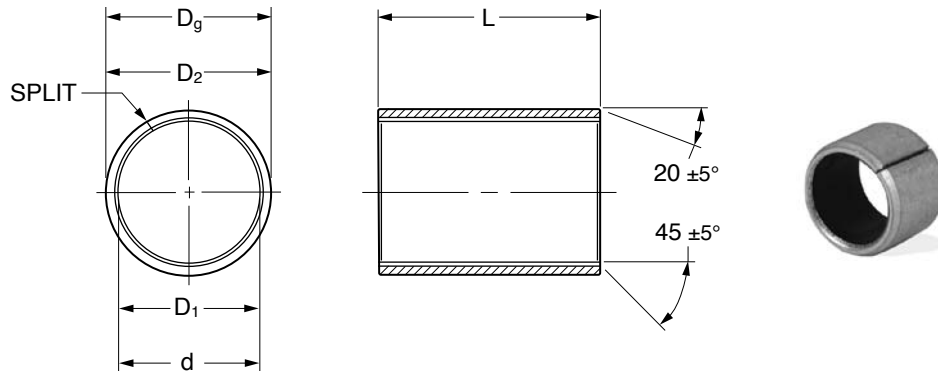
Catalog Number	D ₁	D ₂	L Length ±0.25	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLNMMB222515	22	25	15	21.959	25.000	21.990
BSNPLNMMB222520			20			
BSNPLNMMB222525			25			
BSNPLNMMB222530			30			
BSNPLNMMB222715	22	27	15	21.959	27.000	21.990
BSNPLNMMB222720			20			
BSNPLNMMB222725			25			
BSNPLNMMB222730			30			
BSNPLNMMB242815	24	28	15	23.959	28.000	23.990
BSNPLNMMB242820			20			
BSNPLNMMB242825			25			
BSNPLNMMB242830			30			
BSNPLNMMB252812	25	28	12	24.959	28.000	24.990
BSNPLNMMB252815			15			
BSNPLNMMB252820			20			
BSNPLNMMB252825			25			
BSNPLNMMB252830			30			
BSNPLNMMB252850			50			
BSNPLNMMB283215	28	32	15	27.959	32.000	27.990
BSNPLNMMB283220			20			
BSNPLNMMB283225			25			
BSNPLNMMB283230			30			
BSNPLNMMB303410	30	34	10	29.959	34.000	29.990
BSNPLNMMB303415			15	29.980	34.025	30.085

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

Continued on the next page

NEW
Self-Lubricating | Split-Type
PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±0.25	d Shaft Dia.	D _g Housing Bore	D _{1E} Installed I.D.
BSNPLNMMB303420	30	34	20	29.959	34.000	29.990
BSNPLNMMB303425			25			
BSNPLNMMB303430			30	34.025		
BSNPLNMMB303440			40			
BSNPLNMMB323620	32	36	20	31.950	36.000	31.990
BSNPLNMMB323630			30			
BSNPLNMMB323640			40	36.025		
BSNPLNMMB353920			35			
BSNPLNMMB353930	30	34.975				
BSNPLNMMB353935	35			39.025		
BSNPLNMMB353940	40					
BSNPLNMMB353950	50					
BSNPLNMMB374120	37	41	20	36.950 36.975	41.000 41.025	36.990 37.085
BSNPLNMMB404420	40	44	20	39.950	44.000	39.990
BSNPLNMMB404430			30			
BSNPLNMMB404440			40	44.025		
BSNPLNMMB404445			45			
BSNPLNMMB404450			50			
BSNPLNMMB455020	45	50	20	44.950	50.000	44.990
BSNPLNMMB455030			30			
BSNPLNMMB455040			40	50.025		
BSNPLNMMB455045			45			
BSNPLNMMB455050			50			

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

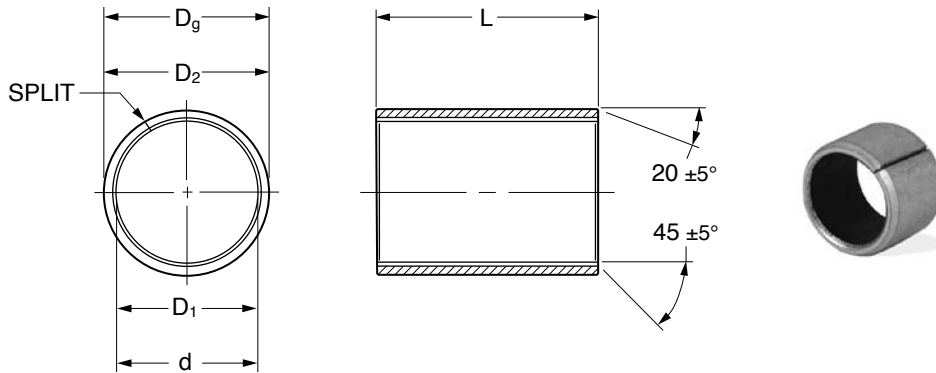
Continued on the next page



NEW

Self-Lubricating | Split-Type PLAIN SLEEVE BEARINGS

- Carbon Steel Backing • Self-Lubricated Liner • Maintenance-Free



Catalog Number	D ₁	D ₂	L Length ±0.25	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNPLNMMB505520	50	55	20	49.950	55.000	49.990
BSNPLNMMB505525			25			
BSNPLNMMB505530			30			
BSNPLNMMB505540			40			
BSNPLNMMB505550			50			
BSNPLNMMB505560			60	49.975	55.030	50.110
BSNPLNMMB556020	55	60	20	54.940	60.000	54.990
BSNPLNMMB556025			25			
BSNPLNMMB556030			30			
BSNPLNMMB556040			40			
BSNPLNMMB556050			50			
BSNPLNMMB556055			55			
BSNPLNMMB556060			60	54.970	60.030	55.110
BSNPLNMMB606520	60	65	20	59.940	65.000	59.990
BSNPLNMMB606530			30			
BSNPLNMMB606540			40			
BSNPLNMMB606550			50			
BSNPLNMMB606560			60			
BSNPLNMMB606570			70	59.970	65.030	60.110
BSNPLNMMB657030	65	70	30	64.940	70.000	64.990
BSNPLNMMB657040			40			
BSNPLNMMB657050			50			
BSNPLNMMB657070			70			
BSNPLNMMB707540	70	75	40	69.940	75.000	69.990
BSNPLNMMB707550			50			
BSNPLNMMB707560			60			
BSNPLNMMB707570			70			

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

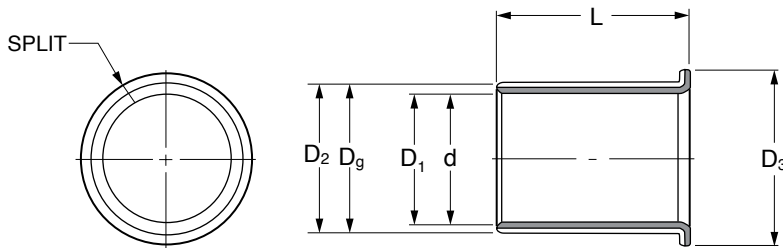


NEW

Self-Lubricating | Split-Type

FLANGED SLEEVE BEARINGS

- Carbon Steel Backing
- Self-Lubricated Liner
- Maintenance-Free



Catalog Number	D ₁	D ₂	D ₃ ±.020	L Length ±.010	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNFLN-06FTH04	.3750	.4688	.6875	.2500	.3740	.4691	.3769
BSNFLN-06FTH06				.3750			
BSNFLN-06FTH08				.5000			
BSNFLN-06FTH12				.7500	.3731	.4684	.3742
BSNFLN-08FTH04	.5000	.5938	.8125	.2500	.4990	.5941	.5019
BSNFLN-08FTH06				.3750			
BSNFLN-08FTH08				.5000			
BSNFLN-08FTH12				.7500	.4980	.5934	.4992
BSNFLN-10FTH06	.6250	.7188	.9375	.3750	.6240	.7192	.6270
BSNFLN-10FTH08				.5000			
BSNFLN-10FTH10				.6250			
BSNFLN-10FTH12				.7500	.6230	.7184	.6242
BSNFLN-12FTH06	.7500	.8750	1.1250	.3750	.7491	.8755	.7525
BSNFLN-12FTH08				.5000			
BSNFLN-12FTH12				.7500			
BSNFLN-12FTH16				1.0000	.7479	.8747	.7493
BSNFLN-14FTH08	.8750	1.0000	1.2500	.5000	.8741	1.0005	.8775
BSNFLN-14FTH12				.7500			
BSNFLN-14FTH16				1.0000			
BSNFLN-14FTH20				1.2500	.8729	.9997	.8743
BSNFLN-16FTH08	1.0000	1.1250	1.3750	.5000	.9991	1.1256	1.0026
BSNFLN-16FTH12				.7500			
BSNFLN-16FTH16				1.0000			
BSNFLN-16FTH20				1.2500	.9979	1.1246	.9992
BSNFLN-20FTH16	1.2500	1.4063	1.7500	1.0000	1.2488	1.4068	1.2528
BSNFLN-20FTH20				1.2500			
BSNFLN-20FTH24				1.5000			
BSNFLN-24FTH16	1.5000	1.6563	2.0000	1.0000	1.4988	1.6568	1.5028
BSNFLN-24FTH24				1.5000			
BSNFLN-24FTH32				2.0000			
BSNFLN-28FTH16	1.7500	1.9375	2.3750	1.0000	1.7487	1.9381	1.7535
BSNFLN-28FTH24				1.5000			
BSNFLN-28FTH32				2.0000			

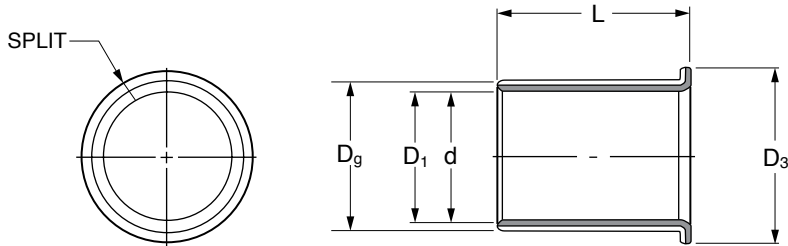
NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).



NEW

Self-Lubricating | Split-Type FLANGED SLEEVE BEARINGS

- Carbon Steel Backing
- Self-Lubricated Liner
- Maintenance-Free



Catalog Number	D ₁	D ₃ ±0.50	L Length ±0.25	d Shaft Dia.	D _g Housing Bore	D _{1E} Installed I.D.
BSNFLNMMB06084	6	12	4	5.990	8.000	5.990
BSNFLNMMB06087			7	5.978	8.015	6.055
BSNFLNMMB06088			8			
BSNFLNMMB081055	8	15	5.5	7.972	10.000	7.990
BSNFLNMMB081075			7.5	7.987	10.015	8.055
BSNFLNMMB081095			9.5			
BSNFLNMMB10127	10	18	7	9.972	12.000	9.990
BSNFLNMMB10129			9	9.987	12.018	10.058
BSNFLNMMB101212			12			
BSNFLNMMB101217			17			
BSNFLNMMB12147	12	20	7	11.966	14.000	11.990
BSNFLNMMB12149			9	11.984	14.018	12.058
BSNFLNMMB121412			12			
BSNFLNMMB121417			17			
BSNFLNMMB141612	14	22	12	13.966	16.000	13.990
BSNFLNMMB141617			17	13.984	16.018	14.058
BSNFLNMMB15179	15	23	9	14.966	17.000	14.990
BSNFLNMMB151712			12	14.984	17.018	15.058
BSNFLNMMB151717			17			

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).

Continued on the next page

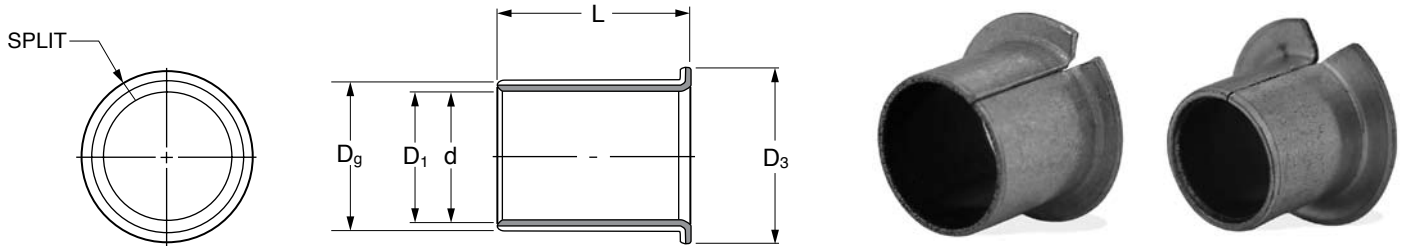


NEW

Self-Lubricating | Split-Type

FLANGED SLEEVE BEARINGS

- Carbon Steel Backing
- Self-Lubricated Liner
- Maintenance-Free



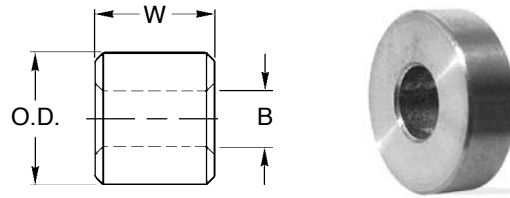
Catalog Number	D ₁	D ₃ ±0.50	L Length ±0.25	d Shaft Dia.	D _g Housing Bore	D ₁ E Installed I.D.
BSNFLNMMB161812	16	24	12	15.966	18.000	15.990
BSNFLNMMB161817			17	15.984	18.018	16.058
BSNFLNMMB182013	18	26	12	17.966	20.000	17.990
BSNFLNMMB182017			17	17.984	20.021	18.061
BSNFLNMMB182022			22			
BSNFLNMMB2023115	20	30	11.5	19.959	23.000	19.990
BSNFLNMMB2023165			16.5	19.980	23.021	20.071
BSNFLNMMB2023215			21.5			
BSNFLNMMB2528115	25	35	11.5	24.959	28.000	24.990
BSNFLNMMB2528165			16.5	24.980	28.021	25.071
BSNFLNMMB2528215			21.5			
BSNFLNMMB303416	30	42	16	29.959	34.000	29.990
BSNFLNMMB303426			26	29.980	34.025	30.085
BSNFLNMMB353916	35	47	16	34.950	39.000	34.990
BSNFLNMMB353926			26	34.975	39.025	35.085
BSNFLNMMB404416	40	53	16	39.950	44.000	39.990
BSNFLNMMB404426			26	39.975	44.025	40.085
BSNFLNMMB455016	45	58	16	44.950	50.000	44.990
BSNFLNMMB455026			26	44.975	50.025	45.105

NOTE: A composite liner consists of a carbon steel backing, an intermediate layer of sintered bronze, PTFE, and lead sliding lining. The bushing contains a certain quantity of lead which, owing to wear during operation, is gradually released and may mix with the products being manufactured. The quantity of lead released is minimal and does not normally exceed a few parts per million (ppm).



Ultraprecision PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated



Features:

- Economical replacement for ball bearings.
- Dimensioned to be readily interchangeable with comparable ball bearings.

Material: Porous Sintered Bronze Per MIL-B-5687 Type 1

Lubrication: Vacuum-Impregnated With Oil Per MIL-L-6085

Specifications:

O.D. concentric to bore within .0002.

Faces square to bore within .0003.

$$\text{Load} = \frac{\text{Load Speed Rating}}{\text{rpm}} = \text{lb.}$$

Catalog Number	Shaft Size +.0000 -.0003	B Bore +.0002 -.0000	O.D. +.0000 -.0002	W Width +.000 -.005	Load Speed Rating lb. X rpm
BSNPLN-031004U	3/64	.0469	.1563	.0625	12000
BSNPLN-031006U					18000
BSNPLN-031205U	3/64	.0550	.1876	.0781	15000
BSNPLN-031207U					21000
BSNPLN-041206U	1/16	.0627	.1876	.0937	18000
BSNPLN-041606U					
BSNPLN-051603U	5/64	.0781	.2500	.0937	18000
BSNPLN-051606U					18000
BSNPLN-051609U					27000
BSNPLN-061202U	3/32	.0937	.3125	.1094	21000
BSNPLN-061204U					12000
BSNPLN-061206U					18000
BSNPLN-061604U	3/32	.0939	.2501	.0625	12000
BSNPLN-062007U					21000
BSNPLN-062009U					27000
BSNPLN-081602U	1/8	.1250	.2500	.0937	18000
BSNPLN-081604U					21000
BSNPLN-081605U					27000
BSNPLN-081606U	1/8	.1252	.3750	.1562	27000
BSNPLN-081607U					18000
				.0937	21000
				.1094	21000

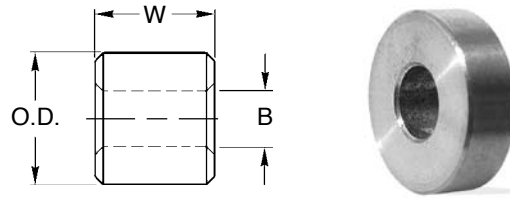
Continued on the next page

Special bores, O.D.'s and lubricants available on request.



Ultraprecision PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated



Features:

- Economical replacement for ball bearings.
- Dimensioned to be readily interchangeable with comparable ball bearings.

Material: Porous Sintered Bronze Per MIL-B-5687 Type 1

Lubrication: Vacuum-Impregnated With Oil Per MIL-L-6085

Specifications:

O.D. concentric to bore within .0002.

Faces square to bore within .0003.

$$\text{Load} = \frac{\text{Load Speed Rating}}{\text{rpm}} = \text{lb.}$$

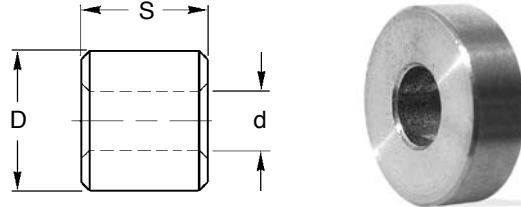
Catalog Number	Shaft Size +.0000 -.0003	B Bore +.0002 -.0000	O.D. +.0000 -.0002	W Width +.000 -.005	Load Speed Rating lb. X rpm	
BSNPLN-082007U BSNPLN-082009U	1/8	.1252	.3126	.1094 .1406	21000 27000	
BSNPLN-082407U BSNPLN-082409U			.3751	.1094 .1406	21000 27000	
BSNPLN-102007U BSNPLN-102008U	5/32	.1564	.3126	.1094 .1250	21000 24000	
BSNPLN-122402U BSNPLN-122404U BSNPLN-122406U	3/16	.1875	.5000	.1562 .1960 .1250	30000 37000 24000	
BSNPLN-122408U BSNPLN-123210U BSNPLN-123212U			.1877	.3751 .5001 .5001	.1250 .1562 .1960	24000 30000 37000
BSNPLN-163204U BSNPLN-163206U BSNPLN-162408U			1/4	.2500 .2500 .2502	.6250 .5000 .3751	.1960 .1875 .1250
BSNPLN-163208U BSNPLN-163212U BSNPLN-164012U	1/4	.2502	.5001 .5001 .6251	.1250 .1875 .1960	24000 35000 37000	
BSNPLN-204416U BSNPLN-245618U BSNPLN-327220U	5/16 3/8 1/2	.3127 .3752 .5002	.6876 .8751 1.1251	.2500 .2812 .3125	47000 50000 50000	

Special bores, O.D.'s and lubricants available on request.



Ultraprecision PLAIN SLEEVE BEARINGS

- Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Features:

- Economical replacement for ball bearings.
- Dimensioned to be readily interchangeable with comparable ball bearings.

Specifications:

- O.D. concentric to bore within 0.005 mm.
- Faces square to bore within 0.008 mm.

Lubrication:

Vacuum-Impregnated With Oil Per MIL-L-6085

$$\text{Load} = \frac{\text{Load Speed Rating}}{\text{rpm}} = \text{lb.}$$

Catalog Number	Shaft* Size h6	d** Bore H7	D* h6	S Width -.17	Load Speed Rating N · rpm
BSNPLNMB030625U	3	3	6	2.5	84000
BSNPLNMB030830U			8	3	100000
BSNPLNMB031040U			10	4	134000
BSNPLNMB040840U	4	4	8	4	134000
BSNPLNMB051050U	5	5	10	5	167000
BSNPLNMB051240U			12	4	134000
BSNPLNMB051350U			13	5	167000
BSNPLNMB061050U	6	6	10	5	167000
BSNPLNMB061650U			16		
BSNPLNMB081660U	8	8	16	6	200000
BSNPLNMB101970U	10	10	19	7	220000
BSNPLNMB122080U	12	12	20	8	220000

NOTE: Use Table 2-3 installation data.

Special bores and O.D.'s available on request.

*Shaft & O.D. Tolerance (h6):

- 3 mm -0.006
- 4, 5 & 6 mm -0.008
- 8 & 10 mm -0.009
- 12, 13 & 16 mm -0.011
- 19 & 20 mm -0.013

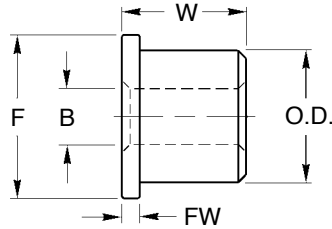
**Bore Tolerance (H7):

- 3 mm +0.01
- 4, 5 & 6 mm +0.012
- 8 & 10 mm +0.015
- 12 mm +0.018



Ultraprecision FLANGED SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated



Features:

- Economical replacement for ball bearings.
- Dimensioned to be readily interchangeable with comparable ball bearings.

Material: Porous Sintered Bronze Per MIL-B-5687 Type 1

Lubrication: Vacuum-Impregnated With Oil Per MIL-L-6085

Specifications:

O.D. concentric to bore within .0002.
Faces square to bore within .0003.

$$\text{Load} = \frac{\text{Load Speed Rating}}{\text{rpm}} = \text{lb.}$$

Catalog Number	Shaft Size	B Bore +.0002 -.0000	O.D. +.0000 -.0002	W Width +.000 -.005	F Flange Dia. ±.005	FW Flange Width +.000 -.002	Load Speed Rating lb. X rpm
BSNFLN-031004U	3/64	.0469	.1563	.0625	.203	.013	12000
BSNFLN-031006U							18000
BSNFLN-031205U	3/64	.0550	.1876	.0781	.234	.023	15000
BSNFLN-031207U							21000
BSNFLN-041207U	1/16	.0627	.1876	.1094	.234	.031	21000
BSNFLN-041606U							18000
BSNFLN-051603U	5/64	.0781	.2500	.0937	.296	.023	18000
BSNFLN-051606U							18000
BSNFLN-051609U							27000
BSNFLN-061202U	3/32	.0937	.3125	.1094	.359	.023	21000
BSNFLN-061204U							12000
BSNFLN-061206U							18000
BSNFLN-062007U							21000
BSNFLN-062007U	3/32	.0939	.3126	.1094	.359	.031	21000
BSNFLN-0620A7U							21000
BSNFLN-062009U							27000
BSNFLN-081602U	1/8	.1250	.2500	.0937	.296	.023	18000
BSNFLN-081604U							21000
BSNFLN-081605U							27000
BSNFLN-081606U							18000
BSNFLN-081607U							21000
BSNFLN-082007U	21000						
BSNFLN-081606U	1/8	.1252	.2501	.0937	.296	.023	18000
BSNFLN-081607U							21000
BSNFLN-082007U							21000

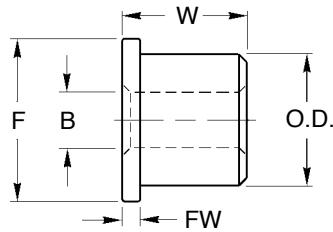
Continued on the next page

Special bores, O.D.'s and lubricants available on request.



Ultraprecision FLANGED SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated



Features:

- Economical replacement for ball bearings.
- Dimensioned to be readily interchangeable with comparable ball bearings.

Material: Porous Sintered Bronze Per MIL-B-5687 Type 1

Lubrication: Vacuum-Impregnated With Oil Per MIL-L-6085

Specifications:

O.D. concentric to bore within .0002.
Faces square to bore within .0003.

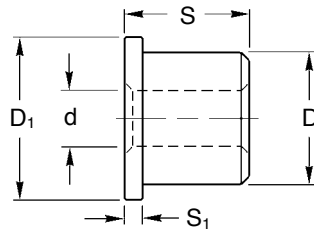
$$\text{Load} = \frac{\text{Load Speed Rating}}{\text{rpm}} = \text{lb.}$$

Catalog Number	Shaft Size	B Bore +.0002 -.0000	O.D. +.0000 -.0002	W Width +.000 -.005	F Flange Dia. ±.005	FW Flange Width +.000 -.002	Load Speed Rating lb. X rpm					
BSNFLN-082009U	1/8	.1252	.3126	.1406	.359	.031	27000					
BSNFLN-082407U			.3751	.1094	.422	.023	21000					
BSNFLN-082409U			.3751	.1406	.422	.031	27000					
BSNFLN-102007U	5/32	.1564	.3126	.1094	.359	.023	21000					
BSNFLN-102008U			.1250	.422	.036	24000						
BSNFLN-122404U	3/16	.1875	.5000	.1960	.565	.042	37000					
BSNFLN-122406U			.3750	.1250	.422	.031	24000					
BSNFLN-122407U		.1877	.3751	.1094	.1250	.422	.023	21000				
BSNFLN-122408U				.1250	.023	24000						
BSNFLN-1224A8U				.1250	.031	24000						
BSNFLN-123210U				.5001	.1562	.565	.042	30000				
BSNFLN-123212U	.1960	.1960	.565	.042	37000							
BSNFLN-163204U	1/4	.2500	.6250	.1960	.690	.042	37000					
BSNFLN-163206U			.5000	.1875	.547	.045	35000					
BSNFLN-162408U		.3751	.1250	.422	.023	.036	24000					
BSNFLN-1624A8U												
BSNFLN-163208U								.5001	.1250	.547	.023	24000
BSNFLN-163212U								.5001	.1875	.547	.045	35000
BSNFLN-164012U		.6251	.1960	.690	.042	37000						
BSNFLN-204416U		5/16	.3127	.6876	.2500	.750	.042	47000				
BSNFLN-245618U		3/8	.3752	.8751	.2812	.969	.062	50000				
BSNFLN-327220U		1/2	.5002	1.1251	.3125	1.250	.062	50000				

Special bores, O.D.'s and lubricants available on request.

Ultraprecision FLANGED SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Features:

- Economical replacement for ball bearings.
- Dimensioned to be readily interchangeable with comparable ball bearings.

Lubrication:

Vacuum-Impregnated With Oil Per Mil-L-6085

Specifications:

O.D. concentric to Bore within 0.005 mm.
Faces square to Bore within 0.008 mm.

Load = $\frac{\text{Load Speed Rating}}{\text{rpm}}$ = Newtons

Catalog Number	Shaft* Size h6	d** Bore H7	D* h6	S Width -0.17	D ₁ ^Δ Flange Dia. h14	S ₁ Flange Width -0.05	Load Speed Rating N • rpm
BSNFLNMB030625U			6	2.5	8	0.5	84000
BSNFLNMB030830U	3	3	8	3	10	0.5	100000
BSNFLNMB031040U			10	4	12	1	134000
BSNFLNMB040840U	4	4	8	4	10	1	134000
BSNFLNMB051040U			10	5	12		167000
BSNFLNMB051250U	5	5	12	4	14	1	134000
BSNFLNMB051350U			13	5	14		167000
BSNFLNMB061050U			10	5	12	1	167000
BSNFLNMB061650U	6	6	16	5	18	1	167000
BSNFLNMB081660U	8	8	16	6	18	1	200000
BSNFLNMB101970U	10	10	19	7	21	1.5	220000
BSNFLNMB122080U	12	12	20	8	22	1.5	220000

NOTE: Use Table 2-3 installation data.

Special bores and O.D.'s available on request.

*Shaft & O.D. Tolerance (h6):
 3 mm -0.006
 4, 5 & 6 mm -0.008
 8 & 10 mm -0.009
 12, 13 & 16 mm -0.011
 19 & 20 mm -0.013

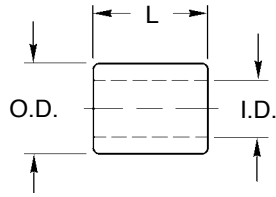
**Bore Tolerance (H7):
 3 mm +0.01
 4, 5 & 6 mm +0.012
 8 & 10 mm +0.015
 12 mm +0.018

^ΔFlange Dia. Tolerance (h14):
 8 mm -0.36
 10, 12, 14 & 18 mm -0.43
 21 & 22 mm -0.52



Small Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.001 -.000	O.D. +.001 -.000	L Length ±.005
BSNPLN-Q100	.1265	.1905	.125
BSNPLN-Q102			.250
BSNPLN-Q104	.1265	.253	.250 – .244
BSNPLN-Q106			.414 – .410
BSNPLN-Q108			.125
BSNPLN-Q110	.157	.253	.187
BSNPLN-Q112			.265
BSNPLN-Q114			.187
BSNPLN-Q116	.188	.253	.210
BSNPLN-Q118			.243
BSNPLN-Q120			.305
BSNPLN-Q122	.188	.253	.330
BSNPLN-Q124			.343 – .337
BSNPLN-Q126			.406
BSNPLN-Q128	.188	.253	.468
BSNPLN-Q130	.188	.284	.186 – .182
BSNPLN-Q132			.249 – .245
BSNPLN-Q134	.188	.3155	.500
BSNPLN-Q136	.188	.4405	.500
BSNPLN-Q138			.250
BSNPLN-Q140	.237	.378	.296
BSNPLN-Q142			.115
BSNPLN-Q144	.251	.3155	.169 – .163
BSNPLN-Q146			.187
BSNPLN-Q148			.234
BSNPLN-Q150	.251	.3155	.250
BSNPLN-Q152			.348
BSNPLN-Q156			.390
BSNPLN-Q158	.251	.3155	.437
BSNPLN-Q160			.500
BSNPLN-Q162			.218
BSNPLN-Q164	.251	.378	.312
BSNPLN-Q166			.406
BSNPLN-Q168			.500
BSNPLN-Q170	.251	.378	.570 – .566
BSNPLN-Q172			.719
BSNPLN-Q174			.407
BSNPLN-Q176	.251	.4405	.437
BSNPLN-Q178	.250	.503	.218
BSNPLN-Q182			.125
BSNPLN-Q184	.313	.378	.208

NOTE: Use Technical Section, Table 2-2 installation data.

Continued on the next page

RUNNING CLEARANCE

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

Shaft Size in.	Clearance min. in.
up to .760	.0005

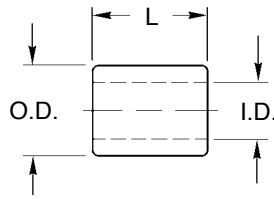
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
up to .760	.001	.003



Small Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.001 -.000	O.D. +.001 -.000	L Length ±.005
BSNPLN-Q186	.3135	.378	.250
BSNPLN-Q188			.281
BSNPLN-Q190	.313	.378	.370
BSNPLN-Q192			.421
BSNPLN-Q194			.487
BSNPLN-Q196			.187
BSNPLN-Q198	.313	.4405	.250
BSNPLN-Q200			.500
BSNPLN-Q202			.312
BSNPLN-Q204			.437
BSNPLN-Q206	.313	.503	.703
BSNPLN-Q208			1.000
BSNPLN-Q210			.500
BSNPLN-Q212	.328	.472	.750
BSNPLN-Q214	.328	.503	.437
BSNPLN-Q216			.187 - .183
BSNPLN-Q218			.500
BSNPLN-Q220	.376	.503	.625
BSNPLN-Q222			.813
BSNPLN-Q224			.328
BSNPLN-Q226	.376	.5655	.500
BSNPLN-Q228			.755
BSNPLN-Q230			.995
BSNPLN-Q232			.312
BSNPLN-Q234	.376	.628	.432
BSNPLN-Q236			.627 - .623
BSNPLN-Q238	.439	.5655	.713
BSNPLN-Q240			.375
BSNPLN-Q242	.502	.628	.418 - .414
BSNPLN-Q244			.437
BSNPLN-Q246			.500
BSNPLN-Q248	.502	.628	.593
BSNPLN-Q250			1.030
BSNPLN-Q252			.250
BSNPLN-Q254	.502	.628	.437 - .429
BSNPLN-Q258			.373
BSNPLN-Q262	.627	.7535	.761 - .756
BSNPLN-Q264	.627	.753	.343
BSNPLN-Q266			.323
BSNPLN-Q268	.627	.8785	.500
BSNPLN-Q270			.625

NOTE: Use Technical Section, Table 2-2 installation data.

Min. recommended clearance
for oil-impregnated bearings
used with ground steel shafting.

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
up to .760	.0005

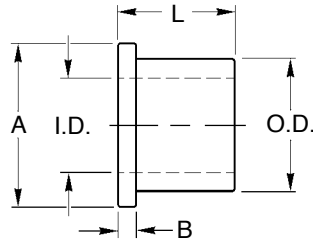
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
up to .760	.001	.003
.761 to 1.510	.0015	.004



Small Series FLANGED SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.001 -.000	O.D. +.000 -.001	L* Length ±.005	A Flange Dia. ±.005	B Flange Width
BSNFLN-G101	.1245	.2215	.122 – .115	.340	.050 – .048
BSNFLN-G103	.125	.190	.228 – .216	.250	.035 – .031
BSNFLN-G105	.126	.2215	.148 – .141	.345	.061 – .057
BSNFLN-G107	.1875	.284	.218 – .212	.375	.057 – .052
BSNFLN-G109		.3155	.1345 – .1265	.437	.062 – .061
BSNFLN-G111	.188	.253	.349 – .344	.310	.034 – .031
BSNFLN-G113		.2843	.281	.375	.121 – .117
BSNFLN-G115		.3155	.240 – .234	.375	.087 – .081
BSNFLN-G117		.316	.375	.437	.064 – .060
BSNFLN-G119	.218	.2825	.207 – .202	.310	.084 – .079
BSNFLN-G121	.251	.3155	.500	.437	.066 – .058
BSNFLN-G123		.316	.156		.065 – .059
BSNFLN-G125		.316	.250	.065 – .059	
BSNFLN-G127		.379	.406	.500	.095 – .093
BSNFLN-G129			.578 – .573		
BSNFLN-G131	.281	.379	.2188	.500	.095 – .093
BSNFLN-G133	.3125	.504	.4848	.562	.065 – .059
BSNFLN-G135	.375	.504	.404	.562	.065 – .059
BSNFLN-G137	.376	.504	.696 – .690	.562	.065 – .059
BSNFLN-G139	.376	.566	.660	.750	.093 – .090
BSNFLN-G141	.377	.629	.610 – .611	.875	.063 – .060
BSNFLN-G143	.438	.504	.154 – .149	.562	.077 – .072
BSNFLN-G145		.5655	.281	.781	.065 – .060
BSNFLN-G147		.5655	.546	.781	
BSNFLN-G149		.754	.625	.875	.065 – .060
BSNFLN-G151	.500	.628	.198 – .192	.870	.042 – .040
BSNFLN-G153	.501	.629	.139 – .136	.875	.050 – .044
BSNFLN-G155			.250	.812	.095 – .091
BSNFLN-G157		.629	.307	.875	.065 – .059
BSNFLN-G159		.562			
BSNFLN-G161	.754	.754	.515	.875	.145 – .140
BSNFLN-G163			.969		.060 – .057
BSNFLN-G165	.626	.7535	.230	.875	.145 – .140
BSNFLN-G167			.371	.991	.063 – .059
BSNFLN-G169			.630	.991	.063 – .059

NOTE: Use Technical Section, Table 2-2 installation data.

*Unless otherwise specified.

Min. recommended clearance
for oil-impregnated bearings
used with ground steel shafting.

RUNNING CLEARANCE

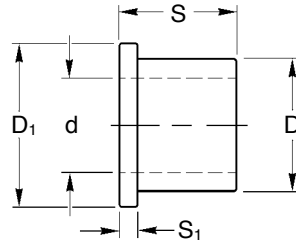
Shaft Size in.	Clearance min. in.
up to .760	.0005

RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
up to .760	.001	.003

Small Series FLANGED SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	d* (E7)	D** (r7)	S Width -0.2	D ₁ Flange Diameter ±0.12	S ₁ Flange Width -0.2
BSNFLNMF010302	1	3	2	5	1
BSNFLNMF020404	2	4	4	6	1.5
BSNFLNMFH20603	2.5	6	3	9	1.5
BSNFLNMF030504	3	5	4	8	1.5
BSNFLNMF040806	4	8	6	10	
BSNFLNMF050806	5	8	6	10	2
BSNFLNMF051006		10		12	
BSNFLNMF061004	6	10	4	14	2
BSNFLNMF061006		10	6		
BSNFLNMF061206		12	6		
BSNFLNMF071208	7	12	8	16	3
BSNFLNMF081208	8				
BSNFLNMF101608	10	16	8	20	3
BSNFLNMF101610			10		
BSNFLNMF121810	12	18	10	22	3
BSNFLNMF121812			12		

NOTE: Use Table 2-2 installation data.

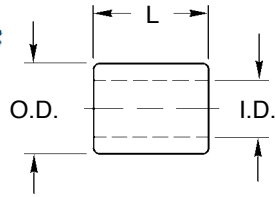
***Bore Tolerance (E7):** 1, 2, 2.5 & 3 mm +0.024, +0.014
 4, 5 & 6 mm +0.032, +0.020
 7, 8, 9 & 10 mm +0.040, +0.025
 12 mm +0.050, +0.032

****O.D. Tolerance (r7):** 3 mm +0.020, +0.010
 4, 5 & 6 mm +0.027, +0.015
 8 & 10 mm +0.034, +0.019
 12, 14, 16 & 18 mm +0.041, +0.023



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L Length ±.005
BSNPLN-P121803	.378	.565	3/8
BSNPLN-P121804			1/2
BSNPLN-P121805			5/8
BSNPLN-P121806	.378	.565	3/4
BSNPLN-P121807			7/8
BSNPLN-P121808			1
BSNPLN-P121810			1-1/4
BSNPLN-P122003	.378	.628	3/8
BSNPLN-P122004			1/2
BSNPLN-P122005	.378	.628	5/8
BSNPLN-P122006			3/4
BSNPLN-P122007			7/8
BSNPLN-P122008	.378	.628	1
BSNPLN-P122010			1-1/4
BSNPLN-P122012			1-1/2
BSNPLN-P122403			3/8
BSNPLN-P122404	.378	.753	1/2
BSNPLN-P122406			3/4
BSNPLN-P122408	.378	.753	1
BSNPLN-P122410			1-1/4
BSNPLN-P141803	.440	.565	3/8
BSNPLN-P141804			1/2
BSNPLN-P141805			5/8
BSNPLN-P141806	.440	.565	3/4
BSNPLN-P141807			7/8
BSNPLN-P141808			1
BSNPLN-P141810			1-1/4
BSNPLN-P142003	.440	.628	3/8
BSNPLN-P142004			1/2
BSNPLN-P142005			5/8
BSNPLN-P142006			3/4
BSNPLN-P142007	.440	.628	7/8
BSNPLN-P142008			1
BSNPLN-P142010			1-1/4
BSNPLN-P142012			1-1/2
BSNPLN-P142204	.4395	.6905	1/2
BSNPLN-P142208			1
BSNPLN-P142212			1-1/2
BSNPLN-P162003	.502	.628	3/8
BSNPLN-P162004			1/2

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

RUNNING CLEARANCE

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

Shaft Size in.	Clearance min. in.
up to .760	.0005

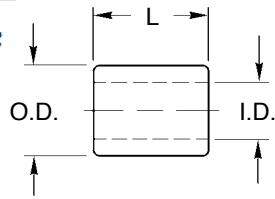
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
up to .760	.001	.003



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L* Length
BSNPLN-P162005	.502	.628	5/8
BSNPLN-P162006			3/4
BSNPLN-P162007			7/8
BSNPLN-P162008	.502	.628	1
BSNPLN-P162009			1-1/8
BSNPLN-P162010			1-1/4
BSNPLN-P162012			1-1/2
BSNPLN-P162204	.503	.690	1/2
BSNPLN-P162205			5/8
BSNPLN-P162206	.503	.690	3/4
BSNPLN-P162207			7/8
BSNPLN-P162208			1
BSNPLN-P162209	.503	.690	1-1/8
BSNPLN-P162210			1-1/4
BSNPLN-P162212			1-1/2
BSNPLN-P162403	.503	.753	3/8
BSNPLN-P162404			1/2
BSNPLN-P162405	.503	.753	5/8
BSNPLN-P162406			3/4
BSNPLN-P162407			7/8
BSNPLN-P162408	.503	.753	1
BSNPLN-P162409			1-1/8
BSNPLN-P162410			1-1/4
BSNPLN-P162412	.503	.753	1-1/2
BSNPLN-P162414			1-3/4
BSNPLN-P162416			2
BSNPLN-P162604	.503	.815	1/2
BSNPLN-P162606			3/4
BSNPLN-P162608			1
BSNPLN-P162612			1-1/2
BSNPLN-P162804	.503	.878	1/2
BSNPLN-P162805			5/8
BSNPLN-P162806			3/4
BSNPLN-P168207	.503	.878	7/8
BSNPLN-P162808			1
BSNPLN-P162810			1-1/4
BSNPLN-P162812			1-1/2
BSNPLN-P163206	.503	1.004	3/4
BSNPLN-P163208			1
BSNPLN-P163212			1-1/2
BSNPLN-P163216			2

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is $\pm .005$
over 1-1/2 is $\pm .0075$

Min. recommended clearance
for oil-impregnated bearings
used with ground steel shafting.

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
up to .760	.0005

RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
up to .760	.001	.003
.761 to 1.510	.0015	.004

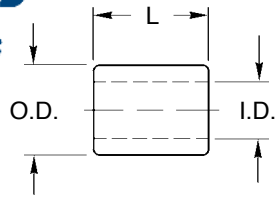
INCH

www.qbcbearings.com



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L* Length
BSNPLN-P182004			1/2
BSNPLN-P182006	.565	.690	3/4
BSNPLN-P182008			1
BSNPLN-P182210	.565	.690	1-1/4
BSNPLN-P182212			1-1/2
BSNPLN-P182404			1/2
BSNPLN-P182406	.565	.753	3/4
BSNPLN-P182408			1
BSNPLN-P182410	.565	.753	1-1/4
BSNPLN-P182412			1-1/2
BSNPLN-P182604			1/2
BSNPLN-P182606	.565	.815	3/4
BSNPLN-P182608			1
BSNPLN-P182610	.565	.815	1-1/4
BSNPLN-P182612			1-1/2
BSNPLN-P202404			1/2
BSNPLN-P202405	.628	.753	5/8
BSNPLN-P202406			3/4
BSNPLN-P202407	.628	.753	7/8
BSNPLN-P202408			1
BSNPLN-P202409			1-1/8
BSNPLN-P202410	.628	.753	1-1/4
BSNPLN-P202412			1-1/2
BSNPLN-P202604			1/2
BSNPLN-P202605	.628	.815	5/8
BSNPLN-P202606			3/4
BSNPLN-P202607	.628	.815	7/8
BSNPLN-P202608			1
BSNPLN-P202610			1-1/4
BSNPLN-P202612	.628	.815	1-1/2
BSNPLN-P202614			1-3/4
BSNPLN-P202804			1/2
BSNPLN-P202805	.628	.878	5/8
BSNPLN-P202806			3/4
BSNPLN-P202807			7/8
BSNPLN-P202808	.628	.878	1
BSNPLN-P202809			1-1/8
BSNPLN-P202810			1-1/4
BSNPLN-P202812	.628	.878	1-1/2
BSNPLN-P202814			1-3/4

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is $\pm .005$
over 1-1/2 is $\pm .0075$

RUNNING CLEARANCE

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

Shaft Size in.	Clearance min. in.
up to .760	.0005

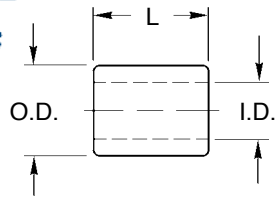
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
up to .760	.001	.003
.761 to 1.510	.0015	.004



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L* Length
BSNPLN-P202816	.628	.878	2
BSNPLN-P203005	.628	.941	5/8
BSNPLN-P203006			3/4
BSNPLN-P203008			1
BSNPLN-P203204	.628	1.003	1/2
BSNPLN-P203205			5/8
BSNPLN-P203206			3/4
BSNPLN-P203207	.628	1.003	7/8
BSNPLN-P203208			1
BSNPLN-P203210			1-1/4
BSNPLN-P203212	.628	1.003	1-1/2
BSNPLN-P203214			1-3/4
BSNPLN-P203216			2
BSNPLN-P222806	.690	.878	3/4
BSNPLN-P222808			1
BSNPLN-P222810			1-1/4
BSNPLN-P222812	.690	.878	1-1/2
BSNPLN-P222814			1-3/4
BSNPLN-P222816			2
BSNPLN-P242804	.753	.878	1/2
BSNPLN-P242805			5/8
BSNPLN-P242806	.753	.878	3/4
BSNPLN-P242807			7/8
BSNPLN-P242808			1
BSNPLN-P242809	.753	.941	1-1/8
BSNPLN-P242810			1-1/4
BSNPLN-P242812			1-1/2
BSNPLN-P242813			1-5/8
BSNPLN-P243004	.753	.941	1/2
BSNPLN-P243005			5/8
BSNPLN-P243006			3/4
BSNPLN-P243007	.753	.941	7/8
BSNPLN-P243008			1
BSNPLN-P243009			1-1/8
BSNPLN-P243010			1-1/4
BSNPLN-P243012	.753	.941	1-1/2
BSNPLN-P243013			1-5/8
BSNPLN-P243014			1-3/4
BSNPLN-P243015	.753	.941	1-7/8
BSNPLN-P243016			2

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is $\pm .005$
over 1-1/2 is $\pm .0075$

RUNNING CLEARANCE

RECOMMENDED PRESS FITS

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

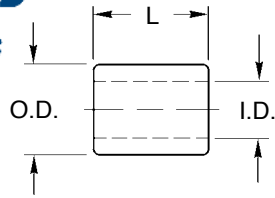
Shaft Size in.	Clearance min. in.
up to .760	.0005

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
.761 to 1.510	.0015	.004



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L* Length
BSNPLN-P243204	.753	1.003	1/2
BSNPLN-P243205			5/8
BSNPLN-P243206	.753	1.003	3/4
BSNPLN-P243207			7/8
BSNPLN-P243208			1
BSNPLN-P243209	.753	1.003	1-1/8
BSNPLN-P243210			1-1/4
BSNPLN-P243212			1-1/2
BSNPLN-P243214	.753	1.003	1-3/4
BSNPLN-P243216			2
BSNPLN-P243220			2-1/2
BSNPLN-P243604	.753	1.128	1/2
BSNPLN-P243606			3/4
BSNPLN-P243608			1
BSNPLN-P243610	.753	1.128	1-1/4
BSNPLN-P243612			1-1/2
BSNPLN-P243614			1-3/4
BSNPLN-P243616			2
BSNPLN-P244006	.753	1.253	3/4
BSNPLN-P244008			1
BSNPLN-P244010			1-1/4
BSNPLN-P244012			1-1/2
BSNPLN-P263206	.815	1.003	3/4
BSNPLN-P263208			1
BSNPLN-P263210			1-1/4
BSNPLN-P263212	.815	1.003	1-1/2
BSNPLN-P263214			1-3/4
BSNPLN-P263216			2
BSNPLN-P263408	.815	1.065	1
BSNPLN-P263410			1-1/4
BSNPLN-P283206	.878	1.003	3/4
BSNPLN-P283207			7/8
BSNPLN-P283208			1
BSNPLN-P283210	.878	1.003	1-1/4
BSNPLN-P283212			1-1/2
BSNPLN-P283214			1-3/4
BSNPLN-P283408	.878	1.0655	1
BSNPLN-P283410			1-1/4
BSNPLN-P283606	.878	1.128	3/4
BSNPLN-P283607			7/8
BSNPLN-P283608			1
BSNPLN-P283609	.878	1.128	1-1/8
BSNPLN-P283610			1-1/4
BSNPLN-P283611			1-3/8
BSNPLN-P283612			1-1/2

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is $\pm .005$
over 1-1/2 is $\pm .0075$

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
up to .760	.0005
.761 to 1.510	.001

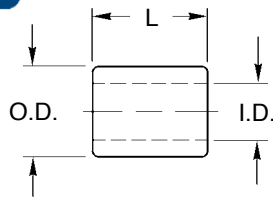
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
.761 to 1.510	.0015	.004



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L* Length
BSNPLN-P283613 BSNPLN-P283614	.878	1.128	1-5/8 1-3/4
BSNPLN-P283616 BSNPLN-P283618 BSNPLN-P283620	.878	1.128	2 2-1/4 2-1/2
BSNPLN-P284006 BSNPLN-P284008	.878	1.253	3/4 1
BSNPLN-P284010 BSNPLN-P284012 BSNPLN-P284016	.878	1.190	1-1/4 1-1/2 2
BSNPLN-P303806 BSNPLN-P303808	.940	1.190	3/4 1
BSNPLN-P303810 BSNPLN-P303812 BSNPLN-P303816	.940	1.190	1-1/4 1-1/2 2
BSNPLN-P304006 BSNPLN-P304008 BSNPLN-P304010	.940	1.254	3/4 1 1-1/4
BSNPLN-P304012 BSNPLN-P304014 BSNPLN-P304016	.940	1.254	1-1/2 1-3/4 2
BSNPLN-P323606 BSNPLN-P323608 BSNPLN-P323610	1.004	1.128	3/4 1 1-1/4
BSNPLN-P323612 BSNPLN-P323614 BSNPLN-P323616	1.004	1.128	1-1/2 1-3/4 2
BSNPLN-P323806 BSNPLN-P323808 BSNPLN-P323810	1.004	1.190	3/4 1 1-1/4
BSNPLN-P323812 BSNPLN-P323814 BSNPLN-P323816	1.004	1.190	1-1/2 1-3/4 2
BSNPLN-P324004 BSNPLN-P324006 BSNPLN-P324007	1.004	1.254	1/2 3/4 7/8
BSNPLN-P324008 BSNPLN-P324010 BSNPLN-P324011	1.004	1.254	1 1-1/4 1-3/8
BSNPLN-P324012 BSNPLN-P324014 BSNPLN-P324016	1.004	1.254	1-1/2 1-3/4 2
BSNPLN-P324018 BSNPLN-P324020 BSNPLN-P324024	1.004	1.254	2-1/4 1-1/2 3

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is $\pm .005$
over 1-1/2 is $\pm .0075$

RUNNING CLEARANCE

RECOMMENDED PRESS FITS

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

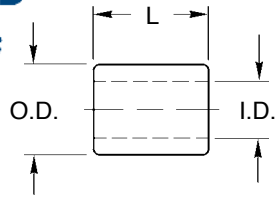
Shaft Size in.	Clearance min. in.
.761 to 1.510	.001

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
.761 to 1.510	.0015	.004



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L* Length
BSNPLN-P324208	1.004	1.316	1
BSNPLN-P324210			1-1/4
BSNPLN-P324212	1.004	1.316	1-1/2
BSNPLN-P324214			1-3/4
BSNPLN-P324216			2
BSNPLN-P324220	1.004	1.316	2-1/2
BSNPLN-P324224			3
BSNPLN-P324406	1.004	1.379	3/4
BSNPLN-P324408			1
BSNPLN-P324410			1-1/4
BSNPLN-P324412	1.004	1.379	1-1/2
BSNPLN-P324414			1-3/4
BSNPLN-P324416			2
BSNPLN-P324420			2-1/2
BSNPLN-P324808	1.004	1.379	1
BSNPLN-P324810			1-1/4
BSNPLN-P324812			1-1/2
BSNPLN-P324814	1.004	1.504	1-3/4
BSNPLN-P324816			2
BSNPLN-P324820			2-1/2
BSNPLN-P324824			3
BSNPLN-P344208	1.065	1.504	1
BSNPLN-P344212			1-1/2
BSNPLN-P344216			2
BSNPLN-P344220			2-1/2
BSNPLN-P364008	1.129	1.316	1
BSNPLN-P364010			1-1/4
BSNPLN-P364012			1-1/2
BSNPLN-P364208	1.129	1.254	1
BSNPLN-P364210			1-1/4
BSNPLN-P364212	1.129	1.316	1-1/2
BSNPLN-P364214			1-3/4
BSNPLN-P364216			2
BSNPLN-P364406	1.129	1.316	3/4
BSNPLN-P364408			1
BSNPLN-P364410			1-1/4
BSNPLN-P364412	1.129	1.379	1-1/2
BSNPLN-P364414			1-3/4
BSNPLN-P324416			2

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is $\pm .005$
over 1-1/2 is $\pm .0075$

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
.761 to 1.510	.001

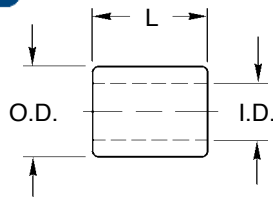
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
.761 to 1.510	.0015	.004



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L* Length
BSNPLN-P364420 BSNPLN-P364424	1.129	1.379	2-1/2 3
BSNPLN-P364808 BSNPLN-P364810 BSNPLN-P364812	1.129	1.504	1 1-1/4 1-1/2
BSNPLN-P364814 BSNPLN-P364816 BSNPLN-P364820	1.129	1.504	1-3/4 2 2-1/2
BSNPLN-P384610 BSNPLN-P384612	1.192	1.441	1-1/4 1-1/2
BSNPLN-P384616 BSNPLN-P384620 BSNPLN-P384624	1.192	1.441	2 2-1/2 3
BSNPLN-P384808 BSNPLN-P384810 BSNPLN-P384812	1.192	1.504	1 1-1/4 1-1/2
BSNPLN-P384814 BSNPLN-P384816 BSNPLN-P384820 BSNPLN-P384824	1.192	1.504	1-3/4 2 2-1/2 3
BSNPLN-P404804 BSNPLN-P404805 BSNPLN-P404806	1.254	1.504	1/2 5/8 3/4
BSNPLN-P404807 BSNPLN-P404808 BSNPLN-P404809	1.254	1.504	7/8 1 1-1/8
BSNPLN-P404810 BSNPLN-P404811 BSNPLN-P404812	1.254	1.504	1-1/4 1-3/8 1-1/2
BSNPLN-P404813 BSNPLN-P404814 BSNPLN-P404815	1.254	1.504	1-5/8 1-3/4 1-7/8
BSNPLN-P404816 BSNPLN-P404818 BSNPLN-P404820 BSNPLN-P404824	1.254	1.504	2 2-1/4 2-1/2 3
BSNPLN-P405008 BSNPLN-P405012 BSNPLN-P405016	1.254	^Δ 1.566	1 1-1/2 2

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is ±.005
over 1-1/2 is ±.0075

^ΔO.D. Tolerance: +.000, -.0015

RUNNING CLEARANCE

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

Shaft Size in.	Clearance min. in.
.761 to 1.510	.001

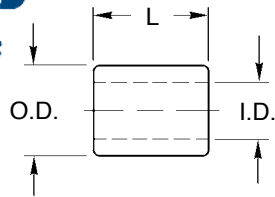
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
.761 to 1.510	.0015	.004
1.511 to 2.510	.002	.005



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.0000 -.0015	L* Length
BSNPLN-P405208	1.254	1.629	1
BSNPLN-P405210			1-1/4
BSNPLN-P405212			1-1/2
BSNPLN-P405214	1.254	1.629	1-3/4
BSNPLN-P405216			2
BSNPLN-P405220			2-1/2
BSNPLN-P405224			3
BSNPLN-P405612	1.254	1.754	1-1/2
BSNPLN-P405614			1-3/4
BSNPLN-P405616	1.254	1.754	2
BSNPLN-P405620			2-1/2
BSNPLN-P405624			3
BSNPLN-P424808	1.316	1.566	1
BSNPLN-P424812			1-1/2
BSNPLN-P424816			2
BSNPLN-P425210	1.316	1.629	1-1/4
BSNPLN-P425212			1-1/2
BSNPLN-P425216			2
BSNPLN-P425220	1.316	1.629	2-1/2
BSNPLN-P425224			3
BSNPLN-P445208	1.379	1.629	1
BSNPLN-P445209			1-1/8
BSNPLN-P445210			1-1/4
BSNPLN-P445212	1.379	1.629	1-1/2
BSNPLN-P445216			2
BSNPLN-P445220			2-1/2
BSNPLN-P445224			3
BSNPLN-P445608	1.379	1.754	1
BSNPLN-P445612			1-1/2
BSNPLN-P445616	1.379	1.754	2
BSNPLN-P445620			2-1/2
BSNPLN-P445624			3
BSNPLN-P465208	1.442	1.629	1
BSNPLN-P465212			1-1/2
BSNPLN-P465216			2
BSNPLN-P465606	1.442	1.754	3/4
BSNPLN-P465608			1
BSNPLN-P465610			1-1/4
BSNPLN-P465612	1.442	1.754	1-1/2
BSNPLN-P465614			1-3/4
BSNPLN-P465616			2

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is $\pm .005$
over 1-1/2 is $\pm .0075$

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

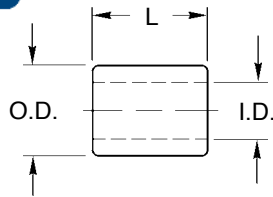
RUNNING CLEARANCE	
Shaft Size in.	Clearance min. in.
.761 to 1.510	.001

Outside Dia. in.	RECOMMENDED PRESS FITS	
	Press Fit, in.	
	Minimum	Maximum
.761 to 1.510	.0015	.004
1.511 to 2.510	.002	.005



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.0000 -.0015	L* Length
BSNPLN-P465620 BSNPLN-P465624	1.442	1.754	2-1/2 3
BSNPLN-P485604 BSNPLN-P485606	1.504	1.754	1/2 3/4
BSNPLN-P485608 BSNPLN-P485610	1.504	1.754	1 1-1/4
BSNPLN-P485611 BSNPLN-P485612	1.504	1.754	1-3/8 1-1/2
BSNPLN-P485614 BSNPLN-P485616	1.504	1.754	1-3/4 2
BSNPLN-P485618 BSNPLN-P485620 BSNPLN-P485624	1.504	1.754	2-1/4 2-1/2 3
BSNPLN-P485808 BSNPLN-P485812	1.504	1.816	1 1-1/2
BSNPLN-P485813 BSNPLN-P485816 BSNPLN-P485824	1.504	1.816	1-5/8 2 3
BSNPLN-P486012 BSNPLN-P486016	1.504	1.879	1-1/2 2
BSNPLN-P486020 BSNPLN-P486022 BSNPLN-P486024	1.504	1.879	2-1/2 2-3/4 3
BSNPLN-P486408 BSNPLN-P486412 BSNPLN-P486416	1.504	2.004	1 1-1/2 2
BSNPLN-P486420 BSNPLN-P486424 BSNPLN-P486428	1.504	2.004	2-1/2 3 3-1/2
BSNPLN-P506010 BSNPLN-P506012	^Δ 1.629	1.879	1-1/4 1-1/2
BSNPLN-P506014 BSNPLN-P506016	^Δ 1.629	1.879	1-3/4 2
BSNPLN-P506018 BSNPLN-P506020 BSNPLN-P506024	^Δ 1.629	1.879	2-1/4 2-1/2 3
BSNPLN-P506408 BSNPLN-P506412 BSNPLN-P506414	^Δ 1.629	2.004	1 1-1/2 1-3/4
BSNPLN-P506416 BSNPLN-P506420 BSNPLN-P506424	^Δ 1.629	2.004	2 2-1/2 3

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is ±.005
over 1-1/2 is ±.0075

^ΔI.D. Tolerance: +.0000, -.0015

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
.761 to 1.510	.001
1.511 to 2.510	.0015

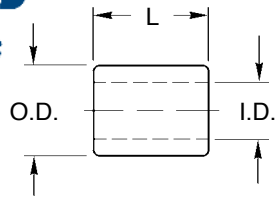
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
.761 to 1.510	.0015	.004
1.511 to 2.510	.002	.005



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.0000 -.0015	O.D. +.0000 -.0015	L* Length
BSNPLN-P526814	1.6915	2.1925	1-3/4
BSNPLN-P526816			2
BSNPLN-P526824	1.6915	2.1925	3
BSNPLN-P526832			4
BSNPLN-P546408	1.754	2.004	1
BSNPLN-P546410			1-1/4
BSNPLN-P546412	1.754	2.004	1-1/2
BSNPLN-P546414			1-3/4
BSNPLN-P546416	1.754	2.004	2
BSNPLN-P546420			2-1/2
BSNPLN-P546424	1.754	2.129	3
BSNPLN-P546811			1-3/8
BSNPLN-P546812	1.754	2.129	1-1/2
BSNPLN-P546816			2
BSNPLN-P546824	1.940	2.1285	3
BSNPLN-P566820			2-1/2
BSNPLN-P567416	1.9405	2.3165	2
BSNPLN-P567420			2-1/2
BSNPLN-P567424	1.9405	2.3165	3
BSNPLN-P567432			4
BSNPLN-P587208	2.004	2.254	1
BSNPLN-P587212			1-1/2
BSNPLN-P587216	2.004	2.254	2
BSNPLN-P587220			2-1/2
BSNPLN-P587224	2.004	2.380	3
BSNPLN-P587612			1-1/2
BSNPLN-P587614	2.004	2.380	1-3/4
BSNPLN-P587616			2
BSNPLN-P587620	2.004	2.380	2-1/2
BSNPLN-P587622			2-3/4
BSNPLN-P587624	2.004	2.380	3
BSNPLN-P587628			3-1/2
BSNPLN-P587632	2.004	2.505 ^Δ	4
BSNPLN-P587808			1
BSNPLN-P587812	2.004	2.505 ^Δ	1-1/2
BSNPLN-P587816			2

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerances: up to & including 1-1/2 is ±.005
over 1-1/2 & including 3 is ±.0075
over 3 is ±.010

^ΔO.D. Tolerances: +.000, -.002

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
1.511 to 2.510	.0015

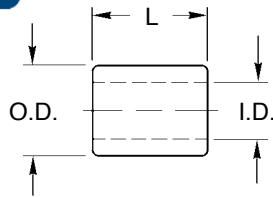
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
1.511 to 2.510	.002	.005



Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. ^Δ	O.D. ^Δ	L* Length
BSNPLN-P587820 BSNPLN-P587824	2.004	2.505	2-1/2 3
BSNPLN-P587828 BSNPLN-P587832	2.004	2.505	3-1/2 4
BSNPLN-P608016 BSNPLN-P608020 BSNPLN-P608024	2.254	2.630	2 2-1/2 3
BSNPLN-P608216 BSNPLN-P608224	2.254	2.755	2 3
BSNPLN-P628216 BSNPLN-P628220 BSNPLN-P628224	2.379	2.755	2 2-1/2 3
BSNPLN-P648216 BSNPLN-P648220	2.504	2.754	2 2-1/2
BSNPLN-P648224 BSNPLN-P648232	2.504	2.754	3 4
BSNPLN-P648418 BSNPLN-P648420 BSNPLN-P648424	2.504	2.880	2-1/4 2-1/2 3
BSNPLN-P648616 BSNPLN-P648624 BSNPLN-P648632	2.504	3.005	2 3 4
BSNPLN-P668612 BSNPLN-P668620	2.754	3.005	1-1/2 2-1/2
BSNPLN-P668816 BSNPLN-P668824 BSNPLN-P668832	2.754	3.225	2 3 4
BSNPLN-P688816 BSNPLN-P688824 BSNPLN-P689016	3.005	3.505	2 3 2
BSNPLN-P689020 BSNPLN-P689024 BSNPLN-P689032	3.005	3.505	2-1/2 3 4
BSNPLN-P709224 BSNPLN-P709228 BSNPLN-P709232	3.005	4.006	3 3-1/2 4
BSNPLN-P729232	4.0035	4.504	4

NOTE: Use Technical Section, Table 2-4 installation data.

***Length Tolerances:** up to & including 1-1/2 is $\pm .005$

over 1-1/2 & including 3 is $\pm .0075$

over 3 is $\pm .010$

ΔI.D. & O.D. Tolerances: up to & including 2-1/2 is + .000, -.0015

over 2-1/2 & including 3-1/2 is + .000, -.002

over 3-1/2 is + .000, -.0025

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
1.511 to 2.510	.0015
over to 2.510	.002

Min. recommended clearance for oil-impregnated bearings used with ground steel shafting.

RECOMMENDED PRESS FITS

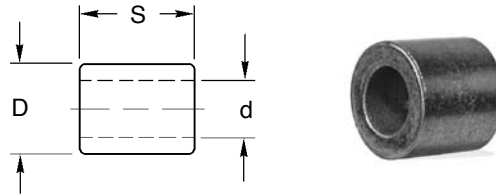
Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
1.511 to 2.510	.002	.005
2.511 to 3.010	.002	.006
over to 3.010	.002	.007

INCH

www.qbcbearings.com

Standard Series PLAIN SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	d* (E7)	D** (r7)	S Width -0.2
BSNPLNMP010302	1	3	2
BSNPLNMP020403	2	4	3
BSNPLNMP020404		4	4
BSNPLNMP020503	2.5	5	3
BSNPLNMPH20603		6	3
BSNPLNMP030503	3	5	3
BSNPLNMP030504			4
BSNPLNMP030506			6
BSNPLNMP040804	4	8	4
BSNPLNMP040806			6
BSNPLNMP040808			8
BSNPLNMP050805	5	8	5
BSNPLNMP050808			8
BSNPLNMP061004	6	10	4
BSNPLNMP061006			6
BSNPLNMP061010			10
BSNPLNMP061208			12
BSNPLNMP061212	12		
BSNPLNMP071008	7	10	8
BSNPLNMP071010			10
BSNPLNMP071208		12	12
BSNPLNMP071210			10
BSNPLNMP071212	12		
BSNPLNMP081206	8	12	6
BSNPLNMP081208			8
BSNPLNMP081212			12
BSNPLNMP081408		14	8
BSNPLNMP081412			12
BSNPLNMP081416	16		
BSNPLNMP091410	9	14	10
BSNPLNMP091420			20
BSNPLNMP101410	10	14	10
BSNPLNMP101416			16
BSNPLNMP101610		16	10
BSNPLNMP101616			16
BSNPLNMP101620	20		
BSNPLNMP121612	12	16	12
BSNPLNMP121620			20
BSNPLNMP121812		18	12
BSNPLNMP121816			16
BSNPLNMP121825			25

NOTE: Use Table 2-2 installation data.

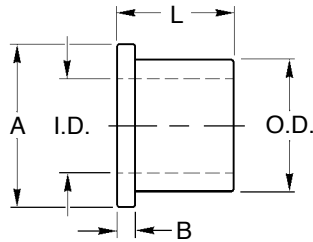
***Bore Tolerance (E7):** 1, 2, 2.5 & 3 mm +0.024, +0.014
 4, 5 & 6 mm +0.032, +0.020
 7, 8, 9 & 10 mm +0.040, +0.025
 12 mm +0.050, +0.032

****O.D. Tolerance (r7):** 3 mm +0.020, +0.010
 4, 5 & 6 mm +0.027, +0.015
 8 & 10 mm +0.034, +0.019
 12, 14, 16 & 18 mm +0.041, +0.023



Standard Series FLANGED SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L Length ±.005	A Flange Dia. ±.005	B Flange Width ±.0025
BSNFLN-F041002 BSNFLN-F041003	.127	.315	1/4 3/8	3/8	3/64
BSNFLN-F061001 BSNFLN-F061002 BSNFLN-F061003	.189	.3145	1/8 1/4 3/8	3/8	3/64
BSNFLN-F081202 BSNFLN-F081203 BSNFLN-F081204	.252	.377	1/4 3/8 1/2	1/2	3/64
BSNFLN-F081205 BSNFLN-F081206	.252	.377	5/8 3/4	1/2	3/64
BSNFLN-F101203	.314	.377	3/8	1/2	3/64
BSNFLN-F101403 BSNFLN-F101406	.314	.439	3/8 3/4	5/8	3/32
BSNFLN-F101603 BSNFLN-F101604 BSNFLN-F101605	.314	.502	3/8 1/2 5/8	11/16	3/32
BSNFLN-F121603 BSNFLN-F121603A BSNFLN-F121604	.377	.502	3/8 13/32 1/2	11/16	3/32
BSNFLN-F121605 BSNFLN-F121606 BSNFLN-F121608 BSNFLN-F121610	.377	.502	5/8 3/4 1 1-1/4	11/16	3/32
BSNFLN-F121806 BSNFLN-F121810	.377	.5645	3/4 1-1/4	3/4	1/8
BSNFLN-F122004 BSNFLN-F122006	.377	.627	1/2 3/4	7/8	1/8
BSNFLN-F122008 BSNFLN-F122010	.377	.627	1 1-1/4	7/8	1/8
BSNFLN-F122404	.377	.753	1/2	1/2	1/8

NOTE: Use Technical Section table 2-4 installation data.

Continued on the next page

Min. recommended clearance
for oil-impregnated bearings
used with ground steel shafting.

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
up to .760	.0005

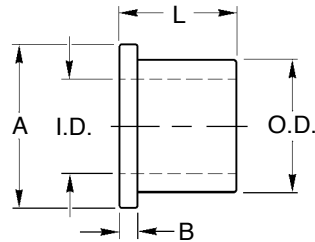
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
up to .760	.001	.003



Standard Series FLANGED SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L Length ±.005	A Flange Dia. ±.005	B Flange Width ±.0025
BSNFLN-F142005 BSNFLN-F142010	.439	.628	5/8 1-1/4	7/8	1/8
BSNFLN-F162003 BSNFLN-F162004 BSNFLN-F162005	.502	.628	3/8	7/8	1/8
BSNFLN-F162006 BSNFLN-F162008 BSNFLN-F162010			1/2 5/8		
BSNFLN-F162012 BSNFLN-F162014			3/4 1 1-1/4		
BSNFLN-F162204 BSNFLN-F162206			1-1/2 * 1-3/4		
BSNFLN-F162404 BSNFLN-F162405 BSNFLN-F162406	.502	.690	1/2	15/16	1/8
BSNFLN-F162407 BSNFLN-F162408			3/4		
BSNFLN-F162410 BSNFLN-F162412			7/8 1		
BSNFLN-F172408			1 1		
BSNFLN-F202404 BSNFLN-F202405 BSNFLN-F202406	.626	.753	1/2	1	1/8
BSNFLN-F202408 BSNFLN-F202410			5/8 3/4		
BSNFLN-F202606 BSNFLN-F202608 BSNFLN-F202610			1 1-1/4		
BSNFLN-F202611 BSNFLN-F202612 BSNFLN-F202616			1-1/4 1-1/2 * 2		
BSNFLN-F202408 BSNFLN-F202410	.565	.753	1	1	1/8
BSNFLN-F202606 BSNFLN-F202608 BSNFLN-F202610			1/2 5/8 3/4		
BSNFLN-F202611 BSNFLN-F202612 BSNFLN-F202616	.627	.815	1	1-1/16	5/32
BSNFLN-F202611 BSNFLN-F202612 BSNFLN-F202616			1-1/4 1-1/2 * 2		

NOTE: Use Technical Section, Table 2-4 installation data.

Continued on the next page

*Length Tolerance: ±.0075

Min. recommended clearance
for oil-impregnated bearings
used with ground steel shafting.

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
up to .760	.0005

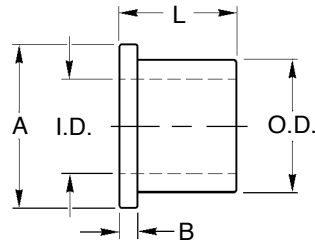
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
up to .760	.001	.003
.761 to 1.510	.0015	.004



Standard Series FLANGED SLEEVE BEARINGS

• Sintered Bronze SAE 841 • Oil-Impregnated • Self-Lubricating



Catalog Number	I.D. +.000 -.001	O.D. +.000 -.001	L Length ±.005	A** Flange Dia.	B Flange Width ±.0025	
BSNFLN-F202806 BSNFLN-F202808 BSNFLN-F202814	.627	.878	3/4 1 * 1-3/4	1-1/8	5/32	
BSNFLN-F242806 BSNFLN-F242808	.752	.878	3/4 1	1-1/8	5/32	
BSNFLN-F243008 BSNFLN-F243012		.940	1	1-3/16	5/32	
BSNFLN-F243205 BSNFLN-F243206 BSNFLN-F243208		1.003	5/8 3/4 1	1-1/4	5/32	
BSNFLN-F243210 BSNFLN-F243212 BSNFLN-F243216		1.003	1-1/4 1-1/2 * 2	1-1/4	5/32	
BSNFLN-F283206 BSNFLN-F283208 BSNFLN-F283210		.877	1.003	3/4 1 1-1/4	1-1/4	5/32
BSNFLN-F283608 BSNFLN-F283612			1.128	1 1-1/2	1-3/8	5/32
BSNFLN-F324006 BSNFLN-F324008	1.002	1.253	3/4 1	1-1/2	3/16	
BSNFLN-F324010 BSNFLN-F324012 BSNFLN-F324016		1.253	1-1/4 1-1/2 2	1-1/2	3/16	
BSNFLN-F324408 BSNFLN-F324414		1.378	1 * 1-3/4	1-5/8	3/16	
BSNFLN-F404808 BSNFLN-F404810		1.252	1.503	1 1-1/4	1-3/4	3/16
BSNFLN-F485612	1.503	^A 1.754	1-1/2	2-1/16	3/16	

NOTE: Use Technical Section, Table 2-4 installation data.

^AO.D. Tolerance: +.000, -.0015

*Length Tolerance: ±.0075

**Flange Tolerances: up to & including 1-1/4 is ±.005
over 1-1/4 is ±.010

RUNNING CLEARANCE

Shaft Size in.	Clearance min. in.
up to .760	.0005
.761 to 1.510	.001

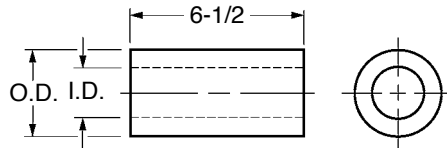
RECOMMENDED PRESS FITS

Outside Dia. in.	Press Fit, in.	
	Minimum	Maximum
.761 to 1.510	.0015	.004
1.511 to 2.510	.002	.005

Min. recommended clearance
for oil-impregnated bearings
used with ground steel shafting.

Sintered Bronze CORED BAR STOCK

• Oil-Impregnated Bronze SAE 841 • Self-Lubricating



Catalog Number	I.D.	O.D.
BSNCOR-SCB0408	1/2	1
BSNCOR-SCB0409		1-1/8
BSNCOR-SCB0410		1-1/4
BSNCOR-SCB0412		1-1/2
BSNCOR-SCB0416		2
BSNCOR-SCB0508	5/8	1
BSNCOR-SCB0509		1-1/8
BSNCOR-SCB0510		1-1/4
BSNCOR-SCB0511		1-3/8
BSNCOR-SCB0512		1-1/2
BSNCOR-SCB0514	1-3/4	
BSNCOR-SCB0516	2	
BSNCOR-SCB0610	3/4	1-1/4
BSNCOR-SCB0612		1-1/2
BSNCOR-SCB0614		1-3/4
BSNCOR-SCB0616		2
BSNCOR-SCB0618		2-1/4
BSNCOR-SCB0620	2-1/2	
BSNCOR-SCB0622	2-3/4	
BSNCOR-SCB0711	7/8	1-3/8
BSNCOR-SCB0712		1-1/2
BSNCOR-SCB0716		2
BSNCOR-SCB0718		2-1/4
BSNCOR-SCB0812		1
BSNCOR-SCB0813	1-5/8	
BSNCOR-SCB0814	1-3/4	

Catalog Number	I.D.	O.D.
BSNCOR-SCB0816	1	2
BSNCOR-SCB0818		2-1/4
BSNCOR-SCB0820		2-1/2
BSNCOR-SCB0824		3
BSNCOR-SCB0828		3-1/2
BSNCOR-SCB0832	4	
BSNCOR-SCB0917	1-1/8	2-1/8
BSNCOR-SCB1014	1-1/4	1-3/4
BSNCOR-SCB1016		2
BSNCOR-SCB1018		2-1/4
BSNCOR-SCB1020		2-1/2
BSNCOR-SCB1024		3
BSNCOR-SCB1028	3-1/2	
BSNCOR-SCB1032	4	
BSNCOR-SCB1116	1-3/8	2
BSNCOR-SCB1122		2-3/4
BSNCOR-SCB1216	1-1/2	2
BSNCOR-SCB1218		2-1/4
BSNCOR-SCB1220		2-1/2
BSNCOR-SCB1222		2-3/4
BSNCOR-SCB1224		3
BSNCOR-SCB1228	3-1/2	
BSNCOR-SCB1232	4	

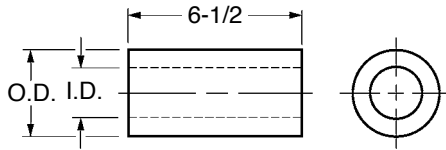
Continued on the next page

NOTE: All bars are supplied with oversized O.D.'s and undersized bores so they can be machine finished to dimensions shown.



Sintered Bronze CORED BAR STOCK

• Oil-Impregnated Bronze SAE 841 • Self-Lubricating



Catalog Number	I.D.	O.D.
BSNCOR-SCB1418	1-3/4	2-1/4
BSNCOR-SCB1420		2-1/2
BSNCOR-SCB1421		2-5/8
BSNCOR-SCB1422		2-3/4
BSNCOR-SCB1424		3
BSNCOR-SCB1428		3-1/2
BSNCOR-SCB1434		4-1/4
BSNCOR-SCB1436		2
BSNCOR-SCB1622	2-3/4	
BSNCOR-SCB1624	3	
BSNCOR-SCB1626	3-1/4	
BSNCOR-SCB1632	4	
BSNCOR-SCB1636	4-1/2	
BSNCOR-SCB1640	5	
BSNCOR-SCB1644	5-1/2	
BSNCOR-SCB1824	2-1/4	3
BSNCOR-SCB1826		3-1/4
BSNCOR-SCB1828		3-1/2
BSNCOR-SCB1830		3-3/4
BSNCOR-SCB1832		4
BSNCOR-SCB1836		4-1/2
BSNCOR-SCB1924	2-3/8	3
BSNCOR-SCB1928		3-1/2
BSNCOR-SCB1932		4
BSNCOR-SCB1936		4-1/2

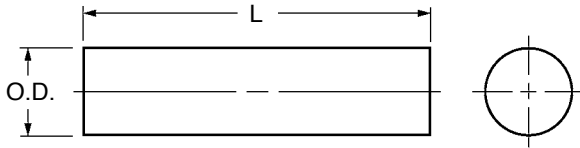
Catalog Number	I.D.	O.D.
BSNCOR-SCB2028	2-1/2	3-1/2
BSNCOR-SCB2030		3-3/4
BSNCOR-SCB2032		4
BSNCOR-SCB2034		4-1/4
BSNCOR-SCB2036		4-1/2
BSNCOR-SCB2040		5
BSNCOR-SCB2230	2-3/4	3-3/4
BSNCOR-SCB2430	3	3-3/4
BSNCOR-SCB2432		4
BSNCOR-SCB2436		4-1/2
BSNCOR-SCB2440		5
BSNCOR-SCB2448		6
BSNCOR-SCB2634	3-1/4	4-1/4
BSNCOR-SCB2838	3-1/2	4-3/4
BSNCOR-SCB2840		5
BSNCOR-SCB2848		6
BSNCOR-SCB3040	3-3/4	5
BSNCOR-SCB3244	4	5-1/2
BSNCOR-SCB3248		6
BSNCOR-SCB3256		7
BSNCOR-SCB3648	4-1/2	6
BSNCOR-SCB4056	5	7
BSNCOR-SCB4864	6	8

NOTE: All bars are supplied with oversized O.D.'s and undersized bores so they can be machine finished to dimensions shown.



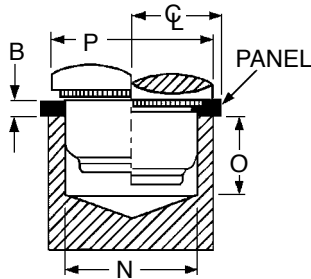
Sintered Bronze SOLID BAR STOCK

- Oil-Impregnated Bronze SAE 841
- Self-Lubricating



Catalog Number	O.D.	L Length
BSNBAR-SSB02	1/4	2
BSNBAR-SSB03	3/8	3
BSNBAR-SSB04	1/2	6-1/2
BSNBAR-SSB05	5/8	
BSNBAR-SSB06	3/4	
BSNBAR-SSB07	7/8	
BSNBAR-SSB08	1	
BSNBAR-SSB09	1-1/8	
BSNBAR-SSB10	1-1/4	
BSNBAR-SSB11	1-3/8	
BSNBAR-SSB12	1-1/2	
BSNBAR-SSB13	1-5/8	
BSNBAR-SSB14	1-3/4	
BSNBAR-SSB16	2	
BSNBAR-SSB18	2-1/4	
BSNBAR-SSB20	2-1/2	
BSNBAR-SSB22	2-3/4	
BSNBAR-SSB24	3	
BSNBAR-SSB26	3-1/4	
BSNBAR-SSB28	3-1/2	
BSNBAR-SSB32	4	
BSNBAR-SSB36	4-1/2	
BSNBAR-SSB40	5	
BSNBAR-SSB44	5-1/2	
BSNBAR-SSB48	6	

NOTE: All bars are supplied oversized so they can be machine finished to dimensions shown.



INSTALLATION:

1. Punch or drill and ream a hole of diameter **A** in panel as specified in the Design Parameters table.

DO NOT DEBURR OR BREAK EDGE OF HOLE.

2. Place bearing assembly in hole. The slight interference fit assures centering the assembly in the mounting hole.

3. Using an anvil with diameter **N**, a minimum depth of **O** and a punch diameter of **P**, press the bearing assembly into the panel by constantly applying a force of **F**, per the table, until the assembly is flush with the panel surface.

DO NOT USE HAMMER BLOWS!

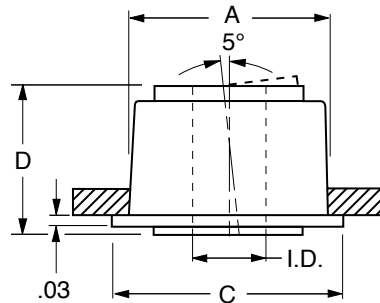
TOOLING AND INSTALLATION DATA

Nominal Shaft Diameter	A Panel Hole Diameter +.003 -.000	N Anvil Dia. +.005 -.000	O Min. Anvil Depth	P Press Tool Min. Dia.	C Min. Dist. Centerline to Panel Edge	Installation Force
						F Cold-Rolled Steel tons
1/8	.344	.359	.49	.59	.24	2.0
3/16	.500	.515	.60	.75	.38	5.0
1/4	.500	.515	.60	.75	.38	5.0
5/16	.625	.640	.66	.87	.45	5.5
3/8	.625	.640	.66	.87	.45	5.5
1/2	.812	.827	.84	1.07	.50	5.5
5/8	1.063	1.078	.97	1.30	.75	6.0
3/4	1.250	1.265	1.09	1.50	.75	6.0



Sintered Bronze PRESSBEARINGS

- Oil-Impregnated Sintered Bronze Bearing
- Carbon Steel Retainer, Black Oxide Finish



Features:

- Press-fit installation
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

DESIGN PARAMETERS

Operating Temperature: -20°F to +200°F

Catalog Number	Nom. I.D.	I.D.		C Flange Dia.	D Bearing Height	A Panel Hole Dia.	Max. Speed rpm	Max. Radial Dyn. Load lbf
		Min.	Max.					
BDBRSS-S125	1/8	.1255	.1260	.41	.27	.344	30550	70
BDBRSS-S187	3/16	.1833	.1888	.56	.38	.500	20310	140
BDBRSS-S250	1/4	.2508	.2513	.56	.38	.500	15270	190
BDBRSS-S312	5/16	.3133	.3140	.69	.43	.625	12240	270
BDBRSS-S375	3/8	.3758	.3765	.69	.43	.625	10180	320
BDBRSS-S500	1/2	.5010	.5017	.88	.60	.812	7640	600
BDBRSS-S625	5/8	.6260	.6270	1.13	.77	1.063	6110	890

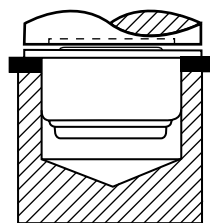
SHAFT RECOMMENDATIONS:

Finish: 16 μ in. or finer.

Material: Cold-rolled steel, drill rod, hardened and ground steels, or nonaustenitic stainless steel.

INSTALLATION NOTES:

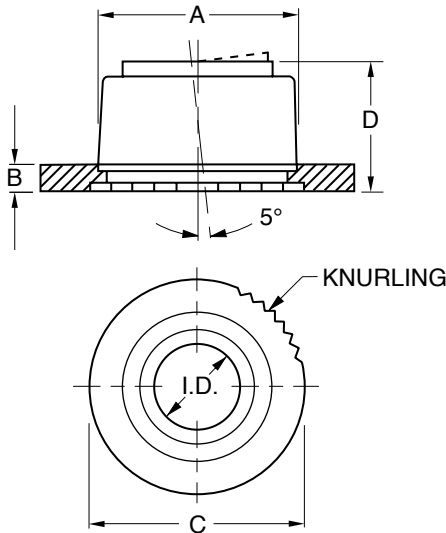
1. The punch must be relieved to accommodate protruding insert.
2. **DO NOT PRESS BEARING ON INSERT!**





Sintered Bronze PRESSBEARINGS

- Oil-Impregnated Sintered Bronze Bearing SAE 840
- Carbon Steel Retainer, Black Oxide Finish
- 303 Stainless Steel Retainer



Features:

- Self-clinching
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

SHAFT RECOMMENDATIONS:

Finish: 16 μ in. or finer.

Material: Cold-rolled steel, drill rod, hardened and ground steels, or nonaustenitic stainless steel. RB 100 min.

DESIGN PARAMETERS

Operating Temperature: -20°F to +200°F

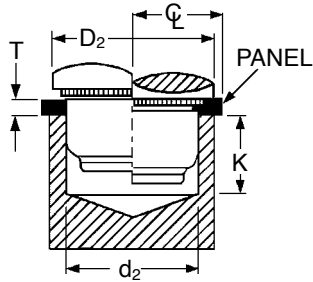
Catalog Number	Nom. I.D.	I.D.		C Knurl O.D.	D Height	A Panel Hole Dia.	B Min. Panel Thickness	Max. Speed rpm	Max. Radial Dyn. Load lbf
		Min.	Max.						
B □BRSS-K125	1/8	.1255	.1260	.39	.29	.344	.04	30550	70
B □BRSS-K187	3/16	.1883	.1888	.55	.40	.500		20310	140
B □BRSS-K250	1/4	.2508	.2513	.55	.40	.500	.04	15270	190
B □BRSS-K312	5/16	.3133	.3140	.67	.46	.625		12240	270
B □BRSS-K375	3/8	.3758	.3765	.67	.46	.625	.06	10180	320
B □BRSS-K500	1/2	.5010	.5017	.87	.64	.812		7640	600
B □BRSS-K625	5/8	.6260	.6270	1.10	.77	1.063	.09	6110	890
B □BRSS-K750	3/4	.7510	.7520	1.30	.89	1.250		5090	1280

RETAINER MATERIAL:

- D** Carbon Steel
- S** Stainless Steel

Example: For a stainless steel retainer, specify catalog number **BSBRSS-K250**.

NOTE: See the previous page for installation instructions.



INSTALLATION:

1. Punch or drill and ream a hole of diameter d_1 in panel as specified in the Design Parameters table.

DO NOT DEBURR OR BREAK EDGE OF HOLE.

2. Place bearing assembly in hole. The slight interference fit assures centering the assembly in the mounting hole.

3. Using an anvil with diameter d_2 , a minimum depth of K and a punch diameter of D_2 , press the bearing assembly into the panel by constantly applying a force of F , per the table, until the assembly is flush with the panel surface.

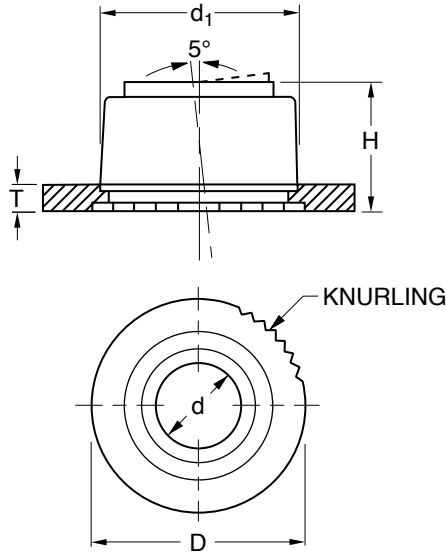
DO NOT USE HAMMER BLOWS!

TOOLING AND INSTALLATION DATA

Nominal Shaft Diameter	d_1 Panel Hole Diameter +0.07	d_2 Anvil Dia. +0.1	K Min. Anvil Depth	D_2 Min. Punch Dia.	C Min. Dist. Centerline to Panel Edge	Installation Force
						F Cold-Rolled Steel N
4 6	12.7	13.15	15.2	19	9.5	45000
8 10	15.9	16.35	16.5	22	11.5	49000
12 15 18	20.6 27 31.8	21.05 27.45 32.25	21.3 24.4 27.5	27 33 38	12.7 19 19	49000 54000 54000

Sintered Bronze PRESSBEARINGS

- Oil-Impregnated Sintered Bronze Bearing SAE 840
- Carbon Steel Retainer, Black Oxide Finish
- 303 Stainless Steel Retainer



Features:

- Self-clinching
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

SHAFT RECOMMENDATIONS:

Finish: 0.4 μm . or finer.

Material: Cold-rolled steel, drill rod, hardened and ground steel, or nonaustenitic stainless steel.

The projections shown are per ISO convention.

DESIGN PARAMETERS

Operating Temperature: -29°C to $+93^\circ\text{C}$

Catalog Number	I.D.		D Knurl O.D.	H Height	d ₁ Panel Hole Dia.	T Min. Panel Thickness	Max. Speed rpm	Max. Radial Load N
	Min.	Max.						
B □ BRSSMK04	4.01	4.03	14	10.2	12.7	1	24170	530
B □ BRSSMK06	6.02	6.04						
B □ BRSSMK08	8.02	8.04	17	11.5	15.9	1.5	12120	1190
B □ BRSSMK10	10.02	10.04						
B □ BRSSMK12	12.03	12.05	22	16.3	20.6	1.5	8060	2530
B □ BRSSMK15	15.03	15.05						
B □ BRSSMK18	18.03	18.05	33	22.5	31.8	2.3	5380	5370

RETAINER MATERIAL:

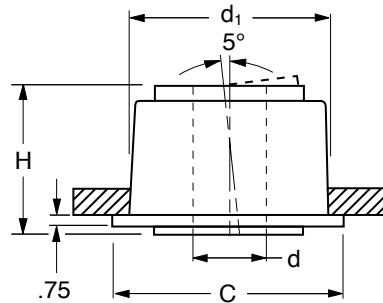
- D** Carbon Steel
- S** Stainless Steel

Example: For a stainless steel retainer, specify catalog number **BSBRSSMK08**.

NOTE: See the previous page for installation instructions.

Sintered Bronze PRESSBEARINGS

- Oil-Impregnated Sintered Bronze Bearing SAE 840
- Carbon Steel, Black Oxide Finish



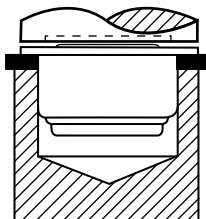
Features:

- Press-fit installation
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

DESIGN PARAMETERS

Operating Temperature: -29°C to $+93^\circ\text{C}$

Catalog Number	Nom. I.D.	I.D.		D Flange O.D.	H Height	d ₁ Panel Hole +0.07 -0.00	Max. Speed rpm	Max. Radial Dyn. Load N
		Min.	Max.					
BDBRSSMS04	4	4.01	4.03	14.2	9.6	12.7	24170	530
BDBRSSMS06	6	6.02	6.04	14.2	9.6	12.7	16110	790
BDBRSSMS08	8	8.02	8.04	17.4	10.8	15.9	12120	1190
BDBRSSMS10	10	10.02	10.04	17.4	10.8	15.9	9700	1490
BDBRSSMS12	12	12.03	12.05	22.2	15.2	20.6	8060	2430
BDBRSSMS15	15	15.03	15.05	28.5	19.6	27	6460	3750



SHAFT RECOMMENDATIONS:

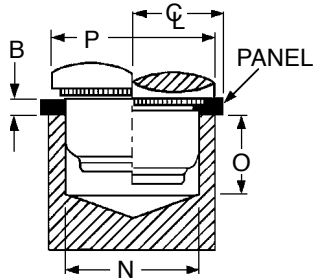
Finish: 0.4 μm or finer.

Material: Cold-rolled steel, drill rod, hardened and ground steels, or nonaustenitic stainless steel.

INSTALLATION NOTES:

1. The punch must be relieved to accommodate protruding insert.
2. **DO NOT PRESS BEARING ON INSERT!**

INSTALLATION:



1. Punch or drill and ream a hole of diameter **A** in panel as specified in the Design Parameters table.

DO NOT DEBURR OR BREAK EDGE OF HOLE.

2. Place bearing assembly in hole. The slight interference fit assures centering the assembly in the mounting hole.

3. Using an anvil with diameter **N**, a minimum depth of **O** and a punch diameter of **P**, press the bearing assembly into the panel by constantly applying a force of **F**, per the table, until the assembly is flush with the panel surface.

DO NOT USE HAMMER BLOWS!

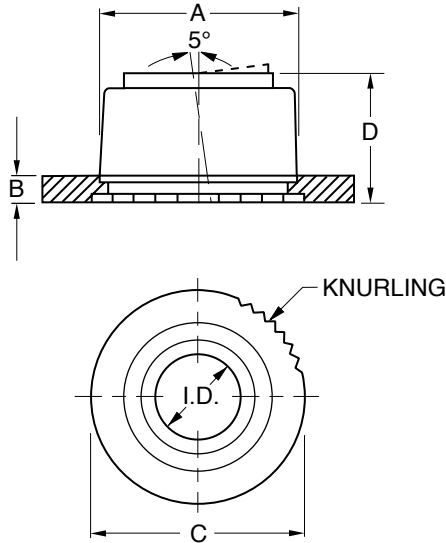
TOOLING AND INSTALLATION DATA

Nominal Shaft Diameter	A Panel Hole Diameter +.003 -.000	N Anvil Dia. +.005 -.000	O Min. Anvil Depth	P Min. Punch Dia.	Q Min. Dist. Centerline to Panel Edge	Installation Force
						F Cold-Rolled Steel tons
3/32	.234	.249	.39	.48	.19	1.0
1/8	.297	.312	.43	.54	.22	1.5
3/16	.375	.390	.48	.62	.25	2.0
1/4	.547	.562	.59	.80	.41	5.0
5/16	.625	.640	.71	.87	.45	5.5
3/8	.812	.827	.87	1.07	.50	5.5
1/2	1.063	1.078	.97	1.31	.75	6.0
5/8	1.250	1.265	1.09	1.50	.75	6.0
3/4						



Delrin PRESSBEARINGS

- Delrin Bearing
- Carbon Steel Retainer, Black Oxide Finish
- 303 Stainless Steel Retainer
- FDA Approved Material



Features:

- Self-clinching
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

SHAFT RECOMMENDATIONS:

Finish: 16 μ in. or finer.

Material: Any metal with above finish.

DESIGN PARAMETERS

Operating Temperature: -40°F to +300°F

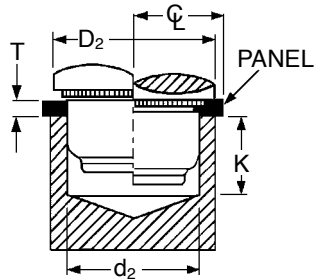
Catalog Number	Nominal I.D.	I.D.		C Knurl O.D.	D Height	A Panel Hole Dia.	B Min. Panel Thickness	Max. Speed rpm	Max. Radial Dyn. Load lbf
		Min.	Max.						
B □ARSS-K094	3/32	.0940	.0970	.28	.19	.234	.04	3980	20
B □ARSS-K126	1/8	.1260	.1280	.34	.23	.297	.04	3010	30
B □ARSS-K188	3/16	.1885	.1905	.42	.28	.375	.04	2010	50
B □ARSS-K251	1/4	.2510	.2530	.60	.39	.547	.06	1220	120
B □ARSS-K313	5/16	.3135	.3155	.67	.45	.625	.06	1010	190
B □ARSS-K376	3/8	.3760	.3780	.87	.65	.812	.06	760	320
B □ARSS-K501	1/2	.5010	.5040	1.11	.77	1.063	.075	610	450
B □ARSS-K626	5/8	.6260	.6280	1.30	.89	1.250	.09	510	640
B □ARSS-K750	3/4	.7510	.7530						

RETAINER MATERIAL:

- D** Carbon Steel
- S** Stainless Steel

Example: For a carbon steel retainer, specify catalog number **BDARSS-K250**.

NOTE: See the previous page for installation instructions.


INSTALLATION:

1. Punch or drill and ream a hole of diameter d_1 in panel as specified in the Design Parameters table.

DO NOT DEBURR OR BREAK EDGE OF HOLE.

2. Place bearing assembly in hole. The slight interference fit assures centering the assembly in the mounting hole.

3. Using an anvil with diameter d_2 , a minimum depth of K and a punch diameter of D_2 , press the bearing assembly into the panel by constantly applying a force of F , per the table, until the assembly is flush with the panel surface.

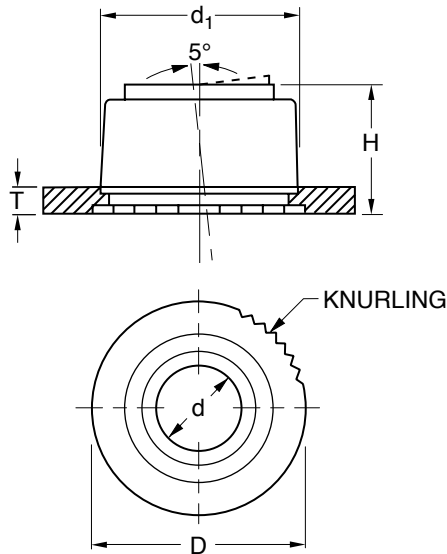
DO NOT USE HAMMER BLOWS!

TOOLING AND INSTALLATION DATA

Nominal Shaft Diameter	d_1 Panel Hole Diameter +0.07	d_2 Anvil Dia. +0.1	K Min. Anvil Depth	D_2 Min. Punch Dia.	C Min. Dist. Centerline to Panel Edge	Installation Force
						F Cold-Rolled Steel N
2	5.9	6.35	9.9	12.2	4.7	9000
4	7.5	7.95	11	13.7	5.5	14000
6	9.5	9.95	11.9	15.6	6.4	18000
8	13.9	14.35	15	20.3	10.3	45000
10	15.9	16.35	18	22	11.5	49000
12	20.6	21.05	22	27	12.7	
15	27	27.45	24.4	33	19	54000
18	31.8	32.25	27.4	38		

Delrin PRESSBEARINGS

- Delrin Bearing
- Carbon Steel Retainer, Black Oxide Finish
- 303 Stainless Steel Retainer
- FDA Approved Material



Features:

- Self-clinching
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

SHAFT RECOMMENDATIONS:

Finish: 0.4 μm or finer.

Material: Any metal with the above finish

The projections shown are per ISO convention.

DESIGN PARAMETERS

Operating Temperature: -40°C to $+149^\circ\text{C}$

Catalog Number	Nom. I.D.	d I.D.		D Knurl O.D.	H Height	d ₁ Panel Hole Dia.	T Min. Panel Thickness	Max. Speed rpm	Max. Radial Dyn. Load N
		Min.	Max.						
B□ARSSMK02	2	2.06	2.10	7.2	4.9	5.9	1	4850	60
B□ARSSMK04	4	4.02	4.07	8.7	6	7.5	1	2430	150
B□ARSSMK06	6	6.02	6.07	10.6	6.9	9.5	1	1620	270
B□ARSSMK08	8	8.03	8.08	15.3	10	13.9	1.5	1210	530
B□ARSSMK10	10	10.03	10.08	17	11.4	15.9	1.5	970	860
B□ARSSMK12	12	12.03	12.08	22	16.5	20.6	1.5	810	1330
B□ARSSMK15	15	15.03	15.08	28	19.4	27	2	650	1870
B□ARSSMK18	18	18.03	18.08	33	22.4	31.8	2.3	540	2680

RETAINER MATERIAL:

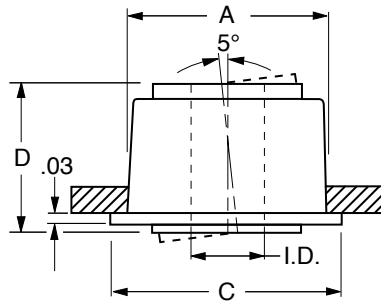
- D Carbon Steel
- S Stainless Steel

Example: For a stainless steel retainer, specify catalog number **BSARSSMK08**.

NOTE: See the previous page for installation instructions.

Delrin PRESSBEARINGS

- Delrin Bearing
- Carbon Steel Retainer, Black Oxide Finish
- FDA Approved Material



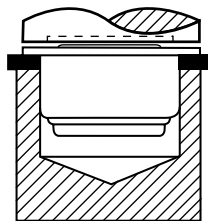
Features:

- Press-fit installation
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

DESIGN PARAMETERS

Operating Temperature: -40°F to +300°F

Catalog Number	I.D.		C Flange Dia.	D Height	A Panel Hole Dia.	Max. Speed rpm	Max. Radial Dyn. Load lbf
	Min.	Max.					
BDARSS-S125	.1260	.1280	.41	.27	.344	3010	30
BDARSS-S187	.1885	.1905	.56	.38	.500	2010	50
BDARSS-S250	.2510	.2530	.56	.38	.500	1520	70
BDARSS-S312	.3135	.3155	.69	.43	.625	1220	120
BDARSS-S375	.3760	.3780	.69	.43	.625	1010	190
BDARSS-S500	.5010	.5040	.88	.60	.812	760	320
BDARSS-S625	.6260	.6280	1.12	.77	1.063	610	450



SHAFT RECOMMENDATIONS:

Finish: 16 μ in. or finer.

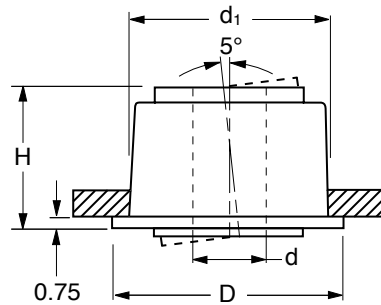
Material: Any metal with the above finish.

INSTALLATION NOTES:

1. The punch must be relieved to accommodate protruding insert.
2. **DO NOT PRESS BEARING ON INSERT!**

Delrin PRESSBEARINGS

- Delrin Bearing
- Carbon Steel Retainer, Black Oxide Finish
- FDA Approved Material



Features:

- Press-fit installation
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

DESIGN PARAMETERS

Operating Temperature: -40°C to $+149^\circ\text{C}$

Catalog Number	Nom. I.D.	d I.D.		D Flange O.D.	H Height	d ₁ Panel Hole Dia.	Max. Speed rpm	Max. Radial Dyn. Load N
		Min.	Max.					
BDARSSM04	4	4.02	4.07	14.2	9.6	12.7	2430	150
BDARSSM06	6	6.02	6.07					
BDARSSM08	8	8.03	8.08	17.4	10.8	15.9	1210	530
BDARSSM10	10	10.03	10.08					
BDARSSM12	12	12.03	12.08	22.2	14.9	20.6	810	1330
BDARSSM15	15	15.03	15.08					

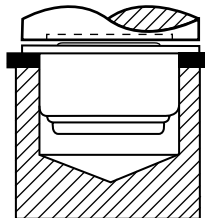
SHAFT RECOMMENDATIONS:

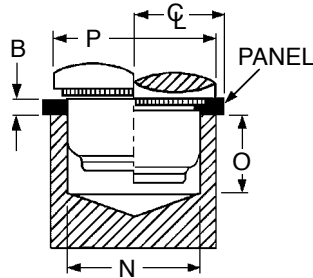
Finish: $0.4\ \mu\text{m}$ or finer.

Material: Any metal with the above finish.

INSTALLATION NOTES:

1. The punch must be relieved to accommodate protruding insert.
2. **DO NOT PRESS BEARING ON INSERT!**





INSTALLATION:

1. Punch or drill and ream a hole of diameter **A** in panel as specified in the Design Parameters table.

DO NOT DEBURR OR BREAK EDGE OF HOLE.

2. Place bearing assembly in hole. The slight interference fit assures centering the assembly in the mounting hole.
3. Using an anvil with diameter **N**, a minimum depth of **O** and a punch diameter of **P**, press the bearing assembly into the panel by constantly applying a force of **F**, per the table, until the assembly is flush with the panel surface.

DO NOT USE HAMMER BLOWS!

TOOLING AND INSTALLATION DATA

Nominal Shaft Diameter	N Anvil Dia. +.005 -.000	O Min. Anvil Depth	P Min. Punch Dia.	Q Min. Dist. Centerline to Panel Edge	Installation Force
					F Cold-Rolled Steel tons
SELF-ALIGNING					
1/8	.515	.60	.75	.38	5.0
3/16	.640	.66	.87	.45	5.5
1/4	.640	.66	.87	.45	5.5
5/16	.827	.84	1.07	.50	5.5
3/8	.827	.84	1.07	.50	5.5
1/2	1.078	.97	1.30	.75	6.0
5/8	1.265	1.09	1.50	.75	6.0
NONALIGNING					
1/8	.390	.51	.62	.25	2.0
3/16	.515	.70	.75	.38	5.0
1/4	.640	.64	.87	.45	5.5
5/16	.640	.64	.87	.45	5.5
3/8	.827	.64	1.07	.50	5.5
1/2	.890	.70	1.12	.63	6.0
9/16	1.078	.94	1.30	.75	6.0
3/4	1.265	.83	1.50	.75	6.0

SHAFT RECOMMENDATIONS:

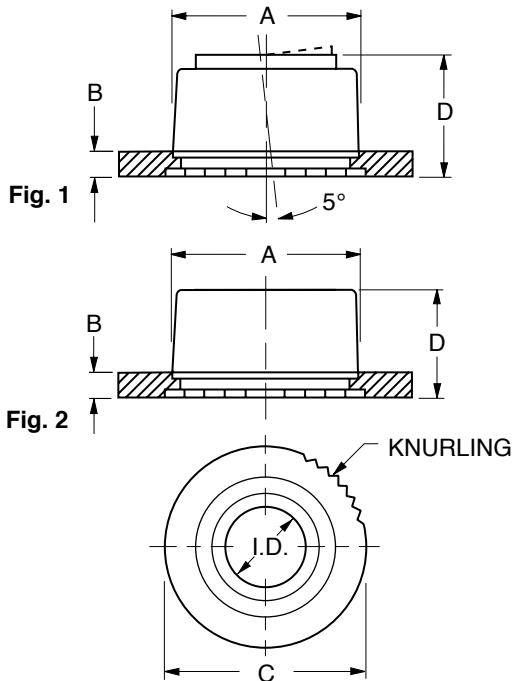
Shafts should be hardened to Rc 58 with a 16 μ in. finish.
 Shaft ends should have radii or be chamfered.

SHAFT DIAMETERS

Nominal Shaft Diameter	SELF-ALIGNING		NONALIGNING	
	Min. Diameter	Max. Diameter	Min. Diameter	Max. Diameter
1/8	.1247	.1250	.1247	.1250
3/16	.1872	.1875	.1872	.1875
1/4	.2495	.2500	.2495	.2500
5/16	.3120	.3125	.3120	.3125
3/8	.3754	.3759	.3745	.3750
1/2	.4995	.5000	.4995	.5005
9/16	—	—	.5620	.5625
5/8	.6245	.6250	.6245	.6250
3/4	—	—	.7495	.7500

Needle Roller Bearing PRESSBEARINGS

- Drawn Cup Needle Roller Bearing
- Carbon Steel Housing, Black Oxide Finish



Features:

- Self-clinching
- Self-aligning to $\pm 5^\circ$ or nonaligning
- High-speed, high-load applications
- Knurling ensures secure self-clinching
- Simple quick installation
- Major assembly and production savings
- Mounting blocks not necessary

DESIGN PARAMETERS

Operating Temperature: -22°F to +248°F

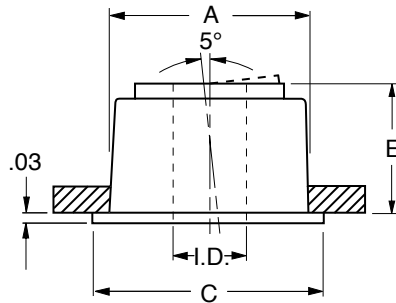
Catalog Number	Nom. I.D.	Shaft Dia.		A Panel Hole	B Min. Panel Thickness	C Knurl O.D.	D Height	Max. Speed rpm	Max. Radial Dyn. Load lbf
		Min.	Max.						
FIG. 1 SELF-ALIGNING									
BDNRSS-SAK125	1/8	.1247	.1250	.500	.04	.55	.40	31500	240
BDNRSS-SAK187	3/16	.1872	.1875	.625	.06	.67	.46	21000	630
BDNRSS-SAK250	1/4	.2495	.2500	.625	.06	.67	.46	44000	570
BDNRSS-SAK312	5/16	.3120	.3125	.812	.06	.87	.64	35500	650
BDNRSS-SAK375	3/8	.3745	.3759	.812	.06	.87	.64	29500	650
BDNRSS-SAK500	1/2	.4995	.5000	1.063	.075	1.10	.77	22000	1040
BDNRSS-SAK625	5/8	.6245	.6250	1.250	.09	1.30	.89	17600	1830
FIG. 2 NONALIGNING									
BDNRSS-NAK125	1/8	.1247	.1250	.375	.04	.42	.31	31500	240
BDNRSS-NAK187	3/16	.1872	.1875	.500	.04	.55	.50	21000	630
BDNRSS-NAK250	1/4	.2495	.2500	.625	.06	.67	.44	44000	570
BDNRSS-NAK312	5/16	.3120	.3125	.625	.06	.67	.44	35500	650
BDNRSS-NAK375	3/8	.3745	.3750	.812	.06	.87	.44	29500	650
BDNRSS-NAK500	1/2	.4995	.5000	.875	.06	.92	.50	22000	1040
*BDNRSS-NAK625	5/8	.6245	.6250	1.063	.075	1.10	.63	17600	1830

NOTE: See previous page for installation instructions. Hardened steel shaft required.

*To be discontinued when present stock is depleted.

Needle Roller Bearing PRESSBEARINGS

- Drawn Cup Needle Roller Bearing
- Carbon Steel Housing, Black Oxide Finish



Features:

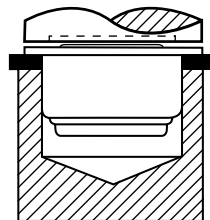
- Simple quick press-fit installation
- Self-aligning to $\pm 5^\circ$
- High-speed, high-load
- No precision holes required
- Major assembly and production savings

DESIGN PARAMETERS

Operating Temperature: -22°F to $+248^\circ\text{F}$

Catalog Number	Nom. I.D.	Shaft Diameter		A Panel Hole	C Flange Dia.	E Height	Max. Speed rpm	Max. Radial Load lbf
		Min.	Max.					
BDNRSS-SAS125	1/8	.1247	.1250	.500	.56	.37	31500	240
BDNRSS-SAS187	3/16	.1872	.1875	.625	.69	.43	21000	630
BDNRSS-SAS250	1/4	.2495	.2500	.625	.69	.43	44000	570
BDNRSS-SAS312	5/16	.3120	.3125	.812	.88	.60	35500	650
BDNRSS-SAS375	3/8	.3745	.3750	.812	.88	.60	29500	650
BDNRSS-SAS500	1/2	.4995	.5000	1.063	1.13	.77	22000	1040
BDNRSS-SAS625	5/8	.6245	.6250	1.250	1.31	.85	17600	1830

NOTES: Hardened steel shaft required.



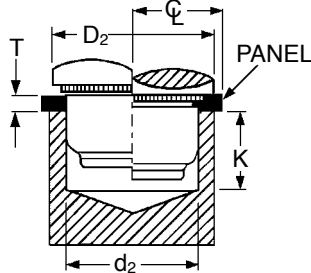
SHAFT RECOMMENDATIONS:

Shafts should be hardened to Rc 58 to 64 with $16 \mu\text{in.}$ finish. Shaft ends should have radii or be chamfered.

INSTALLATION NOTES:

1. The punch must be relieved to accommodate protruding insert.
2. **DO NOT PRESS BEARING ON INSERT!**

INSTALLATION:



1. Punch or drill and ream a hole of diameter d_1 in panel as specified in the Design Parameters table.

DO NOT DEBURR OR BREAK EDGE OF HOLE.

2. Place bearing assembly in hole. The slight interference fit assures centering the assembly in the mounting hole.
3. Using an anvil with diameter d_2 , a minimum depth of K and a punch diameter of D_2 , press the bearing assembly into the panel by constantly applying a force of F , per the table, until the assembly is flush with the panel surface.

DO NOT USE HAMMER BLOWS!

TOOLING AND INSTALLATION DATA

Nominal Shaft Diameter	d_2 Anvil Dia. +0.1	K Min. Anvil Depth	D_2 Min. Punch Dia.	C Min. Dist. Centerline to Panel Edge	Installation Force
					F Cold-Rolled Steel N
SELF-ALIGNING					
4	16.35	16.6	22	11.5	49000
6					
8	21.05	21.3	27	12.7	49000
10					
12	27.45	24.5	33	19	54000
15					
NONALIGNING					
4	13.15	15.8	19	9.5	45000
6	16.35		22	11.5	49000
8	16.35	16.1	22	11.5	49000
10	21.05	17.7	27	12.7	
12	21.05	17.7	27	12.7	

SHAFT RECOMMENDATIONS:

Shafts should be hardened to HRC 58 to 64 with a $0.4 \mu\text{m}$ finish. Shaft ends should have radii or be chamfered.

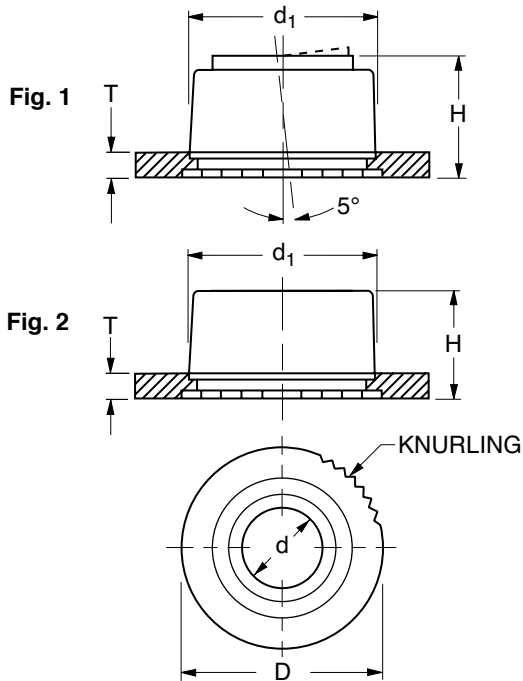
SHAFT DIAMETERS

Nominal Shaft Diameter	SELF-ALIGNING		NONALIGNING	
	Minimum Diameter	Maximum Diameter	Minimum Diameter	Maximum Diameter
4	3.992	4.000	3.992	4.000
6	5.992	6.000	5.992	6.000
8	7.991	8.000	7.991	8.000
10	9.991	10.000	9.991	10.000
12	11.989	12.000	11.989	12.000
15	14.989	15.000	14.989	15.000

Needle Roller Bearing

PRESSBEARINGS

- Drawn Cup Needle Roller Bearing
- Carbon Steel Housing, Black Oxide Finish



Features:

- Self-clinching
- Self-aligning to $\pm 5^\circ$ or nonaligning
- High-speed, high-load applications
- Knurling ensures secure self-clinching
- Simple quick installation
- Major assembly and production savings
- Mounting blocks not necessary

DESIGN PARAMETERS

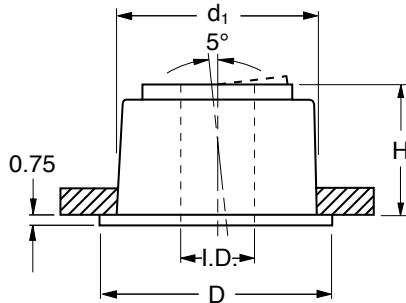
Operating Temperature: -30°C to $+120^\circ\text{C}$

Catalog Number	d Nom. I.D.	Shaft Dia.		D Knurl O.D.	H Height	d ₁ Panel Hole	T Min. Panel Thick- ness	Max. Speed rpm	Max. Radial Load N
		Min.	Max.						
FIG. 1 SELF-ALIGNING									
BDNRSSMSAK04	4	3.992	4.000	17	11.6	15.9	1.5	41000	1780
BDNRSSMSAK06	6	5.992	6.000	17	11.6	15.9	1.5	35000	2030
BDNRSSMSAK08	8	7.991	8.000	22	16.3	20.6	1.5	28000	2750
BDNRSSMSAK10	10	9.991	10.000	22	16.3	20.6	1.5	23000	4400
BDNRSSMSAK12	12	11.989	12.000	28	19.5	27	2	20000	4950
BDNRSSMSAK15	15	14.989	15.000	33	22.5	31.8	2.3	16000	7900
FIG. 2 NONALIGNING									
BDNRSSMNAK04	4	3.992	4.000	14	10.8	12.7	1	41000	1780
BDNRSSMNAK06	6	5.992	6.000	17	10.8	15.9	1.5	35000	2030
BDNRSSMNAK08	8	7.991	8.000	17	11.1	15.9	1.5	28000	2750
BDNRSSMNAK10	10	9.991	10.000	22	12.7	20.6	1.5	23000	4400
BDNRSSMNAK12	12	11.989	12.000	22	12.7	20.6	1.5	20000	4950
BDNRSSMNAK15	15	14.989	15.000	28	18.7	27	2	16000	7900
BDNRSSMNAK18	18	17.989	18.000	33	16	31.8	2.3	13000	8100

NOTE: See previous page for installation instructions.
Hardened steel shaft required.

Needle Roller Bearing PRESSBEARINGS

- Drawn Cup Needle Roller Bearing
- Carbon Steel Housing, Black Oxide Finish



Features:

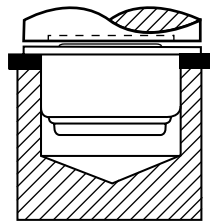
- Simple quick press-fit installation
- Self-aligning to $\pm 5^\circ$
- High-speed, high-load
- No precision holes required
- Major assembly and production savings

DESIGN PARAMETERS

Operating Temperature: -30°C to $+120^\circ\text{C}$

Catalog Number	Nom. I.D.	Shaft Diameter		d ₁ Panel Hole	D Flange O.D.	H Height	Max. Speed rpm	Max. Radial Load N
		Min.	Max.					
BDNRSSMSAS04	4	3.992	4.000	15.9	17.4	10.8	41000	1780
BDNRSSMSAS06	6	5.992	6.000					
BDNRSSMSAS08	8	7.991	8.000	20.6	22.2	15.2	28000	2750
BDNRSSMSAS10	10	9.991	10.000					
BDNRSSMSAS12	12	11.989	12.000	27	28.5	19.6	20000	4950
BDNRSSMSAS15	15	14.989	15.000					

NOTES: Hardened steel shaft required.

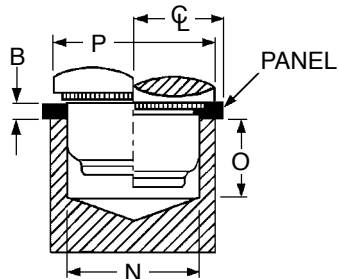


SHAFT RECOMMENDATIONS:

Shafts should be hardened to HRC 58 to 64 with $0.4\ \mu\text{m}$ finish. Shaft ends should have radii or be chamfered.

INSTALLATION NOTES:

1. The punch must be relieved to accommodate protruding insert.
2. **DO NOT PRESS BEARING ON INSERT!**



INSTALLATION:

1. Punch or drill and ream a hole of diameter **A** in panel as specified in the Design Parameters table.

DO NOT DEBURR OR BREAK EDGE OF HOLE.

2. Place bearing assembly in hole. The slight interference fit assures centering the assembly in the mounting hole.
3. Using an anvil with diameter **N**, a minimum depth of **O** and a punch diameter of **P**, press the bearing assembly into the panel by constantly applying a force of **F**, per the table, until the assembly is flush with the panel surface.

DO NOT USE HAMMER BLOWS!

TOOLING AND INSTALLATION DATA

Nominal Shaft Diameter	N Anvil Dia. +.005 -.000	O Min. Anvil Depth	P Min. Punch Dia.	C Min. Dist. Centerline to Panel Edge	Installation Force
					F Cold-Rolled Steel tons
1/4	.640	1.14	.87	.45	5.5
3/8	.890	1.20	1.12	.63	6.0

SHAFT DIAMETERS

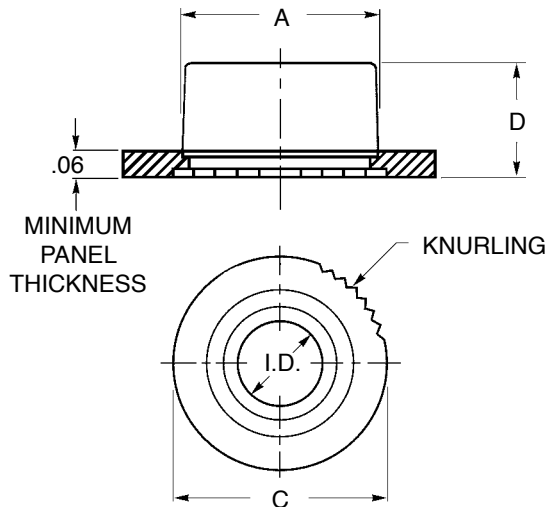
Nominal Shaft Diameter	Minimum Diameter	Maximum Diameter
1/4	.2495	.2500
3/8	.3745	.3750

SHAFT RECOMMENDATIONS:

Shafts should be hardened to Rc 58 to 64 with 16 μ in. finish. Shafts ends should have radii or be chamfered.

Needle Roller Clutch PRESSBEARINGS

- Drawn Cup Needle Roller Clutch
- Carbon Steel Housing, Black Oxide Finish



Features:

- Self-clinching
- Unidirectional drive
- Nonaligning
- Knurling ensures secure self-clinching
- Simple quick installation
- Major assembly and production savings
- Mounting blocks not necessary

DESIGN PARAMETERS

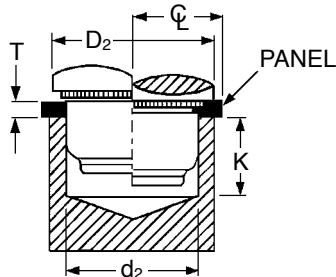
Operating Temperature: -22°F to +248°F

Catalog Number	Nom. I.D.	Shaft Dia.		Direction of Rotation	C Knurl O.D.	D Height	A Panel Hole	Max. Speed rpm	Max. Torque lb. in.	Max. Radial Dyn. Load lbf
		Min.	Max.							
BDCRSS-NAK250	1/4	.2495	.2500	Clockwise	.67	.94	.625	12000	18.6	570
BDCRSS-NAK375	3/8	.3745	.3750	Clockwise	.92	1.00	.875			
BDCRSS-NAK250CW	1/4	.2495	.2500	Counterclockwise	.67	.94	.625	12000	18.6	570
BDCRSS-NAK375CW	3/8	.3745	.3750	Counterclockwise	.92	1.00	.875			

- NOTES:**
1. The direction of rotation is when viewed from the serrated end of the bearing.
 2. See the previous page for installation instructions.
 3. Hardened steel shaft required.

Needle Roller Clutch PRESSBEARINGS

- Drawn Cup Needle Roller Clutch
- Carbon Steel Housing, Black Oxide Finish



INSTALLATION:

1. Punch or drill and ream a hole of diameter d_1 in panel as specified in the Design Parameters table.

DO NOT DEBURR OR BREAK EDGE OF HOLE.

2. Place bearing assembly in hole. The slight interference fit assures centering the assembly in the mounting hole.
3. Using an anvil with diameter d_2 , a minimum depth of K and a punch diameter of D_2 , press the bearing assembly into the panel by constantly applying a force of F , per the table, until the assembly is flush with the panel surface.

DO NOT USE HAMMER BLOWS!

TOOLING AND INSTALLATION DATA

Nominal Shaft Diameter	d_2 Anvil Dia. +0.1	K Min. Anvil Depth	D_2 Min. Punch Dia.	C Min. Dist. Centerline to Panel Edge	Installation Force
					F Cold-Rolled Steel kN
6	16.35	28.8	22	11.5	49
8	22.65	30.4	28	16	50

SHAFT DIAMETERS

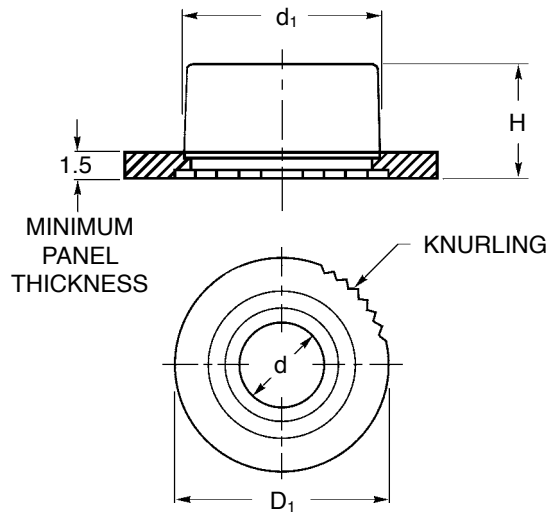
Nominal Shaft Diameter	Minimum Diameter	Maximum Diameter
6	5.992	6.000
8	7.991	8.000

SHAFT RECOMMENDATIONS:

Shafts should be hardened to HRC 58 to 64 with $0.4 \mu\text{m}$ finish. Shaft ends should have radii or be chamfered.

Needle Roller Clutch PRESSBEARINGS

- Drawn Cup Needle Roller Clutch
- Carbon Steel Housing, Black Oxide Finish



Features:

- Self-clinching
- Unidirectional drive
- Nonaligning
- Knurling ensures secure self-clinching
- Simple quick installation
- Major assembly and production savings
- Mounting blocks not necessary

DESIGN PARAMETERS

Operating Temperature: -30°C to +120°C

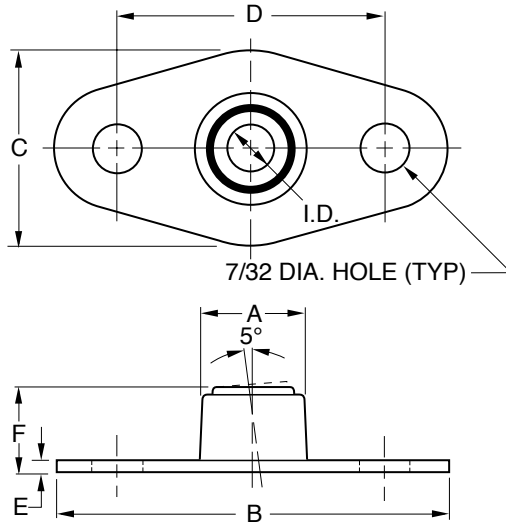
Catalog Number	d Nom. I.D.	Shaft Dia.		Direction of Rotation	D ₁ Knurl O.D.	H Height	d ₁ Panel Hole	Max. Speed rpm	Max. Torque N · m	Max. Radial Dyn. Load N
		Min.	Max.							
BDCRSSMNAK06	6	5.992	6.000	Clockwise	17	23.8	15.9	13000	1.7	2030
BDCRSSMNAK08	8	7.990	8.000	Clockwise	23	25.4	22.2	12000	3.1	4050
BDCRSSMNAK06CW	6	5.992	6.000	Counterclockwise	17	23.8	15.9	13000	1.7	2030
BDCRSSMNAK08CW	8	7.990	8.000	Counterclockwise	23	25.4	22.2	12000	3.1	4050

- NOTES:**
1. The direction of rotation is when viewed from the serrated end of the bearing.
 2. See the previous page for installation instructions.
 3. Hardened steel shaft required.



Sintered Bronze FLANGE-MOUNTED PRESSBEARINGS

- Oil-Impregnated Sintered Bronze Bearing
- Carbon Steel Flange & Retainer, Black Oxide Finish



Features:

- Flange-mounted
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

SHAFT RECOMMENDATIONS:

Finish: 16 μ in. or finer.

Material: Any metal with the above finish

DESIGN PARAMETERS

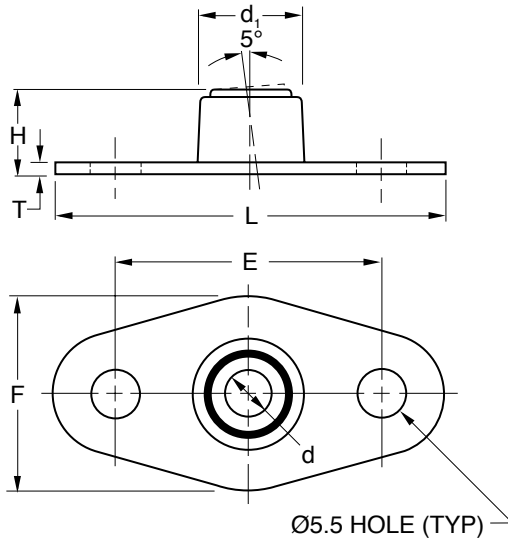
Operating Temperature: -20°F to +200°F

Catalog Number	Nom. I.D.	I.D.		A Panel Clearance Hole Diameter	B	C	D	Nom. E	F Height	Max. Speed rpm	Max. Radial Dyn. Load lbf
		Min.	Max.								
*BDBRSS-BLK187	3/16	.1833	.1888	13/32	1.80	.88	1.22	.05	.40	13570	100
BDBRSS-BLK250	1/4	.2508	.2513	17/32	1.80	.88	1.22	.05	.40	15270	190
BDBRSS-BLK312	5/16	.3133	.3140	21/32	2.10	1.19	1.53	.06	.46	12240	270
BDBRSS-BLK375	3/8	.3758	.3765	21/32	2.10	1.19	1.53	.06	.46	10180	320
BDBRSS-BLK500	1/2	.5010	.5017	27/32	2.35	1.44	1.78	.06	.64	7640	600
BDBRSS-BLK625	5/8	.6260	.6270	1-3/32	2.35	1.56	1.78	.09	.77	6110	890
BDBRSS-BLK750	3/4	.7510	.7520	1-9/32	2.35	1.56	1.78	.09	.89	5090	1280

*To be discontinued when present stock is depleted.

Sintered Bronze FLANGE-MOUNTED PRESSBEARINGS

- Oil-Impregnated Sintered Bronze Bearing
- Carbon Steel Retainer, Black Oxide Finish



The projections shown are per ISO convention.



Features:

- Press-fit installation
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

SHAFT RECOMMENDATIONS:

Finish: 0.4 μm or finer.

Material: Cold-rolled steel, drill rod, hardened and ground steels, or nonaustenitic stainless steel.

DESIGN PARAMETERS

Operating Temperature: 28°C to +93°C

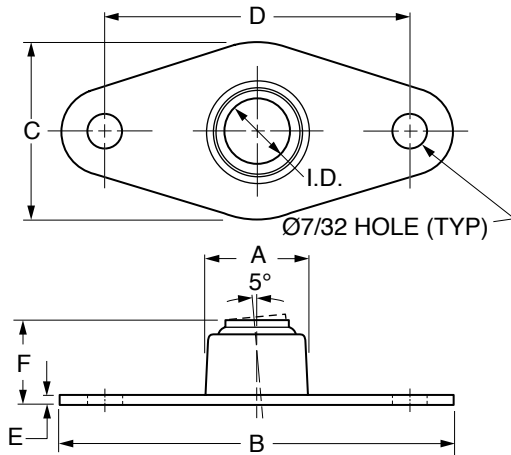
Catalog Number	Nom. I.D.	d I.D.		d ₁ Panel Clearance Hole Diameter	L	F	E	H Height	Nom. T	Max. Speed rpm	Max. Radial Load N
		Min.	Max.								
*BDBRSSMBLK04	4	4.01	4.03	13.8	45	22	31	10.2	1.2	16110	400
BDBRSSMBLK06	6	6.02	6.04	10.3		22.3					
BDBRSSMBLK08	8	8.02	8.04	17	53	30.2	39	11.5	1.5	12120	1190
BDBRSSMBLK10	10	10.02	10.04	17		39					
BDBRSSMBLK12	12	12.03	12.05	21.7	60	36.5	45.2	16.3	1.5	8060	2530
BDBRSSMBLK15	15	15.03	15.05	28.1		39.7		19.4			
BDBRSSMBLK18	18	18.03	18.05	32.9	47	47	22.5	22.5	2.3	5380	5370

*To be discontinued when present stock is depleted.



Delrin FLANGE-MOUNTED PRESSBEARING

- Delrin Bearing
- Carbon Steel Flange & Retainer, Black Oxide Finish



Features:

- Flange-mounted
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

SHAFT RECOMMENDATIONS:

Finish: 16 μ in. or finer.

Material: Any metal with the above finish.

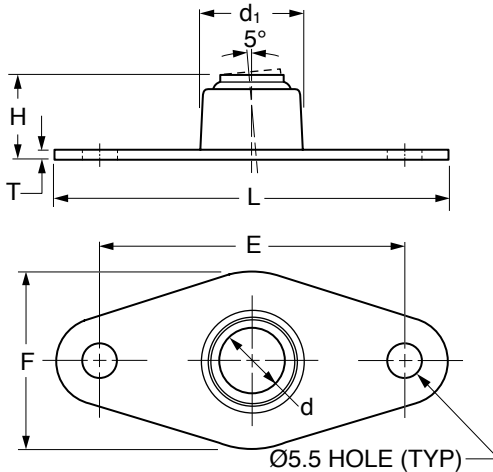
DESIGN PARAMETERS

Operating Temperature: -40°F to +300°F

Catalog Number	Nom. I.D.	I.D.		A Panel Clearance Hole Dia.	B	C	D Mounting Distance	Nom. E	F Height	Max. Speed rpm	Max. Radial Dyn. Load lbf
		Min.	Max.								
BDARSS-BLK187	3/16	.1885	.1905	13/32	1.80	.87	1.21	.05	.28	1520	20
BDARSS-BLK250	1/4	.2510	.2530	13/32	1.80	.87	1.21	.05	.28	1520	70
BDARSS-BLK312	5/16	.3135	.3155	19/32	2.10	1.19	1.53	.06	.39	1220	120
BDARSS-BLK375	3/8	.3760	.3780	21/32	2.10	1.19	1.53	.06	.45	1010	190
BDARSS-BLK500	1/2	.5010	.5040	27/32	2.35	1.43	1.78	.06	.65	760	320
BDARSS-BLK625	5/8	.6260	.6280	1-3/32	2.35	1.56	1.78	.09	.77	610	450
BDARSS-BLK750	3/4	.7510	.7530	1-9/32	2.34	1.85	1.78	.09	.89	510	640

Delrin FLANGE-MOUNTED PRESSBEARINGS

- Delrin Bearing
- Carbon Steel Flange & Retainer, Black Oxide Finish



The projections shown are per ISO convention.



Features:

- Flange-mounted
- Self-aligning to $\pm 5^\circ$
- Self-lubricating

SHAFT RECOMMENDATIONS:

Finish: 0.4 μm or finer.

Material: Any metal with the above finish.

DESIGN PARAMETERS

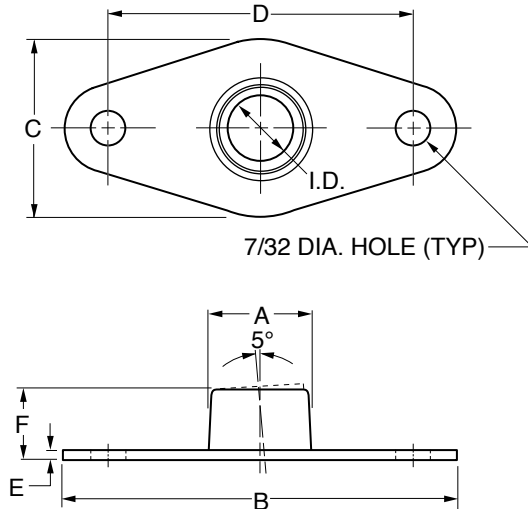
Operating Temperature: -40°C to $+149^\circ\text{C}$

Catalog Number	d Nom. I.D.	d I.D.		d ₁ Panel Clearance Hole Dia.	L	F	E	Nom. T	H Height	Max. Speed rpm	Max. Radial Dyn. Load N
		Min.	Max.								
BDARSSMBLK06	6	6.02	6.07	11	45	22	31	1.2	6.9	1620	270
BDARSSMBLK08	8	8.03	8.08	17	53	30	39	1.6	10	1210	530
BDARSSMBLK10	10	10.03	10.08	17	53	30	39	1.6	11.4	970	860
BDARSSMBLK12	12	12.03	12.08	22	60	36.5	45		16.5	810	1330
BDARSSMBLK15	15	15.03	15.08	28	60	39.7	45	2.3	19.4	650	1870
BDARSSMBLK18	18	18.03	18.08	33		47	45.2		22.4	540	2680



Needle Roller Bearing FLANGE-MOUNTED PRESSBEARINGS

- Drawn Cup Needle Roller Bearing
- Carbon Steel Housing, Black Oxide Finish
- Self-Aligning Type



Features:

- Flange-mounted
- Self-aligning to $\pm 5^\circ$

SHAFT RECOMMENDATIONS:

Shafts should be hardened to Rc 58 with 16 μ in. finish. Shafts ends should have radii or be chamfered.

DESIGN PARAMETERS

Operating Temperature: -22° F to +248° F

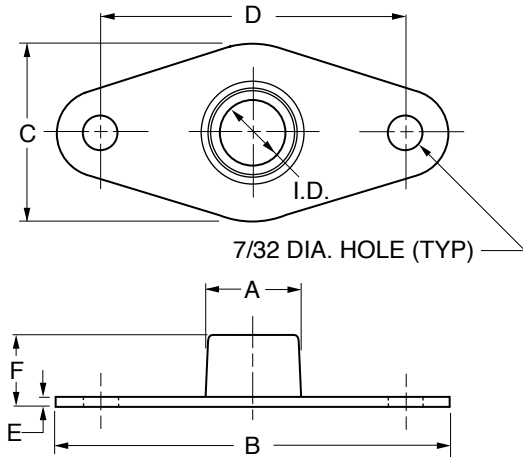
Catalog Number	Nom. I.D.	Shaft Dia.		A Panel Clearance Hole Diameter	B	C	D	Nom. E	F Height	Max. Speed rpm	Max. Radial Load lbf
		Min.	Max.								
BDNRSS-SABLK125	1/8	.1247	.1250	17/32	1.80	.88	1.22	.05	.40	75000	69
BDNRSS-SABLK187	3/16	.1872	.1875	21/32	2.10	1.19	1.53	.06	.46		202
BDNRSS-SABLK250	1/4	.2495	.2500	21/32	2.10	1.19	1.53	.06	.46	44000	570
BDNRSS-SABLK312	5/16	.3120	.3125	27/32	1.78	1.25	1.22	.09	.64	35500	650
BDNRSS-SABLK375	3/8	.3745	.3750	27/32	1.78	1.25	1.22	.09	.64	29500	650
BDNRSS-SABLK500	1/2	.4995	.5000	1-3/32	2.34	1.56	1.78	.09	.77	22000	1040
BDNRSS-SABLK625	5/8	.6245	.6250	1-9/32	2.34	1.85	1.78	.09	.89	17600	1830

NOTE: Hardened steel shaft required.



Needle Roller Bearing FLANGE-MOUNTED PRESSBEARINGS

- Drawn Cup Needle Roller Bearing
- Carbon Steel Housing, Black Oxide Finish



- Features:**
- Flange-mounted
 - Nonaligning

SHAFT RECOMMENDATIONS:

Shafts should be hardened to Rc 58 with 16 μ in. finish.
Shafts ends should have radii or be chamfered.

DESIGN PARAMETERS

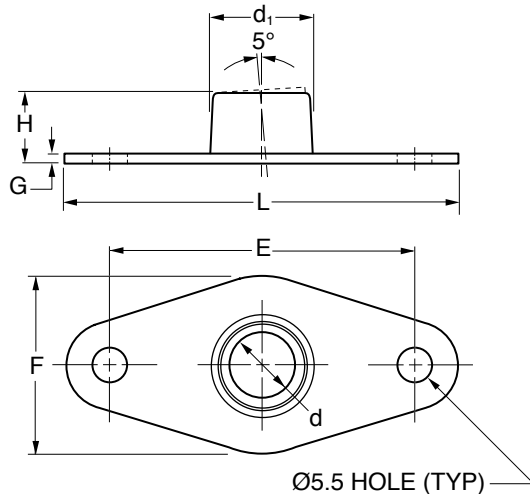
Operating Temperature: -22°F to +248°F

Catalog Number	Nom. I.D.	Shaft Dia.		A Panel Clearance Hole Dia.	B	C	D	Nom. E	F	Max. Speed rpm	Max. Radial Dyn. Load lbf
		Min.	Max.								
BDNRSS-NABLK125	1/8	.1247	.1250	13/32							
BDNRSS-NABLK187	3/16	.1872	.1875	17/32	1.80	.88	1.22	.05	.312 .50	75000	69 202
BDNRSS-NABLK250	1/4	.2495	.2500	21/32	2.10	1.19	1.53	.06	.44	44000 35500	570 650
BDNRSS-NABLK375	3/8	.3745	.3750	27/32	1.78	1.25	1.22	.09	.44	29500	650
BDNRSS-NABLK500	1/2	.4995	.5000	29/32	2.10	1.26	1.53		.50	22000	1040
BDNRSS-NABLK625	5/8	.6245	.6250	1-3/32	2.34	1.56	1.78		.74	17600	1830
BDNRSS-NABLK750	3/4	.7495	.7500	1-9/32					.63	14700	2210

NOTE: Hardened steel shaft required.

Needle Roller Bearing FLANGE-MOUNTED PRESSBEARINGS

- Drawn Cup Needle Roller Bearing
- Carbon Steel Housing, Black Oxide Finish
- Self-Aligning Type



The projections shown are per ISO convention.



Features:

- Flange-mounted installation
- Self-aligning to $\pm 5^\circ$

SHAFT RECOMMENDATIONS:

Shafts should be hardened to HRC 58 with $0.4 \mu\text{m}$ finish. Shaft ends should have radii or be chamfered.

DESIGN PARAMETERS

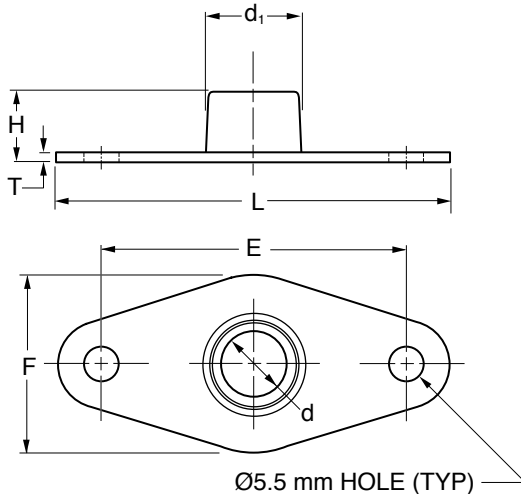
Operating Temperature: -30°C to $+120^\circ\text{C}$

Catalog Number	d Nom. I.D.	Shaft Dia.		d ₁ Panel Clearance Hole Diameter	L	F	E	H Height	Nom. G	Max. Speed rpm	Max. Radial Load N
		Min.	Max.								
BDNRSSMSABLK04	4	3.992	4.000	17	53	30	39	11.6	1.5	41000	1780
BDNRSSMSABLK06	6	5.992	6.000								
BDNRSSMSABLK08	8	7.991	8.000	22	45	31.8	30.9	16.3	2.3	28000	2750
BDNRSSMSABLK10	10	9.991	10.000								
BDNRSSMSABLK12	12	11.989	12.000	28	60	39.6	45.2	19.5	2.3	20000	4950
BDNRSSMSABLK15	15	14.989	15.000								

NOTE: Hardened steel shaft required.

Needle Roller Bearing FLANGE-MOUNTED PRESSBEARINGS

- Drawn Cup Needle Roller Bearing
- Carbon Steel Housing, Black Oxide Finish



The projections shown are per ISO convention.



Features:

- Flange-mounted installation
- Nonaligning

SHAFT RECOMMENDATIONS:

Shafts should be hardened to HRC 58 with 0.4 μm finish. Shaft ends should have radii or be chamfered.

DESIGN PARAMETERS

Operating Temperature: -30°C to +100°C

Catalog Number	d Nom. I.D.	Shaft Dia.		d ₁ Panel Clearance Hole Diameter	L	F	E	Nom. T	H	Max. Speed rpm	Max. Radial Dyn. Load N
		Min.	Max.								
*BDNRSSMNABLK04	4	3.992	4.000	10.5	45.7	22.4	31	1.3	10.8	41000	1780
BDNRSSMNABLK06	6	5.992	6.000	16.7	53	30	38.8	1.5		35000	2030
BDNRSSMNABLK08	8	7.991	8.000	16.7	53	30	38.8	1.5	11.1	28000	2750
BDNRSSMNABLK10	10	9.991	10.000	22	45	31.8	31	2.3	12.7	23000	4400
BDNRSSMNABLK12	12	11.989	12.000	22	45	31.8	31		12.7	20000	4950
BDNRSSMNABLK15	15	14.989	15.000	28	59.4	39.6	45.2	2.3	18.7	16000	7900
BDNRSSMNABLK18	18	17.989	18.000	32.5	59.4	39.6	45.2		16	13000	8100

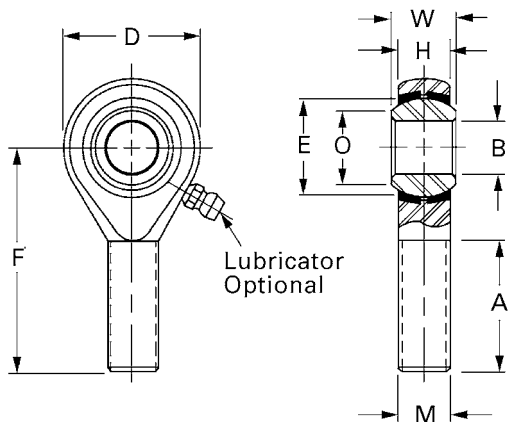
NOTE: Hardened steel shaft required.

*To be discontinued when present stock is depleted.

Precision Rod Ends

FOUR-PIECE-MALE SERIES

• Metal-to-Metal



Materials

BALL	BODY	INSERT
52100 Steel Rc 56 min. Heat-Treated Hard Chrome Plated	Carbon Steel Coated for Corrosion Resistance	Brass

RIGHT-HAND THREAD

Catalog Number	B Bore +.0015 -.0005	W Ball Width +.000 -.005	H Housing Width ±.005	D Head Diameter ±.010	F Length to Center of Ball ±.031	A Thread Length +.062 -.031	M Thread Size UNF-3A	E Ball Diameter Ref.	O Ball Flat Diameter Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRFHMP-030	.1900	.312	.250	.625	1.250	.750	.1900-32	.437	.306	900	.03
BRFHMP-040	.2500	.375	.281	.750	1.562	1.000	.2500-28	.515	.353	1700	.05
BRFHMP-050	.3125	.437	.344	.875	1.875	1.250	.3125-24	.625	.447	2500	.08
BRFHMP-060	.3750	.500	.406	1.000	1.938	1.250	.3750-24	.718	.516	4000	.12
BRFHMP-070	.4375	.562	.437	1.125	2.125	1.375	.4375-20	.812	.586	5000	.17
BRFHMP-080	.5000	.625	.500	1.312	2.438	1.500	.5000-20	.937	.698	7000	.26
BRFHMP-100	.6250	.750	.562	1.500	2.625	1.625	.6250-18	1.125	.839	8050	.41
BRFHMP-120	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	11300	.64
*BRFHMP-160	1.0000	1.375	1.000	2.750	4.125	2.125	1.2500-12	1.875	1.269	28400	2.25

LEFT-HAND THREAD

Catalog Number	B Bore +.0015 -.0005	W Ball Width +.000 -.005	H Housing Width ±.005	D Head Diameter ±.010	F Length to Center of Ball ±.031	A Thread Length +.062 -.031	M Thread Size UNF-3A	E Ball Diameter Ref.	O Ball Flat Diameter Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRFHMP-030L	.1900	.312	.250	.625	1.250	.750	.1900-32	.437	.306	900	.03
BRFHMP-040L	.2500	.375	.281	.750	1.562	1.000	.2500-28	.515	.353	1700	.05
BRFHMP-050L	.3125	.437	.344	.875	1.875	1.250	.3125-24	.625	.447	2500	.08
BRFHMP-060L	.3750	.500	.406	1.000	1.938	1.250	.3750-24	.718	.516	4000	.12
BRFHMP-070L	.4375	.562	.437	1.125	2.125	1.375	.4375-20	.812	.586	5000	.17
BRFHMP-080L	.5000	.625	.500	1.312	2.438	1.500	.5000-20	.937	.698	7000	.26
BRFHMP-100L	.6250	.750	.562	1.500	2.625	1.625	.6250-18	1.125	.839	8050	.41
BRFHMP-120L	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	11300	.64
*BRFHMP-160L	1.0000	1.375	1.000	2.750	4.125	2.125	1.2500-12	1.875	1.269	28400	2.25

NOTE: For grease fitting, add letter "G" to the end of catalog number. Example: **BRFHMP-070LG**

*Size 160 has a one-piece Carbon Steel race.

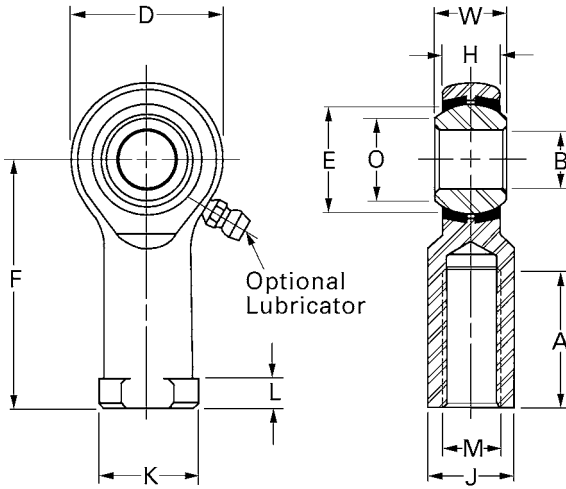
Tolerance for size 160, "D" and "H" is +.030, -.010.



Precision Rod Ends

FOUR-PIECE-FEMALE SERIES

• Metal-to-Metal



Materials

BALL	BODY	INSERT
52100 Steel Rc 56 min. Heat-Treated Hard Chrome Plated	Carbon Steel Coated for Corrosion Resistance	Brass

RIGHT-HAND THREAD

Catalog Number	B Bore +.0015 -.0005	W Ball Width +.000 -.005	H Housing Width ±.005	D Head Dia. ±.010	F Length to Center of Ball ±.031	A Thread Length +.062 -.031	M Thread Size UNF-3B	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	J Across Wrench Flats ±.010	K ±.010	L ±.010	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRFHFP-030	.1900	.312	.250	.625	1.062	.562	.1900-32	.437	.306	.312	.406		1850	.03
BRFHFP-040	.2500	.375	.281	.750	1.312	.750	.2500-28	.515	.353	.375	.468	.187	2700	.05
BRFHFP-050	.3125	.437	.344	.875	1.375	.750	.3125-24	.625	.447	.437	.500		3350	.08
BRFHFP-060	.3750	.500	.406	1.000	1.625	.937	.3750-24	.718	.516	.562	.687		4450	.12
BRFHFP-070	.4375	.562	.437	1.125	1.812	1.062	.4375-20	.812	.586	.625	.750	.250	5350	.17
BRFHFP-080	.5000	.625	.500	1.312	2.125	1.187	.5000-20	.937	.698	.750	.875		7400	.26
BRFHFP-100	.6250	.750	.562	1.500	2.500	1.500	.6250-18	1.125	.839	.875	1.000	.312	8050	.41
BRFHFP-120	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	1.000	1.125	.312	11300	.64
*BRFHFP-160	1.0000	1.375	1.000	2.750	4.125	2.125	1.2500-12	1.875	1.275	1.500	1.625	.437	28400	2.25

LEFT-HAND THREAD

Catalog Number	B Bore +.0015 -.0005	W Ball Width +.000 -.005	H Housing Width ±.005	D Head Dia. ±.010	F Length to Center of Ball ±.031	A Thread Length +.062 -.031	M Thread Size UNF-3B	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	J Across Wrench Flats ±.010	K ±.010	L ±.010	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRFHFP-030L	.1900	.312	.250	.625	1.062	.562	.1900-32	.437	.306	.312	.406		1850	.03
BRFHFP-040L	.2500	.375	.281	.750	1.312	.750	.2500-28	.515	.353	.375	.468	.187	2700	.05
BRFHFP-050L	.3125	.437	.344	.875	1.375	.750	.3125-24	.625	.447	.437	.500		3350	.08
BRFHFP-060L	.3750	.500	.406	1.000	1.625	.937	.3750-24	.718	.516	.562	.687		4450	.12
BRFHFP-070L	.4375	.562	.437	1.125	1.812	1.062	.4375-20	.812	.586	.625	.750	.250	5350	.17
BRFHFP-080L	.5000	.625	.500	1.312	2.125	1.187	.5000-20	.937	.698	.750	.875		7400	.26
BRFHFP-100L	.6250	.750	.562	1.500	2.500	1.500	.6250-18	1.125	.839	.875	1.000	.312	8050	.41
BRFHFP-120L	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	1.000	1.125	.312	11300	.64
*BRFHFP-160L	1.0000	1.375	1.000	2.750	4.125	2.125	1.2500-12	1.875	1.275	1.500	1.625	.437	28400	2.25

NOTE: For grease fittings, add letter "G" to the end of catalog number. Example: **BRFHFP-060G**

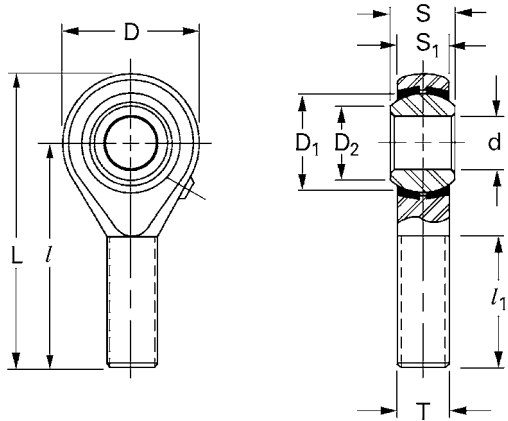
*Size 160 has a one-piece Carbon Steel race.

Tolerance for size 160, "D" and "H" is +.030 -.010, "J", "K" and "L" is ±.015.

Precision Rod Ends

FOUR-PIECE-MALE SERIES

• Metal-to-Metal



Materials

BALL	BODY	INSERT
Chrome Steel Heat-Treated	Carbon Steel Coated for Corrosion Resistance	Brass

RIGHT-HAND THREAD

Catalog Number	d Bore H7	S Ball Width ±0.127	S ₁ Housing Width ±0.254	D Head Dia. ±0.787	l Length to Center of Ball ±0.787	L Overall Length ±0.787	l ₁ Thread Length ±1.575	T Thread Size	D ₁ Ball Dia. Ref.	D ₂ Ball Flat Dia. Ref.	Max. Static Radial Load N	Approx. Weight g
*BRFSMGM050	5	8	6	16	33	35	20	M5 X 0.8	11.11	7.71	3400	12
*BRFSMGM060	6	9	6.75	18	36	39	22	M6 X 1	12.7	8.96	4900	18
*BRFSMGM080	8	12	9	22	42	47	25	M8 X 1.25	15.88	10.4	8300	35
BRFSMGM100	10	14	10.5	26	48	56	29	M10 X 1.5	19.05	12.92	12700	57
BRFSMGM120	12	16	12	30	54	65	33	M12 X 1.75	25.4	15.43	16700	87
BRFSMGM140	14	19	13.5	34	60	74	36	M14 X 2	28.58	16.86	20600	120
BRFSMGM160	16	21	15	38	66	83	40	M16 X 2	31.75	19.39	25000	170
BRFSMGM200	20	25	18	46	78	100	47	M20 X 1.5	38.1	24.38	34300	320
BRFSMGM250	25	31	22	56	94	122	57	M24 X 2	50.8	29.6	50000	580

LEFT-HAND THREAD

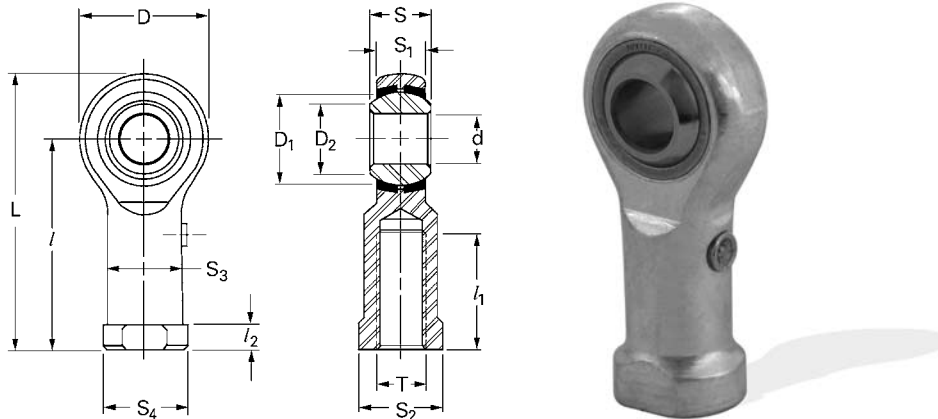
Catalog Number	d Bore H7	S Ball Width ±0.127	S ₁ Housing Width ±0.254	D Head Dia. ±0.787	l Length to Center of Ball ±0.787	L Overall Length ±0.787	l ₁ Thread Length ±1.575	T Thread Size	D ₁ Ball Dia. Ref.	D ₂ Ball Flat Dia. Ref.	Max. Static Radial Load N	Approx. Weight g
*BRFSMGM050L	5	8	6	16	33	35	20	M5 X 0.8	11.11	7.71	3400	12
*BRFSMGM060L	6	9	6.75	18	36	39	22	M6 X 1	12.7	8.96	4900	18
*BRFSMGM080L	8	12	9	22	42	47	25	M8 X 1.25	15.88	10.4	8300	35
BRFSMGM100L	10	14	10.5	26	48	56	29	M10 X 1.5	19.05	12.92	12700	57
BRFSMGM120L	12	16	12	30	54	65	33	M12 X 1.75	25.4	15.43	16700	87
BRFSMGM140L	14	19	13.5	34	60	74	36	M14 X 2	28.58	16.86	20600	120
BRFSMGM160L	16	21	15	38	66	83	40	M16 X 2	31.75	19.39	25000	170
BRFSMGM200L	20	25	18	46	78	100	47	M20 X 1.5	38.1	24.38	34300	320
BRFSMGM250L	25	31	22	56	94	122	57	M24 X 2	50.8	29.6	50000	580

NOTE: For grease fittings, add letter "G" to end of the catalog number. Example: **BRFSMGM160G**

*Grease fittings are not supplied on these sizes.

Precision Rod Ends FOUR-PIECE-FEMALE SERIES

- Metal-to-Metal



Materials

BALL	BODY	INSERT
Chrome Steel Heat-Treated	Carbon Steel Coated for Corrosion Resistance	Brass

RIGHT-HAND THREAD

Catalog Number	d Bore H7	S Ball Width ±0.127	S ₁ Housing Width ±0.254	D Head Dia. ±0.787	l Length to Center of Ball ±0.787	L Overall Length ±0.787	l ₁ Thread Length ±1.575	T Thread Size
*BRFSFGM050□	5	8	6	16	27	35	14	M5 X 0.8
*BRFSFGM060□	6	9	6.75	18	30	39	14	M6 X 1
*BRFSFGM080□	8	12	9	22	36	47	17	M8 X 1.25
BRFSFGM100□	10	14	10.5	26	43	56	20	M10 X 1.5
BRFSFGM120□	12	16	12	30	50	65	22	M12 X 1.75
BRFSFGM140□	14	19	13.5	34	57	74	27	M14 X 2
BRFSFGM160□	16	21	15	38	64	83	33	M16 X 2
BRFSFGM200□	20	25	18	46	77	100	40	M20 X 1.5
BRFSFGM250□	25	31	22	56	94	122	48	M24 X 2

Catalog Number	D ₁ Ball Dia. Ref.	D ₂ Ball Flat Dia. Ref.	S ₂ Across Wrench Flats ±0.254	S ₃ ±0.254	S ₄ ±0.254	l ₂ ±0.254	Max. Static Radial Load N	Approx. Weight g
*BRFSFGM050□	11.11	7.71	8	7.5	9.5	4	5600	14
*BRFSFGM060□	12.7	8.96	10	9.5	12	5	6900	22
*BRFSFGM080□	15.88	10.4	13	12.5	16	5	9800	38
BRFSFGM100□	19.05	12.92	16	15	19	6.5	13200	70
BRFSFGM120□	22.23	15.43	18	17.5	22	6.5	16700	110
BRFSFGM140□	25.4	16.86	21	20	25	8	20600	150
BRFSFGM160□	28.58	19.39	24	22	27	8	25000	200
BRFSFGM200□	34.92	24.38	30	27.5	34	10	34300	370
BRFSFGM250□	42.85	29.6	36	33.5	42	12	50000	670

L Left-Hand Thread

Leave blank for Right-Hand Thread

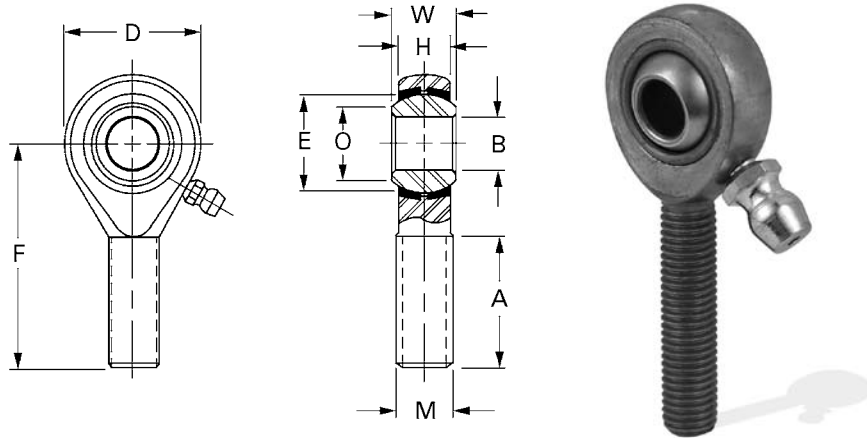
NOTE: For grease fittings, add letter "G" to the end of catalog number. Example: **BRFSFGM100G**

*Grease fittings are not supplied on these sizes.



Precision Rod Ends Extra Capacity FOUR-PIECE-MALE SERIES

- Metal-to-Metal • Magnetic Particle Inspected • Grease Lubricator



Materials

BALL	BODY	INSERT
52100 Alloy Steel Heat-Treated Hard Chrome Plated	4130 Or 4340 Alloy Steel Heat-Treated, Coated for Corrosion Resistance	Copper Alloy

RIGHT-HAND THREAD

Catalog Number	B Bore +.0015 -.0005	W Ball Width +.000 -.005	H Housing Width ±.005	D Head Diameter ±.010	F Length to Center of Ball ±.010	A Thread Length +.062 -.031	M Thread Size UNF-3A	E Ball Diameter Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRFHMX-040G	.2500	.375	.281	.750	1.562	1.000	.3125-24	.515	.353	3260	.06
BRFHMX-050G	.3125	.437	.344	.875	1.875	1.250	.3750-24	.625	.447	4920	.09
BRFHMX-060G	.3750	.500	.406	1.000	1.938	1.250	.4375-20	.718	.516	7240	.13
BRFHMX-070G	.4375	.562	.437	1.125	2.125	1.375	.5000-20	.812	.586	7620	.18
BRFHMX-080G	.5000	.625	.500	1.312	2.438	1.500	.6250-18	.937	.698	11920	.30
BRFHMX-100G	.6250	.750	.562	1.500	2.625	1.625	.7500-16	1.125	.839	13940	.46
BRFHMX-120G	.7500	.875	.687	1.750	2.875	1.750	.8750-14	1.312	.978	21570	.72

LEFT-HAND THREAD

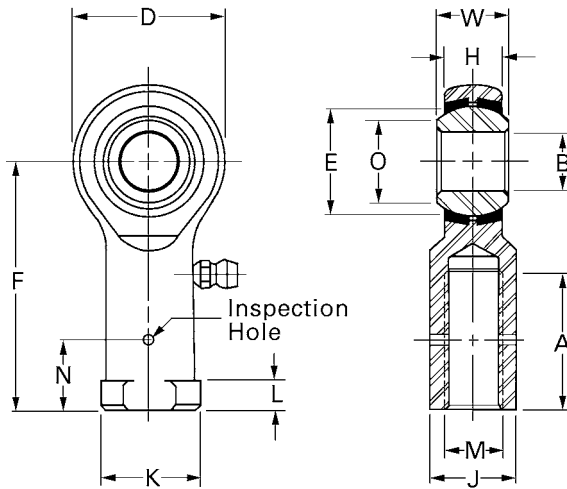
Catalog Number	B Bore +.0015 -.0005	W Ball Width +.000 -.005	H Housing Width ±.005	D Head Diameter ±.010	F Length to Center of Ball ±.010	A Thread Length +.062 -.031	M Thread Size UNF-3A	E Ball Diameter Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRFHMX-040LG	.2500	.375	.281	.750	1.562	1.000	.3125-24	.515	.353	3260	.06
BRFHMX-050LG	.3125	.437	.344	.875	1.875	1.250	.3750-24	.625	.447	4920	.09
BRFHMX-060LG	.3750	.500	.406	1.000	1.938	1.250	.4375-20	.718	.516	7240	.13
BRFHMX-070LG	.4375	.562	.437	1.125	2.125	1.375	.5000-20	.812	.586	7620	.18
BRFHMX-080LG	.5000	.625	.500	1.312	2.438	1.500	.6250-18	.937	.698	11920	.30
BRFHMX-100LG	.6250	.750	.562	1.500	2.625	1.625	.7500-16	1.125	.839	13940	.46
BRFHMX-120LG	.7500	.875	.687	1.750	2.875	1.750	.8750-14	1.312	.978	21570	.72

NOTE: To order part without grease lubricator, remove "G" from end of part number.



Precision Rod Ends Extra Capacity FOUR-PIECE-FEMALE SERIES

- Metal-to-Metal • Magnetic Particle Inspected • Grease Lubricator



Materials

BALL	BODY	INSERT
52100 Alloy Steel Heat-Treated Hard Chrome Plated	4130 Or 4340 Alloy Steel Heat-Treated, Coated for Corrosion Resistance	Copper Alloy

RIGHT-HAND THREAD

Catalog Number	B Bore +.0015 -.0005	W Ball Width +.000 -.005	H Housing Width ±.005	D Head Dia. ±.010	F Length to Center of Ball ±.010	A Thread Length +.062 -.031	M Thread Size UNF-3B	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	J Across Wrench Flats ±.010	K ±.010	N ±.020	L ±.010	Max. Static Radial Load		Approx. Weight lbs.
														With Lubr.	Without Lubr.	
														lbs.		
BRFHFX-040G	.2500	.375	.281	.750	1.312	.750	.2500-28	.515	.355	.375	.468	.312	.187	3260	6680	.06
BRFHFX-050G	.3125	.437	.344	.875	1.375	.750	.3125-24	.625	.447	.437	.500	.406		4920	8410	.08
BRFHFX-060G	.3750	.500	.406	1.000	1.625	.937	.3750-24	.718	.517	.562	.687	.469		7240	11160	.14
BRFHFX-070G	.4375	.562	.437	1.125	1.812	1.062	.4375-20	.812	.586	.625	.750	.531	.250	7620	13660	.18
BRFHFX-080G	.5000	.625	.500	1.312	2.125	1.187	.5000-20	.937	.698	.750	.875	.594		11920	19340	.29
BRFHFX-100G	.6250	.750	.562	1.500	2.500	1.500	.6250-18	1.125	.839	.875	1.000	.750	.312	13940	21080	.43
BRFHFX-120G	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	1.000	1.125	.875		21570	29800	.64

LEFT-HAND THREAD

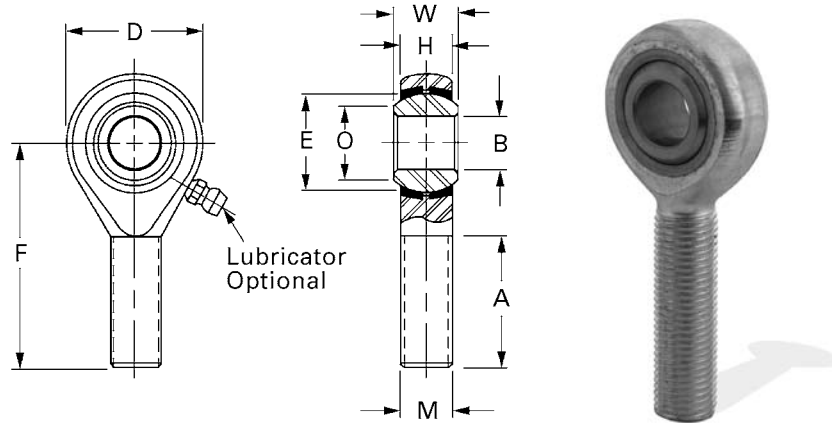
Catalog Number	B Bore +.0015 -.0005	W Ball Width +.000 -.005	H Housing Width ±.005	D Head Dia. ±.010	F Length to Center of Ball ±.010	A Thread Length +.062 -.031	M Thread Size UNF-3B	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	J Across Wrench Flats ±.010	K ±.010	N ±.020	L ±.010	Max. Static Radial Load		Approx. Weight lbs.
														With Lubr.	Without Lubr.	
														lbs.		
BRFHFX-040LG	.2500	.375	.281	.750	1.312	.750	.2500-28	.515	.355	.375	.468	.312	.187	3260	6680	.06
BRFHFX-050LG	.3125	.437	.344	.875	1.375	.750	.3125-24	.625	.447	.437	.500	.406		4920	8410	.08
BRFHFX-060LG	.3750	.500	.406	1.000	1.625	.937	.3750-24	.718	.517	.562	.687	.469		7240	11160	.14
BRFHFX-070LG	.4375	.562	.437	1.125	1.812	1.062	.4375-20	.812	.586	.625	.750	.531	.250	7620	13660	.18
BRFHFX-080LG	.5000	.625	.500	1.312	2.125	1.187	.5000-20	.937	.698	.750	.875	.594		11920	19340	.29
BRFHFX-100LG	.6250	.750	.562	1.500	2.500	1.500	.6250-18	1.125	.839	.875	1.000	.750	.312	13940	21080	.43
BRFHFX-120LG	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	1.000	1.125	.875		21570	29800	.64

NOTE: To order part without grease lubricator, remove "G" from end of part number.



Commercial Rod Ends FOUR-PIECE-MALE SERIES

- Metal-to-Metal • Optional Lubricator



Materials

BALL	BODY	INSERT
52100 Alloy Steel Heat-Treated Chrome Plated	Carbon Steel Coated for Corrosion Resistance	Brass

RIGHT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width ±.010	D Head Diameter ±.031	F Length to Center of Ball ±.031	A Thread Length ±.062	M Thread Size UNF-3A	E Ball Diameter Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRCHMC-030	.1900	.312	.250	.625	1.250	.750	.1900-32	.437	.306	900	.03
BRCHMC-040	.2500	.375	.281	.750	1.562	1.000	.2500-28	.515	.353	1700	.05
BRCHMC-050	.3125	.437	.344	.875	1.875	1.250	.3125-24	.625	.447	2500	.08
BRCHMC-060	.3750	.500	.406	1.000	1.938	1.250	.3750-24	.718	.516	4000	.12
BRCHMC-070	.4375	.562	.437	1.125	2.125	1.375	.4375-20	.812	.586	5000	.17
BRCHMC-080	.5000	.625	.500	1.312	2.438	1.500	.5000-20	.937	.698	7000	.25
BRCHMC-100	.6250	.750	.562	1.500	2.625	1.625	.6250-18	1.125	.839	8050	.41
BRCHMC-120	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	11300	.64

LEFT-HAND THREAD

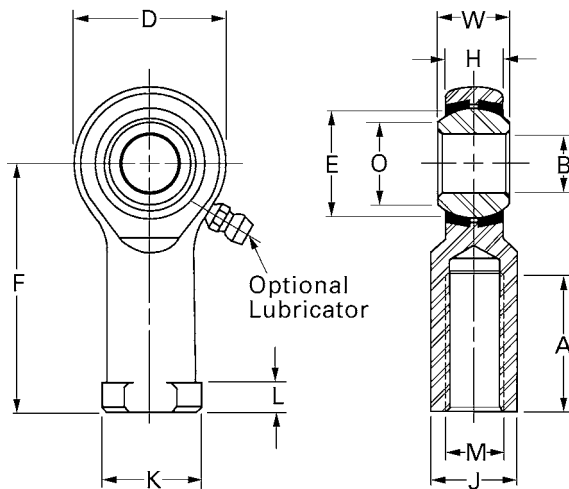
Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width ±.010	D Head Diameter ±.031	F Length to Center of Ball ±.031	A Thread Length ±.062	M Thread Size UNF-3A	E Ball Diameter Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRCHMC-030L	.1900	.312	.250	.625	1.250	.750	.1900-32	.437	.306	900	.03
BRCHMC-040L	.2500	.375	.281	.750	1.562	1.000	.2500-28	.515	.353	1700	.05
BRCHMC-050L	.3125	.437	.344	.875	1.875	1.250	.3125-24	.625	.447	2500	.08
BRCHMC-060L	.3750	.500	.406	1.000	1.938	1.250	.3750-24	.718	.516	4000	.12
BRCHMC-070L	.4375	.562	.437	1.125	2.125	1.375	.4375-20	.812	.586	5000	.17
BRCHMC-080L	.5000	.625	.500	1.312	2.438	1.500	.5000-20	.937	.698	7000	.25
BRCHMC-100L	.6250	.750	.562	1.500	2.625	1.625	.6250-18	1.125	.839	8050	.41
BRCHMC-120L	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	11300	.64

NOTE: For grease fitting, add letter "G" to the end of catalog number. Example: BRCHMC-120LG

Commercial Rod Ends

FOUR-PIECE-FEMALE SERIES

- Metal-to-Metal • Optional Lubricator



Materials

BALL	BODY	INSERT
52100 Alloy Steel Heat-Treated Chrome Plated	Carbon Steel Coated for Corrosion Resistance	Brass

RIGHT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width ±.010	D Head Dia. ±.031	F Length to Center of Ball ±.031	A Thread Length ±.062	M Thread Size UNF-3B	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	J Across Wrench Flats ±.010	K ±.010	L ±.010	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRCHFC-030	.1900	.312	.250	.625	1.062	.562	.1900-32	.437	.306	.312	.406		1850	.03
BRCHFC-040	.2500	.375	.281	.750	1.312	.750	.2500-28	.515	.353	.375	.468	.187	2700	.05
BRCHFC-050	.3125	.437	.344	.875	1.375	.750	.3125-24	.625	.447	.437	.500		3350	.08
BRCHFC-060	.3750	.500	.406	1.000	1.625	.937	.3750-24	.718	.516	.562	.687		4450	.12
BRCHFC-070	.4375	.562	.437	1.125	1.812	1.062	.4375-20	.812	.586	.625	.750	.250	5350	.17
BRCHFC-080	.5000	.625	.500	1.312	2.125	1.187	.5000-20	.937	.698	.750	.875		7400	.26
BRCHFC-100	.6250	.750	.562	1.500	2.500	1.500	.6250-18	1.125	.839	.875	1.000		8050	.41
BRCHFC-120	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	1.000	1.125	.312	11300	.64

LEFT-HAND THREAD

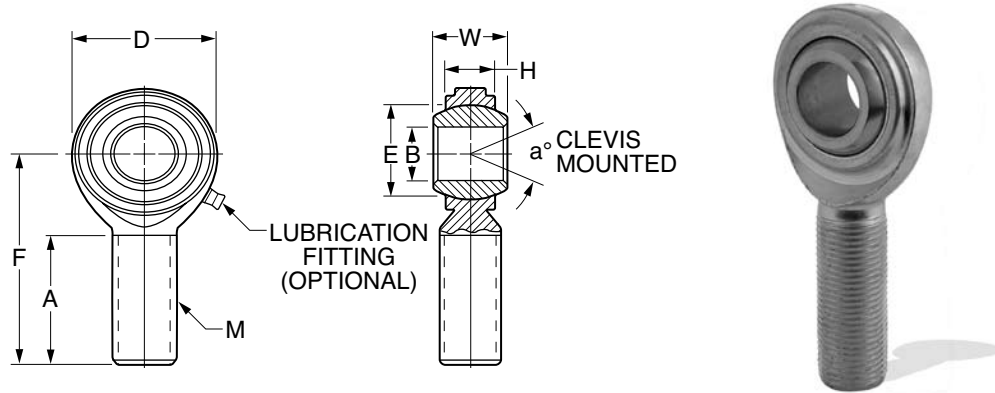
Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width ±.010	D Head Dia. ±.031	F Length to Center of Ball ±.031	A Thread Length ±.062	M Thread Size UNF-3B	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	J Across Wrench Flats ±.010	K ±.010	L ±.010	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRCHFC-030L	.1900	.312	.250	.625	1.062	.562	.1900-32	.437	.306	.312	.406		1850	.03
BRCHFC-040L	.2500	.375	.281	.750	1.312	.750	.2500-28	.515	.353	.375	.468	.187	2700	.05
BRCHFC-050L	.3125	.437	.344	.875	1.375	.750	.3125-24	.625	.447	.437	.500		3350	.08
BRCHFC-060L	.3750	.500	.406	1.000	1.625	.937	.3750-24	.718	.516	.562	.687		4450	.12
BRCHFC-070L	.4375	.562	.437	1.125	1.812	1.062	.4375-20	.812	.586	.625	.750	.250	5350	.17
BRCHFC-080L	.5000	.625	.500	1.312	2.125	1.187	.5000-20	.937	.698	.750	.875		7400	.26
BRCHFC-100L	.6250	.750	.562	1.500	2.500	1.500	.6250-18	1.125	.839	.875	1.000		8050	.41
BRCHFC-120L	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	1.000	1.125	.312	11300	.64

NOTE: For grease fitting, add letter "G" to the end of catalog number. Example: **BRCHFC-120LG**



Commercial Rod Ends TWO-PIECE-MALE SERIES

- Metal-to-Metal • Optional Lubricator • Optional Self-Lubricating Liner



Materials

BALL	BODY
52100 Steel Rc 56 min. Hard Chrome Plated	Low-Carbon Steel Zinc Plated Chromate Treated

RIGHT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width Ref.	D Head Dia. ±.010	F Length to Center of Ball ±.015	A Thread Length +.062 -.031	M Thread Size UNF-2A	E Ball Dia. Ref.	a° Mis. Ang. Ref.	Ult. Static Radial Load lbs.	Approx. Weight lbs.
*BRRODM-CM3	.1900	.312	.234	.625	1.250	.750	#10-32	.437	17	1210	.03
*BRRODM-CM4	.2500	.375	.250	.750	1.562	1.000	1/4-28	.500	21	2225	.04
*BRRODM-CM5	.3125	.437	.312	.875	1.875	1.250	5/16-24	.625	17	3600	.07
BRRODM-CM6	.3750	.500	.359	1.000	1.938	1.250	3/8-24	.719	19	5100	.11
BRRODM-CM7	.4375	.562	.406	1.125	2.125	1.375	7/16-20	.812	18	6402	.15
BRRODM-CM8	.5000	.625	.453	1.312	2.438	1.500	1/2-20	.937	17	8386	.24
BRRODM-CM10	.6250	.750	.484	1.500	2.625	1.625	5/8-18	1.125	22	9813	.36
BRRODM-CM12	.7500	.875	.593	1.750	2.875	1.750	3/4-16	1.312	18	14290	.57

LEFT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width Ref.	D Head Dia. ±.010	F Length to Center of Ball ±.015	A Thread Length +.062 -.031	M Thread Size UNF-2A	E Ball Dia. Ref.	a° Mis. Ang. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
*BRRODM-CML3	.1900	.312	.234	.625	1.250	.750	#10-32	.437	17	1210	.03
*BRRODM-CML4	.2500	.375	.250	.750	1.562	1.000	1/4-28	.500	21	2225	.04
*BRRODM-CML5	.3125	.437	.312	.875	1.875	1.250	5/16-24	.625	17	3600	.07
BRRODM-CML6	.3750	.500	.359	1.000	1.938	1.250	3/8-24	.719	19	5100	.11
BRRODM-CML7	.4375	.562	.406	1.125	2.125	1.375	7/16-20	.812	18	6402	.15
BRRODM-CML8	.5000	.625	.453	1.312	2.438	1.500	1/2-20	.937	17	8386	.24
BRRODM-CML10	.6250	.750	.484	1.500	2.625	1.625	5/8-18	1.125	22	9813	.36
BRRODM-CML12	.7500	.875	.593	1.750	2.875	1.750	3/4-16	1.312	18	14290	.57

NOTES: 1. For grease fittings, add "G" to the end of the catalog number. Example: **BRRODM-CM10G**

*Grease fittings are not supplied on these sizes. Load ratings based on no lubrication fitting.

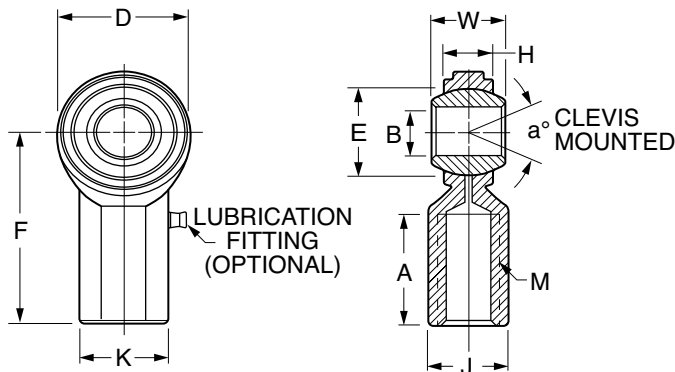
2. Rod ends available with self-lubricating liner.

Add letter "T" to the end of catalog number. Example: **BRRODM-CM8T**



Commercial Rod Ends TWO-PIECE-FEMALE SERIES

• Metal-to-Metal • Optional Lubricator • Optional Self-Lubricating Liner



Materials

BALL	BODY
52100 Steel Rc 56 min. Hard Chrome Plated	Low-Carbon Steel Zinc Plated Chromate Treated

RIGHT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width Ref.	D Head Dia. ±.010	F Length to Center of Ball ±.015	A Thread Length +.062 -.031	M Thread Size UNF-2B	E Ball Dia. Ref.	J Across Wrench Flats ±.010	K Dia. ±.010	a° Mis. Ang. Ref.	Ult. Static Radial Load lbs.	Approx. Weight lbs.
*BRRODF-CM3	.1900	.312	.234	.625	1.062	.500	#10-32	.437	.312	.406	17	2100	.04
BRRODF-CM4	.2500	.375	.250	.750	1.312	.687	1/4-28	.500	.375	.468	21	3250	.05
BRRODF-CM5	.3125	.437	.312	.875	1.375	.687	5/16-24	.625	.437	.500	17	3934	.08
BRRODF-CM6	.3750	.500	.359	1.000	1.625	.812	3/8-24	.719	.562	.687	19	5100	.13
BRRODF-CM7	.4375	.562	.406	1.125	1.812	.937	7/16-20	.812	.625	.750	18	6420	.18
BRRODF-CM8	.5000	.625	.453	1.312	2.125	1.062	1/2-20	.937	.750	.875	17	9100	.29
BRRODF-CM10	.6250	.750	.484	1.500	2.500	1.375	5/8-18	1.125	.875	1.000	22	9800	.43
BRRODF-CM12	.7500	.875	.593	1.750	2.875	1.562	3/4-16	1.312	1.000	1.125	18	14250	.65

LEFT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width Ref.	D Head Dia. ±.010	F Length to Center of Ball ±.015	A Thread Length +.062 -.031	M Thread Size UNF-2B	E Ball Dia. Ref.	J Across Wrench Flats ±.010	K Dia. ±.010	a° Mis. Ang. Ref.	Ult. Static Radial Load lbs.	Approx. Weight lbs.
*BRRODF-CML3	.1900	.312	.234	.625	1.062	.500	#10-32	.437	.312	.406	17	2100	.04
BRRODF-CML4	.2500	.375	.250	.750	1.312	.687	1/4-28	.500	.375	.468	21	3250	.05
BRRODF-CML5	.3125	.437	.312	.875	1.375	.687	5/16-24	.625	.437	.500	17	3934	.08
BRRODF-CML6	.3750	.500	.359	1.000	1.625	.812	3/8-24	.719	.562	.687	19	5100	.13
BRRODF-CML7	.4375	.562	.406	1.125	1.812	.937	7/16-20	.812	.625	.750	18	6420	.18
BRRODF-CML8	.5000	.625	.453	1.312	2.125	1.062	1/2-20	.937	.750	.875	17	9100	.29
BRRODF-CML10	.6250	.750	.484	1.500	2.500	1.375	5/8-18	1.125	.875	1.000	22	9800	.43
BRRODF-CML12	.7500	.875	.593	1.750	2.875	1.562	3/4-16	1.312	1.000	1.125	18	14250	.65

NOTES: 1. For grease fittings, add "G" to the end of the catalog number. Example: **BRRODF-CM5G**

*Grease fittings are not supplied on these sizes.

2. Rod ends available with self-lubricating liner.

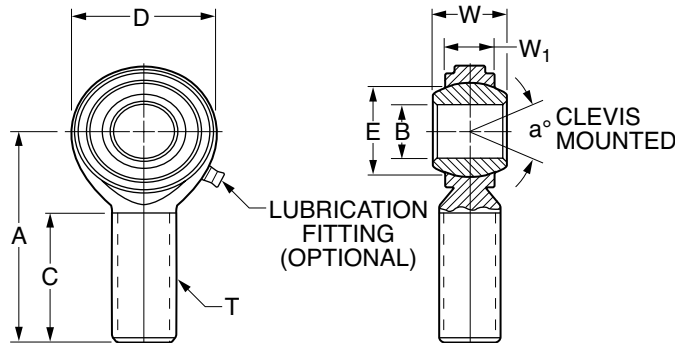
Add letter "T" to the end of catalog number. Example: **BRRODM-CM8T**

NEW

Commercial Rod Ends

TWO-PIECE-MALE SERIES

- Metal-to-Metal • Optional Lubricator



Materials

Ball	Body
52100 Steel HRC 56 min. Hard Chrome Plated	Low-Carbon Steel Zinc Plated Chromate Treated

RIGHT-HAND THREAD

Catalog Number	B Dia. +0.065 -0.012	D Dia. ±0.38	W Width ±0.12	W ₁ Width Ref.	E Ball Dia. Ref.	A Length ±0.40	T Thread	C Thread Length ±1.00	a° Mis Angle Ref.	Ult. Static Radial Load N	Approx. Weight g
*BRRODMMCM3M	3	12.5	6	4.25	7.93	27	M3 X 0.5	15	23	1775	7
*BRRODMMCM5M	5	16	8	5.75	11.1	33	M5 X 0.8	20	22	5168	12
*BRRODMMCM6M	6	19	9	6.25	12.7	36	M6 X 1	22	23	7296	18
*BRRODMMCM8M	8	22.25	12	8	15.88	42	M8 X 1.25	25	28	13591	31
BRRODMMCM10M	10	27	14	9.5	19.05	48	M10 X 1.5	29	26	21024	68
BRRODMMCM12M	12	30	16	10.75	22.23	54	M12 X 1.75	33	27	25819	78
BRRODMMCM14M	14	34.75	19	12.25	25.4	60	M14 X 2	36	30	35214	118
BRRODMMCM16M	16	38	21	12.75	28.58	66	M16 X 2	40	33	37391	173
BRRODMMCM18M	18	42	23	14.75	31.75	72	M18 X 1.5	44	30	47903	260
BRRODMMCM20M	20	46	25	16.25	34.93	78	M20 X 1.5	47	29	57101	290

LEFT-HAND THREAD

Catalog Number	B Dia. +0.065 -0.012	D Dia. ±0.38	W Width ±0.12	W ₁ Width Ref.	E Ball Dia. Ref.	A Length ±0.40	T Thread	C Thread Length ±1.00	a° Mis Angle Ref.	Ult. Static Radial Load N	Approx. Weight g
*BRRODMMCML3M	3	12.5	6	4.25	7.93	27	M3 X 0.5	15	23	1775	7
*BRRODMMCML5M	5	16	8	5.75	11.1	33	M5 X 0.8	20	22	5168	12
*BRRODMMCML6M	6	19	9	6.25	12.7	36	M6 X 1	22	23	7296	18
*BRRODMMCML8M	8	22.25	12	8	15.88	42	M8 X 1.25	25	28	13591	31
BRRODMMCML10M	10	27	14	9.5	19.05	48	M10 X 1.5	29	26	21024	68
BRRODMMCML12M	12	30	16	10.75	22.23	54	M12 X 1.75	33	27	25819	78
BRRODMMCML14M	14	34.75	19	12.25	25.4	60	M14 X 2	36	30	35214	118
BRRODMMCML16M	16	38	21	12.75	28.58	66	M16 X 2	40	33	37391	173
BRRODMMCML18M	18	42	23	14.75	31.75	72	M18 X 1.5	44	30	47903	260
BRRODMMCML20M	20	46	25	16.25	34.93	78	M20 X 1.5	47	29	57101	290

NOTE: For grease fittings, add "G" to the end of the catalog number. Example: **BRRODMMCM18MG**

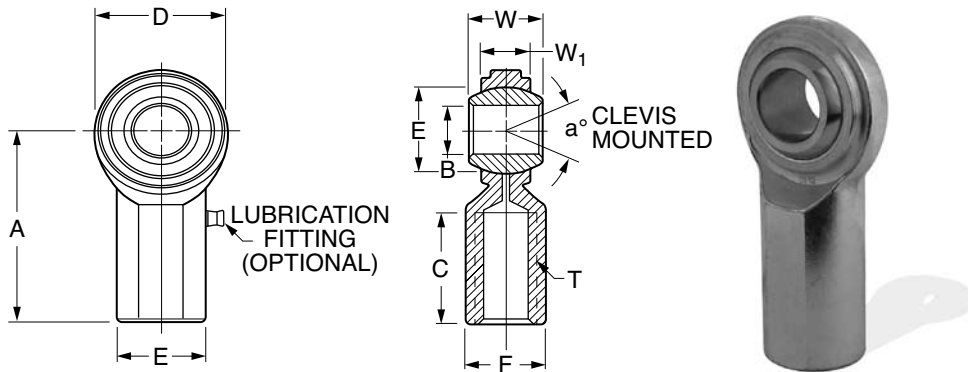
*Grease fittings are not supplied on these sizes. Load ratings based on no lubrication fitting.

NEW

Commercial Rod Ends

TWO-PIECE-FEMALE SERIES

- Metal-to-Metal • Optional Lubricator



Materials

Ball	Body
52100 Steel	Low-Carbon Steel
HRC 56 min.	Zinc Plated
Hard Chrome Plated	Chromate Treated

RIGHT-HAND THREAD

Catalog Number	B Dia. +0.065 -0.012	D Dia. ±0.38	W Width ±0.12	W ₁ Width Ref.	E Ball Dia. Ref.	A Length ±0.40	T Thread	C Thread Length ±1.00	E Dia. ±0.25	F Flat ±0.25	a° Mis Angle Ref.	Ult. Static Radial Load N	Approx. Weight g
*BRRODFMCF3M	3	12.5	6	4.25	7.93	21	M3 X 0.5	10	8	7	23	5746	10
*BRRODFMCF5M	5	16	8	5.75	11.1	27	M5 X 0.8	14	11	9	22	8247	18
BRRODFMCF6M	6	19	9	6.25	12.7	30	M6 X 1	14	13	11	23	11895	25
BRRODFMCF8M	8	22.25	12	8	15.88	36	M8 X 1.25	17	16	14	28	15190	40
BRRODFMCF10M	10	27	14	9.5	19.05	43	M10 X 1.5	21	19	17	26	22750	80
BRRODFMCF12M	12	30	16	10.75	22.23	50	M12 X 1.75	24	22	19	27	25819	95
BRRODFMCF14M	14	34.75	19	12.25	25.4	57	M14 X 2	27	25	22	30	35214	160
BRRODFMCF16M	16	38	21	12.75	28.58	64	M16 X 2	33	27	22	33	37391	215
BRRODFMCF18M	18	42	23	14.75	31.75	71	M18 X 1.5	36	25.58	25.4	30	47903	300
BRRODFMCF20M	20	46	25	16.25	34.93	77	M20 X 1.5	40	30.15	27	29	57101	350

LEFT-HAND THREAD

Catalog Number	B Dia. +0.065 -0.012	D Dia. ±0.38	W Width ±0.12	W ₁ Width Ref.	E Ball Dia. Ref.	A Length ±0.40	T Thread	C Thread Length ±1.00	E Dia. ±0.25	F Flat ±0.25	a° Mis Angle Ref.	Ult. Static Radial Load N	Approx. Weight g
*BRRODFMCFL3M	3	12.5	6	4.25	7.93	21	M3 X 0.5	10	8	7	23	5746	10
*BRRODFMCFL5M	5	16	8	5.75	11.1	27	M5 X 0.8	14	11	9	22	8247	18
BRRODFMCFL6M	6	19	9	6.25	12.7	30	M6 X 1	14	13	11	23	11895	25
BRRODFMCFL8M	8	22.25	12	8	15.88	36	M8 X 1.25	17	16	14	28	15190	40
BRRODFMCFL10M	10	27	14	9.5	19.05	43	M10 X 1.5	21	19	17	26	22750	80
BRRODFMCFL12M	12	30	16	10.75	22.23	50	M12 X 1.75	24	22	19	27	25819	95
BRRODFMCFL14M	14	34.75	19	12.25	25.4	57	M14 X 2	27	25	22	30	35214	160
BRRODFMCFL16M	16	38	21	12.75	28.58	64	M16 X 2	33	27	22	33	37391	215
BRRODFMCFL18M	18	42	23	14.75	31.75	71	M18 X 1.5	36	25.58	25.4	30	47903	300
BRRODFMCFL20M	20	46	25	16.25	34.93	77	M20 X 1.5	40	30.15	27	29	57101	350

NOTE: For grease fittings, add "G" to the end of the catalog number. Example: **BRRODFMCFL10MG**

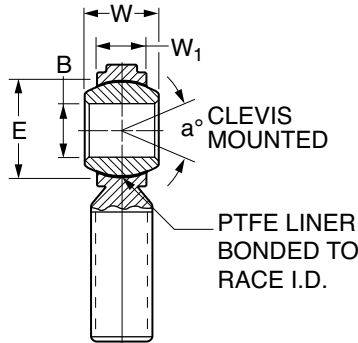
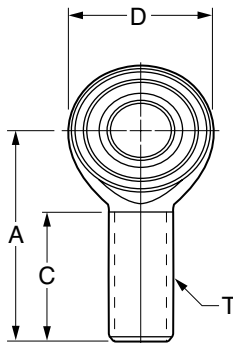
*Grease fittings are not supplied on these sizes.



NEW

**Commercial Rod Ends | Stainless Steel
TWO-PIECE-MALE SERIES**

- Self-Lubricating Liner



Materials

Ball	Body	Liner
440C Stainless Steel Heat-Treated	303 Stainless Steel Passivated	Teflon™ Fabric

RIGHT-HAND THREAD

Catalog Number	B Dia. +.0025 -.0005	D Dia. ±.010	W Width ±.005	W ₁ Width Ref.	E Ball Dia. Ref.	A Length ±.015	T Thread UNF-3A	C Thread Length +.062 -.031	a° Misalign. Angle Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRRCOM-SCM3T	.1900	.625	.312	.234	.437	1.250	#10-32	.750	20	912	.03
BRRCOM-SCM4T	.2500	.750	.375	.250	.500	1.562	1/4-28	1.000	27	1370	.04
BRRCOM-SCM5T	.3125	.875	.437	.312	.625	1.875	5/16-24	1.250	22	2050	.07
BRRCOM-SCM6T	.3750	1.000	.500	.359	.719	1.938	3/8-24	1.250	22	3040	.11
BRRCOM-SCM7T	.4375	1.125	.562	.406	.812	2.125	7/16-20	1.375	21	3780	.15
BRRCOM-SCM8T	.5000	1.312	.625	.453	.937	2.438	1/2-20	1.500	20	4700	.24
BRRCOM-SCM10T	.6250	1.500	.750	.484	1.125	2.625	5/8-18	1.625	26	5860	.36
BRRCOM-SCM12T	.7500	1.750	.875	.593	1.312	2.875	3/4-16	1.750	24	7512	.57

LEFT-HAND THREAD

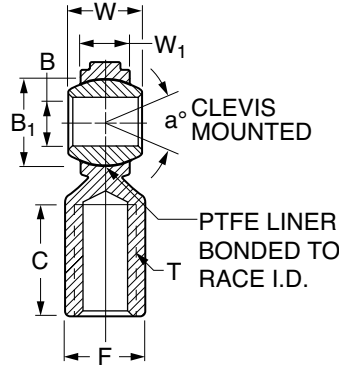
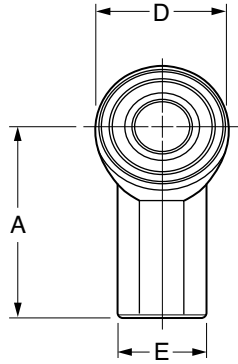
Catalog Number	B Dia. +.0025 -.0005	D Dia. ±.010	W Width ±.005	W ₁ Width Ref.	E Ball Dia. Ref.	A Length ±.015	T Thread UNF-3A	C Thread Length +.062 -.031	a° Misalign. Angle Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRRCOM-SCML3T	.1900	.625	.312	.234	.437	1.250	#10-32	.750	20	912	.03
BRRCOM-SCML4T	.2500	.750	.375	.250	.500	1.562	1/4-28	1.000	27	1370	.04
BRRCOM-SCML5T	.3125	.875	.437	.312	.625	1.875	5/16-24	1.250	22	2050	.07
BRRCOM-SCML6T	.3750	1.000	.500	.359	.719	1.938	3/8-24	1.250	22	3040	.11
BRRCOM-SCML7T	.4375	1.125	.562	.406	.812	2.125	7/16-20	1.375	21	3780	.15
BRRCOM-SCML8T	.5000	1.312	.625	.453	.937	2.438	1/2-20	1.500	20	4700	.24
BRRCOM-SCML10T	.6250	1.500	.750	.484	1.125	2.625	5/8-18	1.625	26	5860	.36
BRRCOM-SCML12T	.7500	1.750	.875	.593	1.312	2.875	3/4-16	1.750	24	7512	.57



NEW

**Commercial Rod Ends | Stainless Steel
TWO-PIECE-FEMALE SERIES**

- Self-Lubricating Liner



Materials

Ball	Body	Liner
440C Stainless Steel Heat-Treated	303 Stainless Steel Passivated	Teflon™ Fabric

RIGHT-HAND THREAD

Catalog Number	B Dia. +.0025 -.0005	D Dia. ±.010	W Width ±.005	W ₁ Width Ref.	B ₁ Ball Dia. Ref.	A Length ±.015	T Thread UNF-2B	C Thread Length +.062 -.031	E Dia. ±.010	F Flat ±.010	a° Mis. Angle Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRRCOF-SCF3T	.1900	.625	.312	.234	.437	1.062	#10-32	.500	.406	.312	20	930	.04
BRRCOF-SCF4T	.2500	.750	.375	.250	.500	1.312	1/4-28	.687	.468	.375	27	1380	.05
BRRCOF-SCF5T	.3125	.875	.437	.312	.625	1.375	5/16-24	.687	.500	.437	22	2100	.08
BRRCOF-SCF6T	.3750	1.000	.500	.359	.719	1.625	3/8-24	.812	.687	.562	22	3080	.13
BRRCOF-SCF7T	.4375	1.125	.562	.406	.812	1.812	7/16-20	.937	.750	.625	21	3790	.18
BRRCOF-SCF8T	.5000	1.312	.625	.453	.937	2.125	1/2-20	1.062	.875	.750	20	4720	.29
BRRCOF-SCF10T	.6250	1.500	.750	.484	1.125	2.500	5/8-18	1.375	1.000	.875	26	5870	.43
BRRCOF-SCF12T	.7500	1.750	.875	.593	1.312	2.875	3/4-16	1.562	1.125	1.000	24	7520	.65

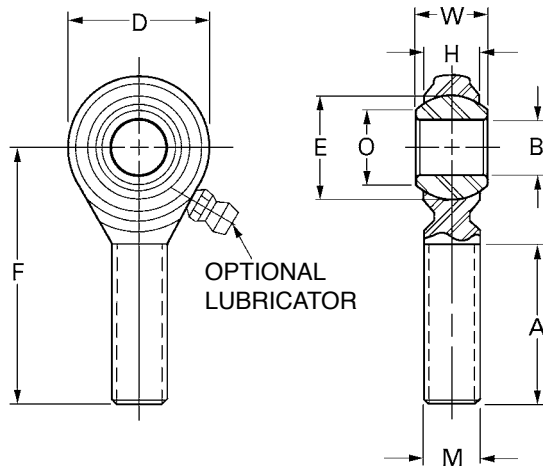
LEFT-HAND THREAD

Catalog Number	B Dia. +.0025 -.0005	D Dia. ±.010	W Width ±.005	W ₁ Width Ref.	B ₁ Ball Dia. Ref.	A Length ±.015	T Thread UNF-2B	C Thread Length +.062 -.031	E Dia. ±.010	F Flat ±.010	a° Mis. Angle Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRRCOF-SCFL3T	.1900	.625	.312	.234	.437	1.062	#10-32	.500	.406	.312	20	930	.04
BRRCOF-SCFL4T	.2500	.750	.375	.250	.500	1.312	1/4-28	.687	.468	.375	27	1380	.05
BRRCOF-SCFL5T	.3125	.875	.437	.312	.625	1.375	5/16-24	.687	.500	.437	22	2100	.08
BRRCOF-SCFL6T	.3750	1.000	.500	.359	.719	1.625	3/8-24	.812	.687	.562	22	3080	.13
BRRCOF-SCFL7T	.4375	1.125	.562	.406	.812	1.812	7/16-20	.937	.750	.625	21	3790	.18
BRRCOF-SCFL8T	.5000	1.312	.625	.453	.937	2.125	1/2-20	1.062	.875	.750	20	4720	.29
BRRCOF-SCFL10T	.6250	1.500	.750	.484	1.125	2.500	5/8-18	1.375	1.000	.875	26	5870	.43
BRRCOF-SCFL12T	.7500	1.750	.875	.593	1.312	2.875	3/4-16	1.562	1.125	1.000	24	7520	.65



Commercial Rod Ends Extra Capacity TWO-PIECE-MALE SERIES

- Metal-to-Metal • Optional Lubricator



Materials

BALL	BODY
52100 Alloy Steel Heat-Treated Hard Chrome Plated	Carbon Steel Coated For Corrosion Resistance

RIGHT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width ±.010	D Head Dia. ±.031	F Length to Center of Ball ±.031	A Thread Length ±.062	M Thread Size UNF-3A	E Ball Diameter Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRCMCR-030	.1900	.312	.250	.625	1.250	.750	.1900-32	.437	.306	950	.03
BRCMCR-040	.2500	.375	.281	.750	1.562	1.000	.2500-28	.515	.353	2000	.05
BRCMCR-050	.3125	.437	.344	.875	1.875	1.250	.3125-24	.625	.447	3000	.08
BRCMCR-060	.3750	.500	.406	1.000	1.938	1.250	.3750-24	.718	.516	5000	.11
BRCMCR-070	.4375	.562	.437	1.125	2.125	1.375	.4375-20	.812	.586	6500	.16
BRCMCR-080	.5000	.625	.500	1.312	2.438	1.500	.5000-20	.937	.698	9000	.24
BRCMCR-100	.6250	.750	.562	1.500	2.625	1.625	.6250-18	1.125	.839	10000	.40
BRCMCR-120	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	14000	.63

LEFT-HAND THREAD

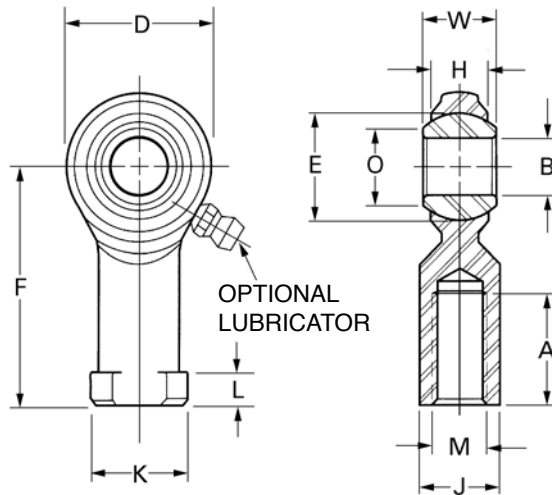
Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width ±.010	D Head Dia. ±.031	F Length to Center of Ball ±.031	A Thread Length ±.062	M Thread Size UNF-3A	E Ball Diameter Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRCMCR-030L	.1900	.312	.250	.625	1.250	.750	.1900-32	.437	.306	950	.03
BRCMCR-040L	.2500	.375	.281	.750	1.562	1.000	.2500-28	.515	.353	2000	.05
BRCMCR-050L	.3125	.437	.344	.875	1.875	1.250	.3125-24	.625	.447	3000	.08
BRCMCR-060L	.3750	.500	.406	1.000	1.938	1.250	.3750-24	.718	.516	5000	.11
BRCMCR-070L	.4375	.562	.437	1.125	2.125	1.375	.4375-20	.812	.586	6500	.16
BRCMCR-080L	.5000	.625	.500	1.312	2.438	1.500	.5000-20	.937	.698	9000	.24
BRCMCR-100L	.6250	.750	.562	1.500	2.625	1.625	.6250-18	1.125	.839	10000	.40
BRCMCR-120L	.7500	.875	.687	1.750	2.875	1.750	.7500-16	1.312	.978	14000	.63

NOTE: For grease fitting, add letter "G" to the end of catalog number. Example: **BRCMCR-120LG**



Commercial Rod Ends Extra Capacity TWO-PIECE-FEMALE SERIES

- Metal-to-Metal • Optional Lubricator



Materials

BALL	BODY
52100 Alloy Steel Heat-Treated Hard Chrome Plated	Carbon Steel Coated For Corrosion Resistance

RIGHT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width ±.010	D Head Dia. Ref.	F Length to Center of Ball Ref.	A Thread Length +.062 -.031	M Thread Size UNF-3B	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	J Across Wrench Flats Ref.	K Ref.	L Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRCFCR-030	.1900	.312	.250	.625	1.062	.500	.1900-32	.437	.306	.312	.406		2000	.03
BRCFCR-040	.2500	.375	.281	.750	1.312	.625	.2500-28	.515	.355	.375	.468	.187	3200	.05
BRCFCR-050	.3125	.437	.344	.875	1.375	.625	.3125-24	.625	.447	.437	.500		3800	.08
BRCFCR-060	.3750	.500	.406	1.000	1.625	.687	.3750-24	.718	.517	.562	.687		5000	.12
BRCFCR-070	.4375	.562	.437	1.125	1.812	.812	.4375-20	.812	.586	.625	.750	.250	6500	.17
BRCFCR-080	.5000	.625	.500	1.312	2.125	.937	.5000-20	.937	.698	.750	.875		9000	.26
BRCFCR-100	.6250	.750	.562	1.500	2.500	1.187	.6250-18	1.125	.839	.875	1.000	.312	10000	.41
BRCFCR-120	.7500	.875	.687	1.750	2.875	1.375	.7500-16	1.312	.978	1.000	1.125		14000	.64

LEFT-HAND THREAD

Catalog Number	B Bore +.0025 -.0005	W Ball Width ±.005	H Housing Width ±.010	D Head Dia. Ref.	F Length to Center of Ball Ref.	A Thread Length +.062 -.031	M Thread Size UNF-3B	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	J Across Wrench Flats Ref.	K Ref.	L Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BRCFCR-030L	.1900	.312	.250	.625	1.062	.500	.1900-32	.437	.306	.312	.406		2000	.03
BRCFCR-040L	.2500	.375	.281	.750	1.312	.625	.2500-28	.515	.355	.375	.468	.187	3200	.05
BRCFCR-050L	.3125	.437	.344	.875	1.375	.625	.3125-24	.625	.447	.437	.500		3800	.08
BRCFCR-060L	.3750	.500	.406	1.000	1.625	.687	.3750-24	.718	.517	.562	.687		5000	.12
BRCFCR-070L	.4375	.562	.437	1.125	1.812	.812	.4375-20	.812	.586	.625	.750	.250	6500	.17
BRCFCR-080L	.5000	.625	.500	1.312	2.125	.937	.5000-20	.937	.698	.750	.875		9000	.26
BRCFCR-100L	.6250	.750	.562	1.500	2.500	1.187	.6250-18	1.125	.839	.875	1.000	.312	10000	.41
BRCFCR-120L	.7500	.875	.687	1.750	2.875	1.375	.7500-16	1.312	.978	1.000	1.125		14000	.64

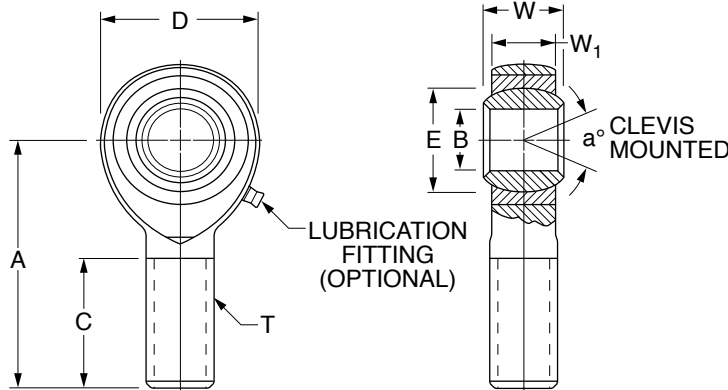
NOTE: For grease fitting, add letter "G" to the end of catalog number. Example: **BRCFCR-120LG**



NEW

Extra Strength Rod Ends | Aluminum Series
THREE-PIECE-MALE SERIES

- Heavy-Duty Shank • Optional Lubricator
- Optional Self-Lubricating Liner



Materials

BALL	BODY	RACE
52100 Steel Rc 56 min. Hard Hard Chrome Plated	Aluminum 7075-T6 Hard Anodized Red	Steel Alloy, Heat-Treated Zinc Plated, Chromate Treated

RIGHT-HAND THREAD

Catalog Number	B Dia. +.0015 -.0005	D Dia. ±.010	W Width +.000 -.005	W ₁ Width ±.005	E Ball Dia. Ref.	A Length ±.015	T Thread UNF-3A	C Thread Length +.062 -.031	a° Misalign. Angle Ref.	Ult. Static Radial Load lbs.	Approx. Weight lbs.
BRREXM-ALRSM6	.3750	1.125	.500	.406	.719	2.125	7/16-20	1.375	10	7718	.088
BRREXM-ALRSM7	.4375	1.312	.562	.437	.812	2.438	1/2-20	1.500	12	10120	.121
BRREXM-ALRSM8	.5000	1.500	.625	.500	.937	2.625	5/8-18	1.625	10	14880	.200
BRREXM-ALRSM10	.6250	1.750	.750	.562	1.125	2.875	3/4-16	1.750	13	19240	.317
BRREXM-ALRSM12	.5000										

LEFT-HAND THREAD

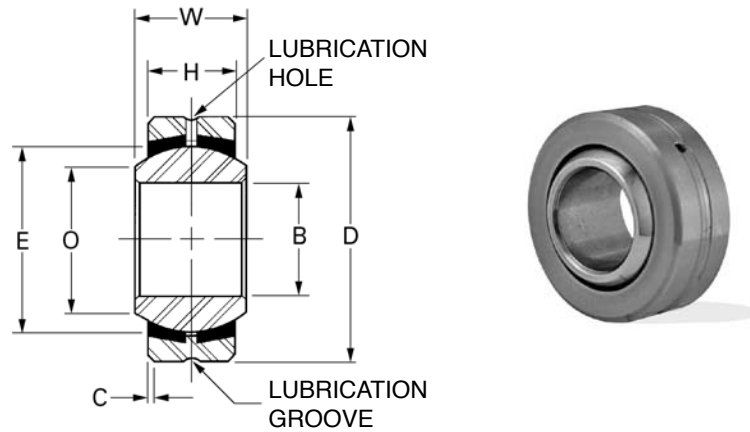
Catalog Number	B Dia. +.0015 -.0005	D Dia. ±.010	W Width +.000 -.005	W ₁ Width ±.005	E Ball Dia. Ref.	A Length ±.015	T Thread UNF-3A	C Thread Length +.062 -.031	a° Misalign. Angle Ref.	Ult. Static Radial Load lbs.	Approx. Weight lbs.
BRREXM-ALRSML6	.3750	1.125	.500	.406	.719	2.125	7/16-20	1.375	10	7718	.088
BRREXM-ALRSML7	.4375	1.312	.562	.437	.812	2.438	1/2-20	1.500	12	10120	.121
BRREXM-ALRSML8	.5000	1.500	.625	.500	.937	2.625	5/8-18	1.625	10	14880	.200
BRREXM-ALRSML10	.6250	1.750	.750	.562	1.125	2.875	3/4-16	1.750	13	19240	.317
BRREXM-ALRSML12	.5000										

- NOTES:** 1. For grease fitting, add letter "G" to the end of the catalog number.
 Example: **BRREXM-ALRSM6G**
 2. For self-lubricating liner, add letter "T" to the end of the catalog number.
 Example: **BRREXM-ALRSM10T**

INCH

www.qbcbearings.com

- Metal-to-Metal



Materials

OUTER RACE	BALL	INSERT
4130 or 4340 Alloy Steel Heat-Treated, Coated For Corrosion Resistance	52100 Alloy Steel Heat-Treated Chrome Plated	Copper Alloy

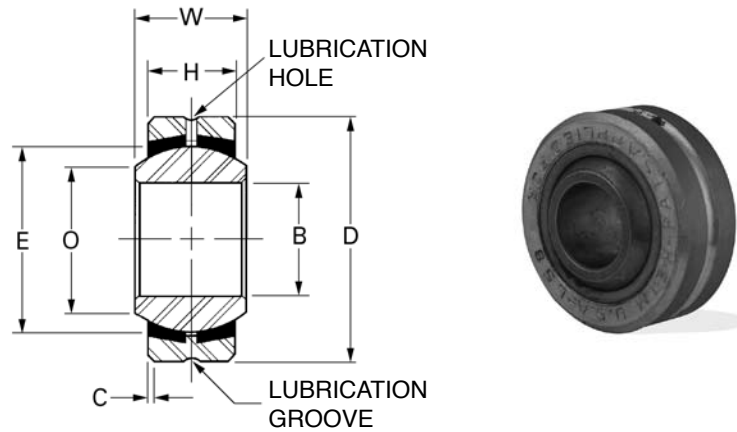
Catalog Number	B Bore +.0000 -.0005	D Outside Dia. +.0000 -.0005	W Ball Width +.000 -.005	H* Housing Width +.000 -.005	C Chamfer +.015 -.000	E Ball Diameter Ref.	O Ball Flat Diameter Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BPFLSS-020	.1650	.4687	.250	.187	.020	.343	.235	2000	.01
BPFLSS-030	.1900	.5625	.281	.218	.020	.406	.293	2750	.02
BPFLSS-040	.2500	.6562	.343	.250	.022	.500	.364	4200	.02
BPFLSS-050	.3125	.7500	.375	.281	.022	.562	.419	5800	.03
BPFLSS-060	.3750	.8125	.406	.312	.032	.625	.475	7150	.04
BPFLSS-070	.4375	.9062	.437	.343	.032	.687	.530	8625	.05
BPFLSS-080	.5000	1.0000	.500	.390		.781	.600	11200	.07
BPFLSS-090	.5625	1.0937	.562	.437	.032	.875	.670	14000	.09
BPFLSS-100	.6250	1.1875	.625	.500		.968	.739	17700	.12
BPFLSS-120	.7500	1.4375	.750	.593		1.187	.920	25750	.21
BPFLSS-140	.8750	1.5625	.875	.703	.044	1.312	.980	33600	.27
BPFLSS-160	1.0000	1.7500	1.000	.797		1.500	1.118	37520	.38

*H tolerance across inserts is ± 0.015

See technical section for additional design options.

Four-Piece | Brass Insert PRECISION SPHERICAL BEARINGS

- Metal-to-Metal



Materials

OUTER RACE	BALL	INSERT
Carbon Steel, Coated For Corrosion Resistance	52100 Alloy Steel Heat-Treated	Brass

Catalog Number	B Bore +.0000 -.0005	D Outside Dia. +.0000 -.0005	W Ball Width +.000 -.005	H* Housing Width +.000 -.005	C Chamfer +.015 -.000	E Ball Diameter Ref.	O Ball Flat Diameter Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BPFLSX-030	.1900	.6250	.281	.187		.406	.293	2960	.02
BPFLSX-040	.2500	.7500	.375	.281	.016	.515	.354	5245	.04
BPFLSX-050	.3125	.8750	.437	.313		.625	.447	6550	.05
BPFLSX-060	.3750	1.0000	.500	.375	.016	.718	.517	8605	.08
BPFLSX-070	.4375	1.1875	.562	.437	.032	.812	.586	11100	.12
BPFLSX-080	.5000	1.3125	.687	.531	.044	.937	.637	15600	.18
BPFLSX-100	.6250	1.5625	.875	.687	.044	1.187	.802	25700	.33
BPFLSX-120	.7500	2.2500	1.250	.937	.044	1.625	1.038	47600	.97
BPFLSX-160	1.0000	2.3750	1.125	.875	.062	1.750	1.345	48200	.94
BPFLSX-190	1.1875	2.6250	1.250	1.000	.085	2.000	1.562	63000	1.27
BPFLSX-240	1.5000	3.2500	1.500	1.250	.085	2.500	2.000	98000	2.38
BPFLSX-300	1.8750	4.0000	1.625	1.313	.125	3.000	2.521	123500	3.75

*H tolerance across inserts is ± 0.015

See technical section for additional design options.

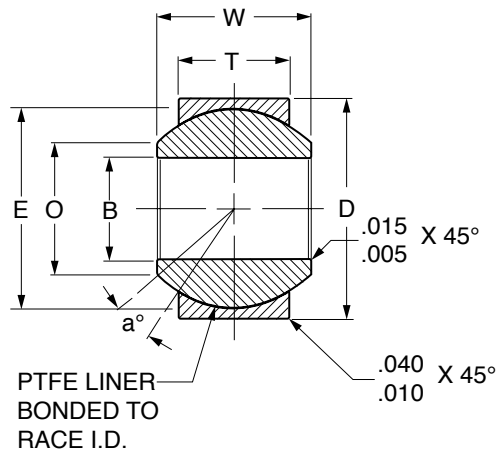


NEW

Four-Piece | Wide Series

PRECISION SPHERICAL BEARINGS

- Stainless Steel • Self-Lubricating PTFE Liner



Materials

BALL	RACE	LINER
440C Stainless Steel Heat-Treated	17-4 PH Stainless Steel Heat-Treated	PTFE Fabric

Catalog Number	B Dia. +.0000 -.0005	D Dia. +.0000 -.0005	W Width +.000 -.002	T Width +.005 -.005	O Ball Flat Dia. Ref.	E Ball Dia. Ref.	a° Mis. Ang. Min.	Load Ratings lbs.			Approx. Weight lbs.
								Static Limit		Dynamic Oscillating Radial Load	
								Radial lbs.	Axial lbs.		
BPFWSS-3T	.1900	.6250	.437	.327	.301	.531	15	2500	1770	4900	.031
BPFWSS-4T	.2500	.6875	.437	.317	.360	.593	14	5500	1640	6505	.035
BPFWSS-5T	.3125	.8125	.500	.406	.466	.687	8	9400	2630	8310	.060
BPFWSS-6T	.3750	.9375	.562	.442	.537	.781	10	13700	3650	11750	.080
BPFWSS-7T	.4375	1.0000	.625	.505	.607	.875	9	20700	4970	14950	.100
BPFWSS-8T	.5000	1.1250	.687	.536	.721	1.000	10	21400	5370	18100	.135
BPFWSS-9T	.5625	1.1875	.750	.567	.747	1.062	12	26600	6130	20250	.160
BPFWSS-10T	.6250	1.3750	.875	.630	.845	1.250	13	29000	7730	26200	.240
BPFWSS-12T	.7500	1.6250	.875	.755	.995	1.375	6	37000	10800	33600	.350
BPFWSS-14T	.8750	2.1250	1.375	1.005	1.269	1.875	12	65200	19300	56250	.970
BPFWSS-16T	1.0000							104000			

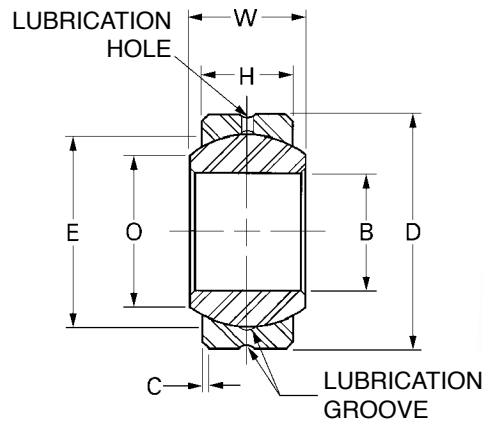
NOTE: Diameter B and D are concentric within .005 T.I.R.

NO LOAD BREAKAWAY TORQUE

BORE DIAMETER	TORQUE
.1900	.5 to 5.0 lbs. in.
.2500 to .7500	1.0 to 5.0 lbs. in.
.8750 & 1.0000	2.0 to 8.0 lbs. in.

Two-Piece PRECISION SPHERICAL BEARINGS

• Metal-to-Metal • Alloy Steel



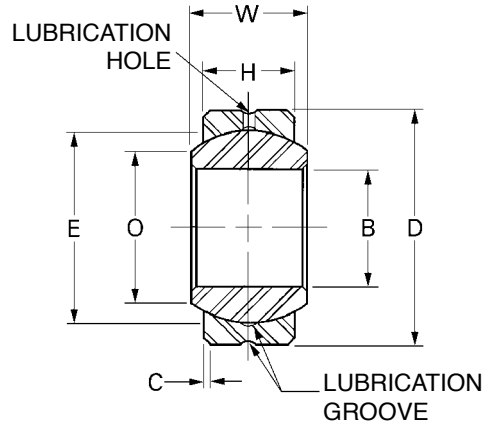
Materials

OUTER RACE	BALL
4130 or 4340 Alloy Steel Heat-Treated, Coated for Corrosion Resistance	52100 Alloy Steel Heat-Treated Chrome Plated

Catalog Number	B Bore +.0000 -.0005	D Outside Dia. +.0000 -.0005	W Ball Width +.000 -.005	H Width ±.005	C Chamfer +.015 -.000	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BPFLHA-020	.1650	.4687	.250	.187	.020	.343	.235	4400	.01
BPFLHA-030	.1900	.5625	.281	.218	.020	.406	.293	6480	.02
BPFLHA-040	.2500	.6562	.343	.250	.022	.500	.364	10000	.02
BPFLHA-050	.3125	.7500	.375	.281	.022	.562	.419	13900	.03
BPFLHA-060	.3750	.8125	.406	.312	.032	.625	.475	18750	.04
BPFLHA-070	.4375	.9062	.437	.343	.032	.687	.530	22300	.05
BPFLHA-080	.5000	1.0000	.500	.390		.781	.600	26900	.07
BPFLHA-090	.5625	1.0937	.562	.437	.032	.875	.670	36000	.09
BPFLHA-100	.6250	1.1875	.625	.500		.968	.739	48000	.12
BPFLHA-120	.7500	1.4375	.750	.593		1.187	.920	78000	.21
BPFLHA-140	.8750	1.5625	.875	.703	.044	1.312	.980	103000	.27
BPFLHA-160	1.0000	1.7500	1.000	.797		1.500	1.118	125000	.38

See technical section for additional design options.

- Metal-to-Metal



Materials

OUTER RACE	BALL
300 Series Stainless Steel	440C Stainless Steel Heat-Treated

Catalog Number	B Bore +.0000 -.0005	D Outside Dia. +.0000 -.0005	W Ball Width +.000 -.005	H Width ±.005	C Chamfer +.015 -.000	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BPSLHS-020	.1650	.4687	.250	.187	.020	.343	.235	3200	.01
BPSLHS-030	.1900	.5625	.281	.218	.020	.406	.293	4400	.02
BPSLHS-040	.2500	.6562	.343	.250	.022	.500	.364	6700	.02
BPSLHS-050	.3125	.7500	.375	.281	.022	.562	.419	9200	.03
BPSLHS-060	.3750	.8125	.406	.312	.032	.625	.475	12400	.04
BPSLHS-070	.4375	.9062	.437	.343	.032	.687	.530	14900	.05
BPSLHS-080	.5000	1.0000	.500	.390		.781	.600	17900	.07
BPSLHS-090	.5625	1.0937	.562	.437	.032	.875	.670	23700	.09
BPSLHS-100	.6250	1.1875	.625	.500		.968	.739	32000	.12
BPSLHS-120	.7500	1.4375	.750	.593		1.187	.920	48000	.21
BPSLHS-140	.8750	1.5625	.875	.703	.044	1.312	.980	69000	.27
BPSLHS-160	1.0000	1.7500	1.000	.797		1.500	1.118	83000	.38

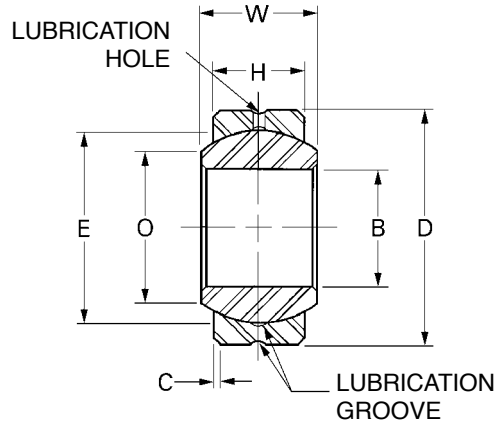
See technical section for additional design options.



NEW

Two-Piece | Heavy-Duty PRECISION SPHERICAL BEARING

- Metal-to-Metal • Alloy Steel • Optional Self-Lubricating Liner



Materials

OUTER RACE	BALL
Alloy Steel	52100 Steel
Heat-Treated	Heat-Treated
Oil-Coated	Chrome Plated

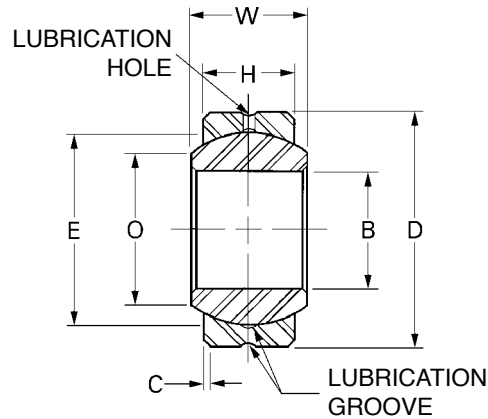
Catalog Number	B Bore +.0000 -.0005	D Outside Dia. +.0000 -.0005	W Ball Width +.000 -.005	H Width ±.005	C Chamfer +.015 -.000	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BPFFKS-030	.1900	.5625	.281	.218	.020	.406	.293	5400	.014
BPFFKS-040	.2500	.6562	.343	.250	.022	.500	.364	8400	.022
BPFFKS-050	.3125	.7500	.375	.281	.022	.562	.419	11600	.035
BPFFKS-060	.3750	.8125	.406	.312	.032	.625	.475	15600	.038
BPFFKS-070	.4375	.9062	.437	.343	.032	.687	.530	22300	.047
BPFFKS-080	.5000	1.0000	.500	.390	.032	.781	.600	26900	.065
BPFFKS-090	.5625	1.0937	.562	.437	.032	.875	.670	36000	.086
BPFFKS-100	.6250	1.1875	.625	.500	.032	.968	.739	40000	.110
BPFFKS-120	.7500	1.4375	.750	.593	.044	1.187	.920	78000	.204
BPFFKS-140	.8750	1.5625	.875	.703	.044	1.312	.980	86000	.263
BPFFKS-160	1.0000	1.7500	1.000	.797	.044	1.500	1.118	104000	.386

- NOTES:** 1. Spherical Bearings available with self-lubricating liner.
 Add "T" to the end of catalog number. Example: **BPFFKS-060T**
 2. Bearings with liners have no lubrication hole or grooves in race.

See technical section for additional design options.

Two-Piece COMMERCIAL SPHERICAL BEARINGS

• Metal-to-Metal • Carbon Steel • Optional Self-Lubricating Liner



Materials

OUTER RACE	BALL
Low-Carbon Steel Oil-Coated	52100 Steel Heat-Treated Hard Chrome Plated

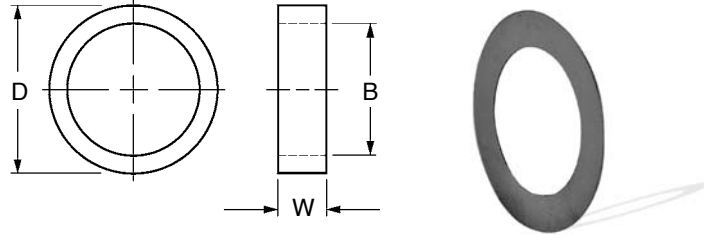
Catalog Number	B Bore +.0025 -.0005	D Outside Dia. +.0000 -.0007	W Ball Width ±.005	H Width ±.010	C Chamfer +.015 -.000	E Ball Dia. Ref.	O Ball Flat Dia. Ref.	Max. Static Radial Load lbs.	Approx. Weight lbs.
BPF COM-030	.1900	.5625	.281	.218	.020	.406	.293	3250	.02
BPF COM-040	.2500	.6562	.343	.250	.022	.500	.364	4900	.02
BPF COM-050	.3125	.7500	.375	.281		.562	.419	6450	.03
BPF COM-060	.3750	.8125	.406	.312	.032	.625	.475	8250	.04
BPF COM-070	.4375	.9062	.437	.343		.687	.530	10200	.05
BPF COM-080	.5000	1.0000	.500	.390		.781	.600	13600	.07
BPF COM-090	.5625	1.0937	.562	.437	.032	.875	.670	15900	.09
BPF COM-100	.6250	1.1875	.625	.500		.968	.739	21000	.12
BPF COM-120	.7500	1.4375	.750	.593		1.187	.920	30000	.21
BPF COM-140	.8750	1.5625	.875	.703	.044	1.312	.980	41100	.27
BPF COM-160	1.0000	1.7500	1.000	.797		1.500	1.118	54700	.38

- NOTES:** 1. Spherical Bearings available with self-lubricating liner.
Add "T" to the end of catalog number. Example: **BPF**COM-100T
2. Bearings with liners have no lubrication hole or grooves in race.

See technical section for additional design options.

Inner Ring BEARING SPACERS

• 18-8 Stainless Steel



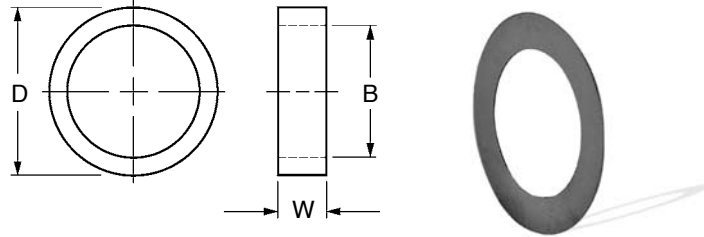
Catalog Number	B +.005 -.000	D ±.005	W			
BHSINR-079164002 BHSINR-079164004	.079	.164	.002	±.001		
			.004			
BHSINR-079164006 BHSINR-079164008 BHSINR-079164010			.006	±.001		
			.008			
			.010			
BHSINR-079164012 BHSINR-079164014 BHSINR-079164016			.012	±.002		
	.014					
	.016					
BHSINR-093203002 BHSINR-093203004	.093	.203	.002	±.001		
			.004			
BHSINR-093203006 BHSINR-093203008 BHSINR-093203010			.006	±.001		
			.008			
			.010			
BHSINR-093203012 BHSINR-093203014 BHSINR-093203016			.012	±.002		
			.014			
			.016			
BHSINR-125187002 BHSINR-125187004 BHSINR-125187006			.125	.187	.002	±.001
					.004	
	.006					
BHSINR-125187008 BHSINR-125187010 BHSINR-125187012	.008	±.002				
	.010					
	.012					
BHSINR-125187014 BHSINR-125187016 BHSINR-125187031	.014	±.002				
	.016					
	.031					
BHSINR-125187063 BHSINR-125187094 BHSINR-125187125	.063	±.003				
	.094					
	.125					
BHSINR-125187188 BHSINR-125187250 BHSINR-125187375 BHSINR-125187500	.188	±.003				
	.250					
	.375					
	.500					
BHSINR-187250002	.187	.250	.002	±.001		

Catalog Number	B +.005 -.000	D ±.005	W	
BHSINR-187250004 BHSINR-187250006 BHSINR-187250008	.187	.250	.004	±.001
			.006	
			.008	
BHSINR-187250010 BHSINR-187250012 BHSINR-187250014			.010	±.002
			.012	
			.014	
BHSINR-187250016 BHSINR-187250031 BHSINR-187250063	.016	±.002		
	.031			
	.063			
BHSINR-187250094 BHSINR-187250125 BHSINR-187250188	.187	.250	.094	±.003
			.125	
			.188	
BHSINR-187250250 BHSINR-187250375 BHSINR-187250500			.250	±.003
	.375			
	.500			
BHSINR-250375002 BHSINR-250375004 BHSINR-250375006	.250	.375	.002	±.001
			.004	
			.006	
BHSINR-250375008 BHSINR-250375010 BHSINR-250375012			.008	±.002
			.010	
			.012	
BHSINR-250375014 BHSINR-250375016 BHSINR-250375031			.014	±.002
			.016	
			.031	
BHSINR-250375063 BHSINR-250375094 BHSINR-250375125			.063	±.003
			.094	
			.125	
BHSINR-250375188 BHSINR-250375250 BHSINR-250375375 BHSINR-250375500			.188	±.003
			.250	
	.375			
	.500			
BHSINR-313500002 BHSINR-313500004	.313	.500	.002 .004	±.001

Continued on the next page

Inner Ring BEARING SPACERS

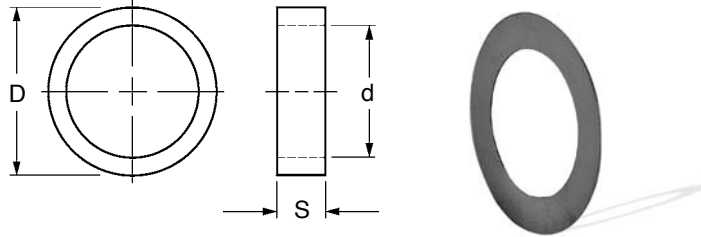
• 18-8 Stainless Steel



Catalog Number	B +.005 -.000	D ±.005	W	
BHSINR-313500006 BHSINR-313500008	.313	.500	.006	±.001
BHSINR-313500010 BHSINR-313500012 BHSINR-313500014 BHSINR-313500016			.008	
BHSINR-313500031 BHSINR-313500062 BHSINR-313500125			.010 .012 .014 .016	±.002
BHSINR-313500031 BHSINR-313500062 BHSINR-313500125			.031 .062 .125	
BHSINR-313500031 BHSINR-313500062 BHSINR-313500125			.031 .062 .125	±.003
BHSINR-375562002 BHSINR-375562004 BHSINR-375562006 BHSINR-375562008	.375	.562	.002	±.001
BHSINR-375562010 BHSINR-375562012 BHSINR-375562014 BHSINR-375562016			.004 .006 .008	
BHSINR-375562031 BHSINR-375562063 BHSINR-375562094 BHSINR-375562125			.010 .012 .014 .016	±.002
BHSINR-375562031 BHSINR-375562063 BHSINR-375562094 BHSINR-375562125			.031 .063 .094 .125	
BHSINR-375562188 BHSINR-375562250 BHSINR-375562375 BHSINR-375562500			.031 .063 .094 .125	±.003
BHSINR-375562188 BHSINR-375562250 BHSINR-375562375 BHSINR-375562500	.188 .250 .375 .500	±.003		
BHSINR-500750002 BHSINR-500750004 BHSINR-500750006 BHSINR-500750008	.500	.750	.002	±.001
BHSINR-500750010 BHSINR-500750012 BHSINR-500750014 BHSINR-500750016			.004 .006 .008	
BHSINR-500750031 BHSINR-500750062 BHSINR-500750125			.010 .012 .014 .016	±.002
BHSINR-500750031 BHSINR-500750062 BHSINR-500750125			.031 .062 .125	
BHSINR-500750031 BHSINR-500750062 BHSINR-500750125			.031 .062 .125	±.003

Inner Ring BEARING SPACERS

• 18-8 Stainless Steel

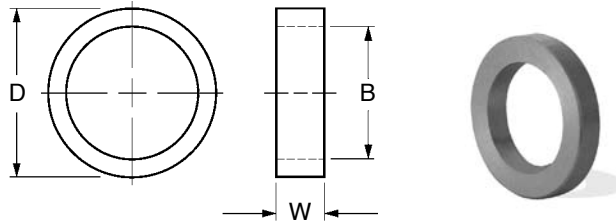


Catalog Number	d +0.13 0	D ±0.13	S ±0.025
BHSINRM30537310	3.05	3.73	0.1
BHSINRM30537315			0.15
BHSINRM30537325			0.25
BHSINRM30537340			0.4
BHSINRM40553010	4.05	5.3	0.1
BHSINRM40553015			0.15
BHSINRM40553025			0.25
BHSINRM40553040			0.4
BHSINRM50559310	5.05	5.93	0.1
BHSINRM50559315			0.15
BHSINRM50559325			0.25
BHSINRM50559340			0.4
BHSINRM60579010	6.05	7.9	0.1
BHSINRM60579015			0.15
BHSINRM60579025			0.25
BHSINRM60579040			0.4
BHSINRM80510210	8.05	10.2	0.1
BHSINRM80510215			0.15
BHSINRM80510225			0.25
BHSINRM80510240			0.4
BHSINRM10012310	10.05	12.3	0.1
BHSINRM10012315			0.15
BHSINRM10012325			0.25
BHSINRM10012340			0.4



Inner Ring BEARING SPACERS

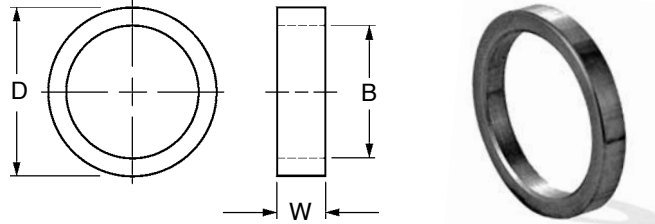
• Anodized Aluminum



Catalog Number	B +.005 -.000	D ±.005	W ±.003
BHAINR-125187031	.125	.187	.031
BHAINR-125187063			.063
BHAINR-125187094			.094
BHAINR-125187125			.125
BHAINR-125187188	.125	.187	.188
BHAINR-125187250			.250
BHAINR-125187375			.375
BHAINR-125187500			.500
BHAINR-187250031	.187	.250	.031
BHAINR-187250063			.063
BHAINR-187250094			.094
BHAINR-187250125			.125
BHAINR-187250188	.187	.250	.188
BHAINR-187250250			.250
BHAINR-187250375			.375
BHAINR-187250500			.500
BHAINR-250375031	.250	.375	.031
BHAINR-250375063			.063
BHAINR-250375094			.094
BHAINR-250375125			.125
BHAINR-250375188	.250	.375	.188
BHAINR-250375250			.250
BHAINR-205375375			.375
BHAINR-205375500			.500
BHAINR-375562031	.375	.562	.031
BHAINR-375562063			.063
BHAINR-375562094			.094
BHAINR-375562125			.125
BHAINR-375562188	.375	.562	.188
BHAINR-375562250			.250
BHAINR-375562375			.375
BHAINR-375562500			.500

Outer Ring BEARING SPACERS

• 18-8 Stainless Steel

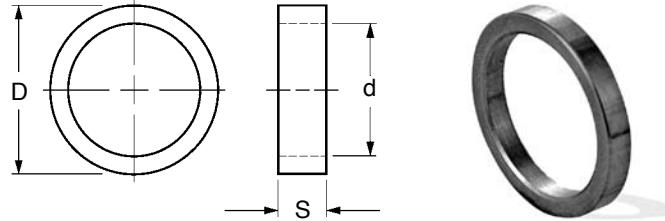


Catalog Number	B +.005 -.000	D ±.005	W	
BHSOTR-088153003			.003	
BHSOTR-088153005	.088	.153	.005	±.001
BHSOTR-088153007			.007	
BHSOTR-088153010	.088	.153	.010	±.002
BHSOTR-088153020			.020	
BHSOTR-123178003			.003	
BHSOTR-123178005	.123	.178	.005	±.001
BHSOTR-123178007			.007	
BHSOTR-123178010	.123	.178	.010	±.002
BHSOTR-123178020			.020	
BHSOTR-167248003			.003	
BHSOTR-167248005	.167	.248	.005	±.001
BHSOTR-167248007			.007	
BHSOTR-167248010	.167	.248	.010	±.002
BHSOTR-167248020			.020	
BHSOTR-206310003			.003	
BHSOTR-206310005	.206	.310	.005	±.001
BHSOTR-206310007			.007	
BHSOTR-206310010	.206	.310	.010	±.002
BHSOTR-206310020			.020	
BHSOTR-253375003			.003	
BHSOTR-253375005	.253	.373	.005	±.001
BHSOTR-253375007			.007	
BHSOTR-253375010	.253	.373	.010	±.002
BHSOTR-253375020			.020	
BHSOTR-253375032			.032	
BHSOTR-253375062	.253	.373	.062	±.003
BHSOTR-253375125			.125	
BHSOTR-253375250			.250	
BHSOTR-253375375	.253	.373	.375	±.003
BHSOTR-253375500			.500	
BHSOTR-378498003			.003	
BHSOTR-378498005	.378	.498	.005	±.001
BHSOTR-378498007			.007	

Catalog Number	B +.005 -.000	D ±.005	W	
BHSOTR-378498010			.010	
BHSOTR-378498020	.378	.498	.020	±.002
BHSOTR-378498032			.032	
BHSOTR-378498062	.378	.498	.062	±.003
BHSOTR-378498125			.125	
BHSOTR-378498250			.250	
BHSOTR-378198375	.378	.498	.375	±.003
BHSOTR-378498500			.500	
BHSOTR-503623003			.003	
BHSOTR-503623005	.503	.623	.005	±.001
BHSOTR-503623007			.007	
BHSOTR-503603010	.503	.623	.010	±.002
BHSOTR-503623020			.020	
BHSOTR-503623032			.032	
BHSOTR-503623062	.503	.623	.062	±.003
BHSOTR-503623125			.125	
BHSOTR-503623250			.250	
BHSOTR-503623375	.503	.623	.375	±.003
BHSOTR-503623500			.500	
BHSOTR-562685016			.016	±.002
BHSOTR-562685032	.562	.685	.032	±.003
BHSOTR-562685062			.062	±.003
BHSOTR-687873003			.003	
BHSOTR-687873005	.687	.873	.005	±.001
BHSOTR-687873007			.007	
BHSOTR-687873010			.010	
BHSOTR-687873016	.687	.873	.016	±.002
BHSOTR-687873020			.020	
BHSOTR-687873032			.032	
BHSOTR-687873062	.687	.873	.062	±.003
BHSOTR-687873125			.125	
BHSOTR-687873250			.250	
BHSOTR-687873375	.687	.873	.375	±.003
BHSOTR-687873500			.500	

Outer Ring BEARING SPACERS

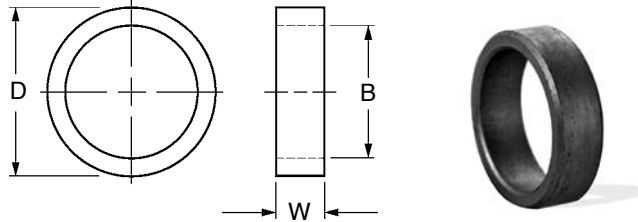
• 18-8 Stainless Steel



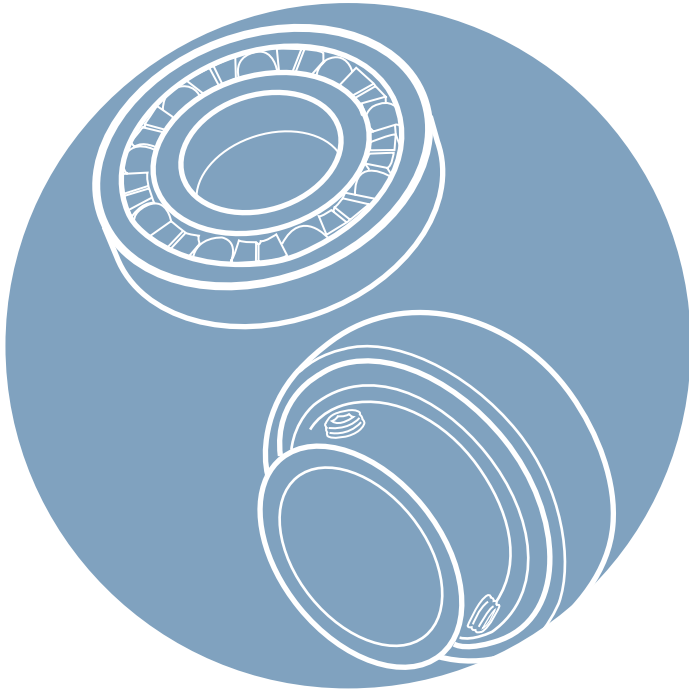
Catalog Number	d +0.13 0	D 0 -0.13	S ±0.025
BHSOTRM62570015 BHSOTRM62570025	6.25	7	0.15 0.25
BHSOTRM67580015 BHSOTRM67580025	6.75	8	0.15 0.25
BHSOTRM78590015 BHSOTRM78590025 BHSOTRM78590040	7.85	9	0.15 0.25 0.4
BHSOTRM82510015 BHSOTRM82510025	8.25	10	0.15 0.25
BHSOTRM10011015 BHSOTRM10011025	10	11	0.15 0.25
BHSOTRM11113015 BHSOTRM11113025 BHSOTRM11113040	11.15	13	0.15 0.25 0.4
BHSOTRM13015015 BHSOTRM13015025	13	15	0.15 0.25
BHSOTRM13816015 BHSOTRM13816025 BHSOTRM13816040	13.8	16	0.15 0.25 0.4
BHSOTRM16619015 BHSOTRM16619025 BHSOTRM16619040	16.65	19	0.15 0.25 0.4

Outer Ring BEARING SPACERS

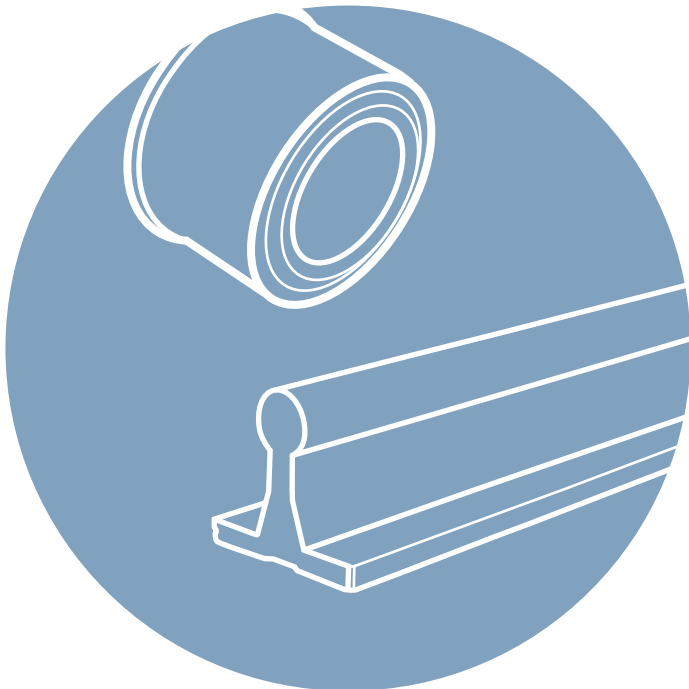
• Anodized Aluminum



Catalog Number	B		D		W
	+0.005 -0.000		±.005		
BHAOTR-253375032			.032		±.003
BHAOTR-253375062	.253	.373	.062		
BHAOTR-253375125			.125		
BHAOTR-253375250			.250		±.003
BHAOTR-253375375	.253	.373	.375		
BHAOTR-253375500			.500		
BHAOTR-378498032			.032		±.003
BHAOTR-378498062	.378	.498	.062		
BHAOTR-378498125			.125		
BHAOTR-378498250			.250		±.003
BHAOTR-378498375	.378	.498	.375		
BHAOTR-378498500			.500		
BHAOTR-503623032			.032		±.003
BHAOTR-503623062	.503	.623	.062		
BHAOTR-503623125			.125		
BHAOTR-503623250			.250		±.003
BHAOTR-503623375	.503	.623	.375		
BHAOTR-503623500			.500		
BHAOTR-687873032			.032		±.003
BHAOTR-687873062	.687	.873	.062		
BHAOTR-687873125			.125		
BHAOTR-687873250			.250		±.003
BHAOTR-687873375	.687	.873	.375		
BHAOTR-687873500			.500		



www.qbcbearings.com



Technical Characteristics & Life Calculation	page 253 – 255
Mounting Recommendations	page 256 – 258
Application of Rails of Different Length	page 259
Inspection Example	page 260 – 261
Calculation Example	page 262 – 263
“GR” Linear System	page 264
Guideways “NG”	page 270
Guideways “M/V”	page 272
“RM & RV” Linear Systems	page 274
Rails with Antifriction Material “RVA”	page 278
Double Raceway Rails “GRD”	page 280
Recirculating Ball Bearings “RK” and “RKD”	page 284
Special Rails	page 286
Table Arrangements	page 287
Frictionless Tables “TR”	page 288
Inspection Tables	page 295
Frictionless Tables “TRL”	page 296
Inspection Tables	page 303
Frictionless Tables “TRKD”	page 304
Inspection Tables	page 306

• **Machine tools in general, particularly:**

- Centerless Grinders
- Bore Grinders
- External Grinders
- Bearing Grinders
- Boring Machines
- Milling Machines
- Tool Sharpening Machines

• **General machinery:**

- Material Forming Machines
- Electrical Discharge Machines
- Welding Machines
- Assembly Machines
- Manipulators
- Robots
- Optical, Precision & Electronics Industry
- Instruments
- Industrial Movie & Photography Machines
- Measuring Systems

• **Machines for:**

- Shoe Industry
- Optical Industry
- Chamfering of lens
- Rubber & Tire Industry
- Marble & Glass Industry
- Wood Working Industry
- Textyle Industry
- Gold Industry
- Precious Stone Industry
- Clock Working Industry
- Ultrasound Equipment

• **Medical industry:**

- Cat Scanners
- Orthopantomographs
- Blood Processing Equipment
- Optometry Equipment

Specialty applications are realized at research centers, chemical laboratories, etc. Our products are used in both private and industrial sector where precise and sensitive movements are required.

The rails are made of special alloyed steel and through-hardened to a hardness value of 60 ± 2 HRC. The precision relative to the parallelism variation between the raceways and the reference surface are dependent upon the quality selected (10 micron/1600 millimeters for the "standard" quality, 5 micron/1600 millimeters for the "selected" quality). It is important to state that all the elements are individually checked during all manufacturing phases before the final inspection. Also, a non-destructive check is performed to assure the absence of internal cracks which may have been generated during heat treating. Such micro-cracks could drastically affect both the precision and the life of the rails.

The advantages obtained by employing rolling systems can be summarized as follows:

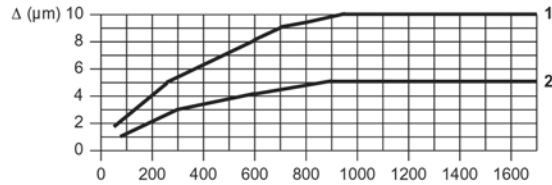
- Very sensitive movement (friction coefficient of 0.003)
- Lack of start-up frictional losses (stick-slip)
- Minimum wear
- High load carrying capacity
- Maximized precision
- Availability in stock of all models included in the catalogue

In our production program we have a full range of standardized cross roller tables with lengths ranging from 25 to 1010 mm and widths of 30 to 145 mm; with load ratings from 250 N to 48100 N. The structural members of the tables are made of cast iron (G25), naturally aged, or of steel.

A range of anticorrosive tables is also available; their light mass makes it possible to reduce inertial forces.

Manufacturing tolerances

1. Standard quality
2. Selected quality



HRC	Fd
20	0,10
30	0,25
40	0,34
45	0,42
50	0,53
55	0,78
57	0,90
58	1,00

The rails are through-hardened to 60 ±2 HRC. The material is alloy steel. (DIN 1.2842) Each rail is accurately checked during all the manufacturing phases and it is subjected to a final inspection where the geometry, hardness, surface texture of raceways and adjacent surfaces are thoroughly checked.

Hardness

The rail hardness is of major importance since its variation has a direct influence on the life expectancy of the system. It is important to know that the best working conditions (Fd = 1) corresponds to a hardness value of 58 HRC minimum. For hardness lower than 58 HRC, the teorical load rating should be multiplied by the corresponding hardness factor. Therefore, if a rail with a hardness of 55 HRC and theoretical load rating of 3000 N is used, its load rating will be C = 3000 x Fd which corresponds to 3000 x 0.78 thus 2340 N.

Temperature

Trc°	Ft
300	0,60
250	0,75
120	0,90
80	1,00

The temperature also has a great influence on the system life. For temperatures above 80°C the factor Ft should be introduced. The table shows the most common factors if the theoretical load rating of a recirculating ball unit RK 6100 is 715 N such a rating will be reduced to 536,25 N (715x0.75) if the temperature rises to 250°C. Permissible operating temperatures is between -40°C and +80°C.

Acceleration

If all the conditions of the system have been verified, values up to 50 m/sec² are allowed.

Speed

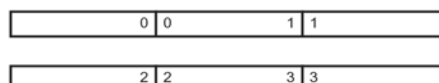
Linear systems utilizing GR type rails could be used for speed up to 50 m/min. If higher speeds are sought, our engineering office should be consulted.

Sealing and protection

It is absolutely necessary that the linear system is protected from impurities of either solid or liquid nature.

Multi-piece ways

For systems requiring longer than standard catalogue rails, multi-piece ways can be provided. To accomplish this, the individual rails are head-ground and ground simultaneously to the required length. By doing so, there will be no difference in precision and smoothness. In case of shipping of multi- piece system, the individual rails will be numbered to allow proper mounting.



Lubrication

The rolling systems are usually lubricated with a thin oil film applied during assembly. This lubrication method allows the better utilization of the precision and smoothness characteristics of such an arrangement. However, should the application dictate it, oil-drip, oil-mist or lithium based greases (KP2K - DIN 51502-51825) can be used.

Preload

Usually the preload is applied with set screws placed in correspondence of the mounting screws by using appropriate dynamometric spanners. A system could also be preloaded by means of a tapered gib, a wedge of cylinder, though all of these methods are more complex and require a more accurate execution of the supporting structure. Such accuracy may not be achievable or even wanted by the user. The preload setting is usually dictated by the application and can vary between 2% and 20% of the dynamic load rating of the system examined.

Life

We have already examined two of the factors which may affect life of a rolling system (temperature and hardness). In addition, we like to mention others which are also important.

- 1) Manufacturing tolerances of the supporting surfaces non-respondent to the minimum requirements.
- 2) Mounting not according to our recommendations.
- 3) Presence of particles or impurities between the rolling elements.
- 4) The system should not be subjected to its maximum allowable load until after a break-in period to allow proper adjustment of the system itself.

In these conditions are respected the life of a system can be calculated according to the following formula:

$$L = FD \times \left(\frac{P}{F1}\right)^p \times 2,5 \text{ in } 10^5 \text{ (m)}$$

L = Basic rated life 10^5 (m)

FD = Reliability factor

P = Dinamic load rating (N)

F1 = Dynamic load (N)

p = Life exponent (10/3 for rollers, 3 for balls)

Example: Given - Roller 9 mm

P = 1300 N

F1 = 200 N

Rail hardness = 58 HRC

Temperature = 100°C

Reliability FD 90% = 1

$$L = 1 \times \left(\frac{1300}{200}\right)^{10/3} \times 10^5 = 513 \text{ in } 10^5 \text{ (m)}$$

To circulate the theoretical life in hours, the formula is:

$$Lh = L \times \frac{8,33}{C \times Nc}$$

Where

Lh = Basic rated life (hours)

C = Stroke length (mm)

Nc = Frequency of reciprocating motion in 1 minute

Example:

Stroke = 400 mm

Frequency = 30

L = 513 x 10^5 m

$$Lh = \frac{8,33 \times 513 \times 10^5}{400 \times 30} = 35610 \text{ h}$$

%	FD
90	1,00
95	0,62
96	0,53
97	0,44
98	0,33
99	0,21

The figure below represents the two components which are usually equipped with way systems with either rollers, balls or needles.
The structure onto which the rails have been mounted must be sturdy enough so as to prevent rails from taking particular positions, when stressed by the preload, which may jeopardize the ideal geometry between rollers and raceways.

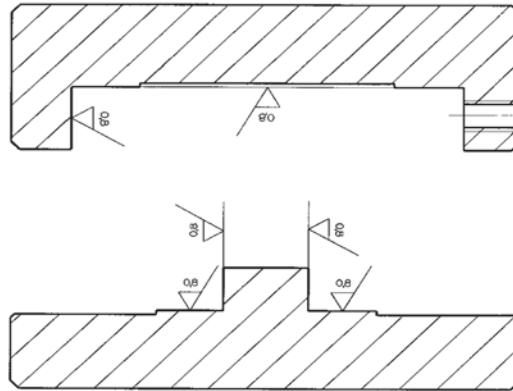


Fig. 2

For a properly executed mounting, the following condition should be verified:

- 1) The supporting surfaces should be ground or, in the worst case, milled, paying particular attention to the process.
- 2) The planarity and parallelism of the system are directly affected by the precision of the surfaces indicated to be ground. The deviation allowance for such surfaces should be within the values indicated on the graph on Page 7.
- 3) The included angle between the two adjacent surfaces should be 90°.
- 4) The holes for the retention screws should be carefully deburred to guarantee the surface quality of the supporting face.

It should be noted that all rails have threaded holes. This allows for two different mounting methods.

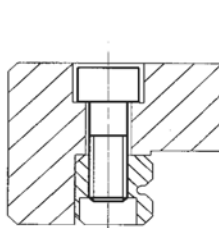


Fig. 3

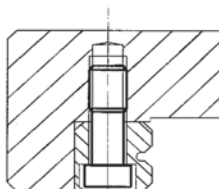


Fig. 4

Mounting of rails

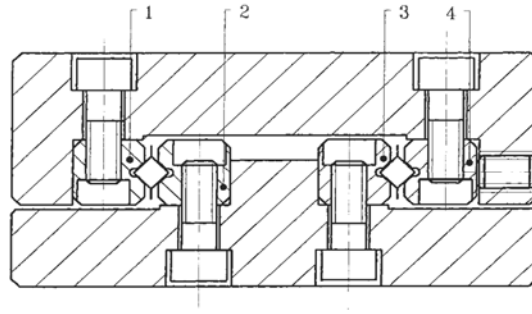


Fig. 5

Independently from any assembly method, we recommended to follow these steps:

- 01) Assembly of rails 2 and 3, which should be carefully pressed against the supporting surfaces before tightening of the screws.
- 02) Checking of the planarity, parallelism of the rails installed.
- 03) Installation of the rail 1, following the same steps as for rails 2 and 3.
- 04) Installation of the rail 4, without tightening the retaining screws.
- 05) Installation of the relative cages.
- 06) Installation of end pieces and/or wipers.
- 07) Slide the moving portion of the system to the end of the travel/stroke to allow the centering of the cages.
- 08) Tighten the preloading screws sufficiently to eliminate the clearance. The preloading value should be selected according to the application requirement (rail type, rigidity, etc.). Such a value may vary between 2% and 20% of the rated dynamic capacity. In all cases the smoothness of the system must be preserved.
- 09) Tighten the retaining screws of rail 4.
- 10) To ensure a proper mounting of the rail, the marking should be visible at all times.
- 11) For a mounting as indicated in Figure 6, the height A and A1 can be matched, at extra cost, to a maximum variation of ± 0.01 mm.
- 12) After the assembly, make sure that the limit switch trips before the cages hit the screws or the end pieces.

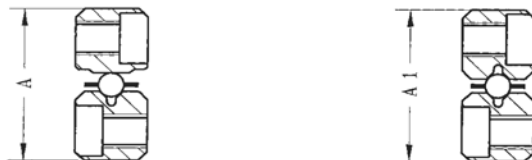


Fig. 6

Note: During the preloading phase the cage must always be behind the preloading screw that is adjusted. Also, in case of heavy mobile portion, provision must be taken to neutralize the weight. If this is not done, the preloading operation will be more complex and the correct setting of preload very difficult to achieve.

Determination of cage length

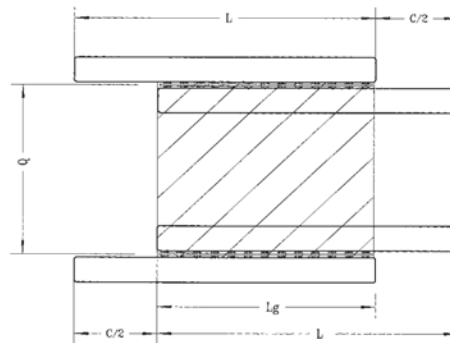


Fig. 7

Assuming to choose the rail type GR9 400 with a stroke length $C = 250$ mm. The cage length is determined by the following relationship: $L_g = L - 1/2 C$

Thus, $L_g = 400 - (250/2) = 275$ mm

Note: The selection of a specific rail length, as a function of given stroke, should satisfy the following requirements:

- 1) If the rail length will be up to 400 mm, all strokes between 1 mm and 2/3 of the rail length will be possible.
- 2) If the rail length will be more than 400 mm, all strokes between 1 mm and the length of the rail will be possible.

Based on the above, in a system riding on four rails of equal length (500 mm) the moving portion could overhand 1/2 of its length (condition limit) Fig. 8.

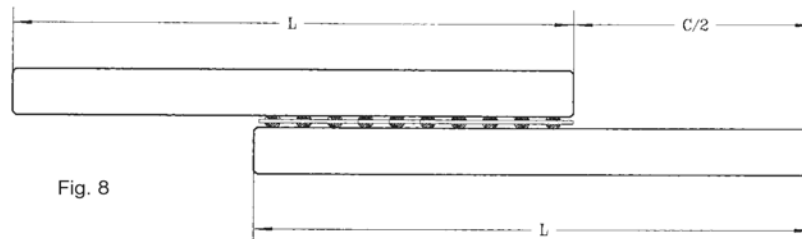


Fig. 8

Determination of the number of rolling elements and the load rating of cage

From the previous example, $L_g = 275$ mm

Rail type GR9

Roller diameter 9mm

Examining the table on Page 20 to obtain the value of the pitch relative to the cage/roller in exam.

$t = 18$ mm thus, the number of roller will be $NR = L_g/t = 15$

The number of supporting rollers for a cross roller cage will be $NR/2$. However, the usual assembly requires two rail systems, thus the total capacity will be a function of NR or the number of rollers in one cage, being $P = 1300N$ the load carrying capacity of a roller, (See dimension table on Page 20) the system load rating will be: $P = P \times NR$ thus, for the previously selected cage: $P = 1300 \times 15 = 19500N$.

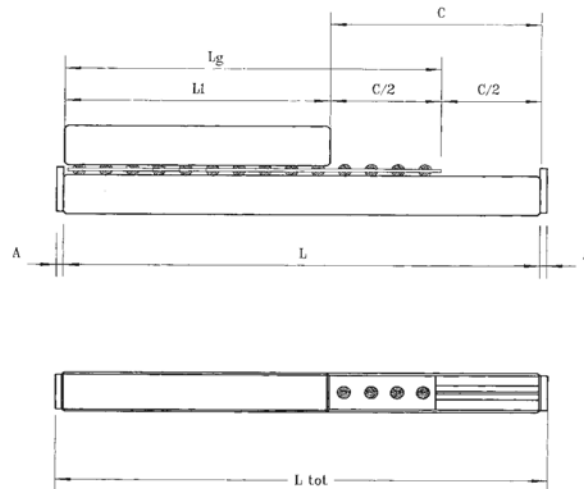


Fig. 9

If, for example, we intend to build a small carrier (200 mm long) which rides on a structure 800 mm long for a stroke of 600 mm, assuming the loads to be of limited magnitude, we could select the following material:

- 2 rails - GR9 800
- 2 rails - GR9 200 with chamfers
- 2 Cages - BB9 with 27 rollers
- 4 end pieces - GC9

In this case the selection was based on the longer rail, thus

$$L_g = L - C/2 = 800 - 300 = 500 \text{ mm}$$

$$N_R = L_g/t = 500/18 = 27.7 \text{ (thus 27 rollers)}$$

We will need also the chamfering of the rails GR9 200 to maintain the smoothness of travel of the table. The load carrying capacity will be based on the number of rollers within the two rails.

$$N_R = L_1/t = 200/18 = 11.1 \text{ (thus 11 rollers)}$$

Since the load rating is 1300N/roller, the load rating will be:

$$P = 11 \times 1300 = 14300\text{N}$$

For application similar to the one described above, it is recommended to provide guiding grooves to eliminate the potential cage swerving during motion. (See Fig. 10 and table on Page 20) (only for GR rails).

In the above-mentioned application type, the type GC end plates without wiper shall be assembled at the end of the long rail.

Similar application can be realized with rails RM + RV or GR + T.

Note: The shorter rails should always be chamfered (Additional operation performed at plant).

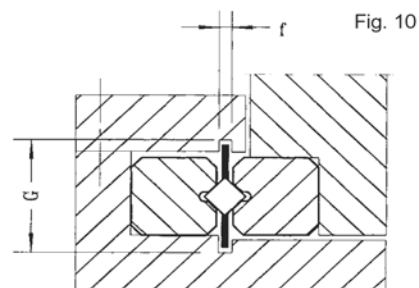


Fig. 10



Via Quasimodo, 22/24
20025 LEGNANO MI
- ITALY -

TAB 001-1 Rev. 1

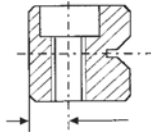
INSPECTION TABLE

rail type: GR

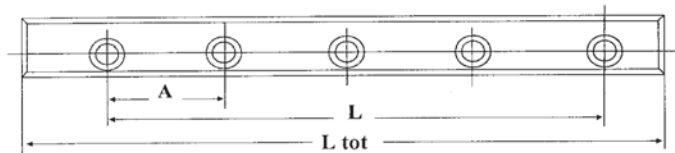
order number:

Date :

Resp. :



	GR
max error (specification)	± 0,2 mm
error (measured)	

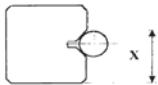


	GR1	GR2	GR3	GR6	GR9	GR12
A	10	15	25	50	100	100
max error (specification)	± 0,3 mm					
error (measured)						
L	L < 350 mm			L > 350 mm		
max error (specification)	± 0,3 mm			± 0,8 ‰ L		
error (measured)						
max error (specification) on rail's length (Ltot)	Ltot < 300 mm ± 0,3 mm			Ltot > 300 mm ± 1 ‰ Ltot		
error (measured)						

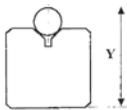
roughness (specification) referred to raceways	0,3 RA
roughness (measured)	
hardness (specification)	60 ± 2 HRC
hardness (measured)	



Via Quasimodo, 22/24
20025 LEGNANO MI
- ITALY -

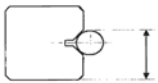


	GR	GR (QS)
max error (specification) X	± 0,005 mm	± 0,0025 mm
error (measured)		

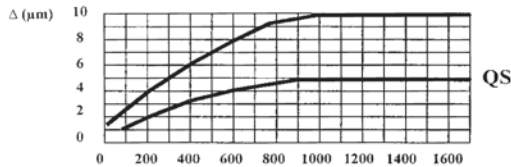


	GR
max error (specification) Y	0 / -0,1 mm
error (measured)	

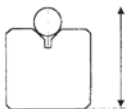
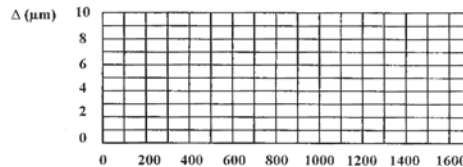
Parallelism variation vs length



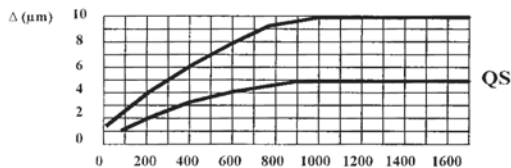
ERROR SPECIFICATION



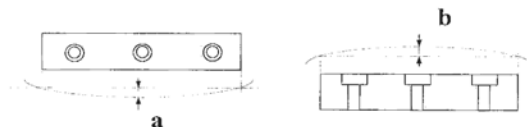
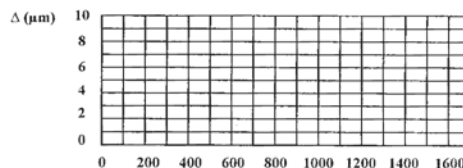
ERROR MEASURED



ERROR SPECIFICATION



ERROR MEASURED



	ADMITTED	MEASURED
arrows (a)		
arrows (b)		

(mm)

Due to elastic deformations of a linear system and to the lack of uniformity in the distribution of the unit loads, we resorted to theoretic safety factors (CTS) according to which the close contact between the mobile part and raceways is given by the following quantities:

CTS crossrollers	2
CTS balls	4
CTS needles	1

Example 1

Calculation example and load check:

- Rails = GR9 300
- Stroke = 180 mm
- Cages = AA9/11
- Load (F) = 6000 N
- $L_g = 210$ mm
- Preload = 10%

- Roller load = $\frac{6000}{11} = 545,5$ N

Load due to mobile portion NRP = $80/11 = 7,3$ N.

It is also necessary to take the preload into account.

That is: 10% of 545,5 N = 54,6 N.

The sum of the forces acting on the table (preload, weight, external load, etc.) must be smaller than the capacity P which in this case is 1300 N.

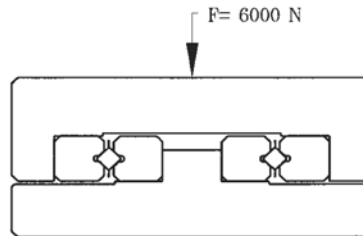


Fig. 11

Therefore:

$545,5 + 7,3 + 54,6 = 607,4$ N $607,4$ N < 1300 N

Thus our selection is verified positively.

Example 2

Loading condition as indicated in Fig. 12a and 12b.

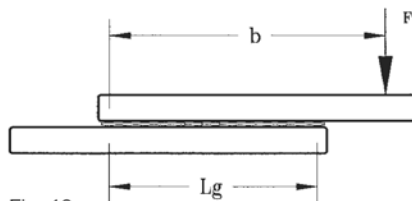


Fig. 12a

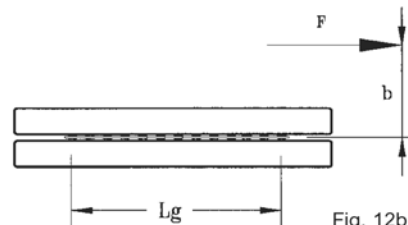


Fig. 12b

Rails, cages and stroke characteristics as in table TR6 310

- NR = 16
- NRP = $16:2 = 8$
- Preload = 8% (F3)
- Upper table weight = 45 N (F2)
- External load = 200 N (F)
- b = 300 mm
- $L_g = 180$ mm
- CTS = 2

This calculation is valid for both cases 12a e 12b

$$F1 = \frac{Fxb}{CxCTS} = \frac{200 \times 300}{180 \times 2} = 166,7 \text{ N}$$

$$F2 = 45 \text{ N}/16 = 2,8 \text{ N}$$

$$F3 = 8\% \times 166,7 \text{ N} = 13,3 \text{ N}$$

$$\Sigma F = F1 + F2 + F3 < C = 166,7 + 2,8 + 13,3 = 182,8 \text{ N} < 530 \text{ N}$$

where 530 N is the load rating for a roller diameter of 6 mm

(Table on Page 20)

This calculation is valid for the roller at the two extremities of the cage, thus it represents the worst condition. In addition, if only the roller of the extremities would be under load, both rails and structure would deform permanently.

Therefore, it is safe to assume that the load distribution is similar to the one depicted in Figure 13.

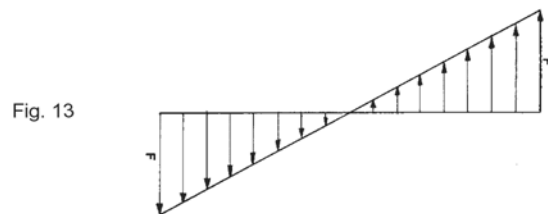


Fig. 13

Example 3

Loading condition as shown.

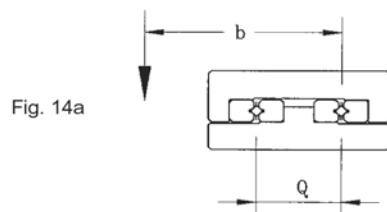


Fig. 14a

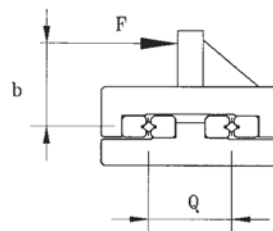


Fig. 14b

The rails, cages and stroke characteristics as in table TR3-155

b	= 120 mm
Q	= 28 mm
NR	= 21
NRP	= 21/2 = 10.5 (10)
Preload	= 10% (F3)
Upper table weight	= 7 N (F2)
P	= 130 N/Roller
F	= 160 N

$$F1 = \frac{Fxb}{QxNRP} = \frac{160 \times 120}{28 \times 10} = 68,6 \text{ N}$$

$$F2 = 0,33 \text{ N}$$

$$F3 = 10\% \times 68,6 = 6,86 \text{ N}$$

$$\Sigma F = F1 + F2 + F3 = 75,8 \text{ N} < 130 \text{ N}$$

where 130 N is the load rating for a roller diameter of 3 mm

(Table on Page 20)

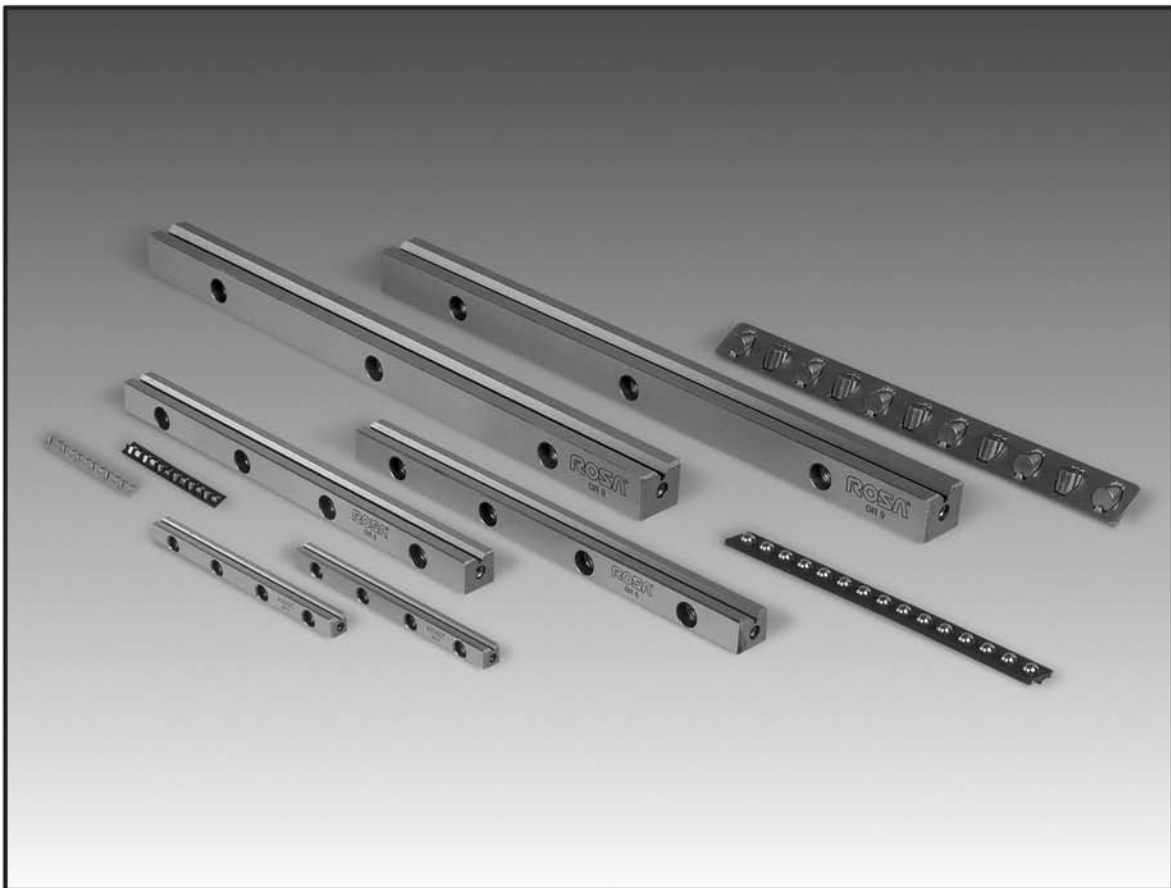
Therefore our system loading checks out.

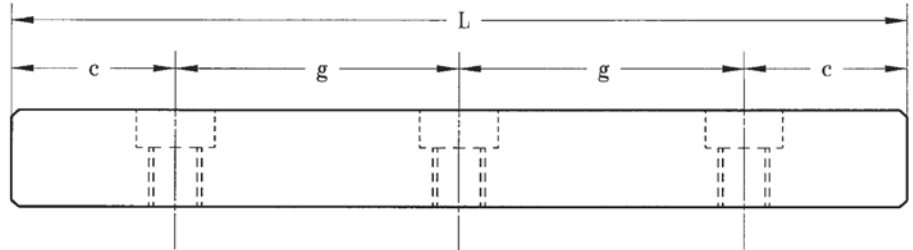
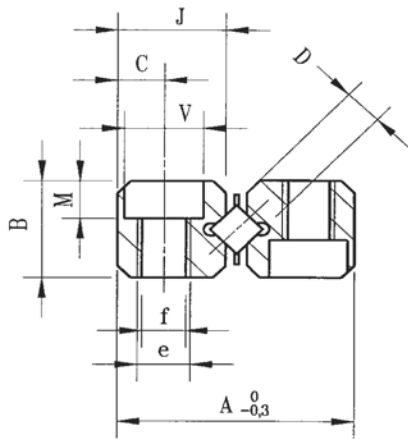
Note: For applications not shown, please refer to our Engineering office.

GR type linear system bearings could utilize either cross roller or ball as rolling elements. The two will differ substantially in load ratings. The ratio is approximately 10 to 1 in favor of rollers, depending upon the dimension under consideration.

Balls are more advantageous in case of presence of impurities and/or misalignment as it happens when the structure, to which rails are anchored, is not sturdy enough to support them and rails are not therefore placed in their correct position.

Such systems offer good load rating with respect to the cross section, length and relative stroke. They utilize different cages and end pieces depending upon the application.



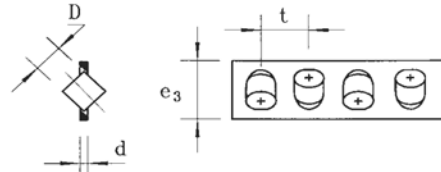


Designation	Rail Type	Rail Weight (g)	L	g	c	D	A	B	J	C	e	f	V	M
GR1	GR 1 020	02	20	1x10										
	GR 1 030	03	30	2x10										
	GR 1 040	04	40	3x10										
	GR 1 050	05	50	4x10										
	GR 1 060	06	60	5x10										
	GR 1 070	07	70	6x10	5	1,5	8,5	4	3,9	1,8	M2	1,65	3	1,4
	GR 1 080	08	80	7x10										
	GR 1 090	09	90	8x10										
	GR 1 100	10	100	9x10										
	GR 1 120	12	120	11x10										
GR 1 140	14	140	13x10											
GR2	GR 2 030	06	30	1x15										
	GR 2 045	09	45	2x15										
	GR 2 060	12	60	3x15										
	GR 2 075	15	75	4x15										
	GR 2 090	18	90	5x15										
	GR 2 105	22	105	6x15	7,5	2	12	6	5,5	2,5	M3	2,5	4,3	2,0
	GR 2 120	25	120	7x15										
	GR 2 135	28	135	8x15										
	GR 2 150	31	150	9x15										
	GR 2 180	37	180	11x15										
GR 2 210	44	210	13x15											
GR3	GR 3 050	23	50	1x25										
	GR 3 075	34	75	2x25										
	GR 3 100	45	100	3x25										
	GR 3 125	56	125	4x25										
	GR 3 150	67	150	5x25										
	GR 3 175	78	175	6x25	12,5	3	18	8	8,2	3,5	M4	3,3	6	3,2
	GR 3 200	89	200	7x25										
	GR 3 225	100	225	8x25										
	GR 3 250	111	250	9x25										
	GR 3 275	122	275	10x25										
GR 3 300	133	300	11x25											

Designation	Rail Type	Rail Weight (g)	L	g	c	D	A	B	J	C	e	f	V	M
GR6	GR 6 100	145	100	1x50										
	GR 6 150	220	150	2x50										
	GR 6 200	295	200	3x50										
	GR 6 250	370	250	4x50										
	GR 6 300	445	300	5x50										
	GR 6 350	520	350	6x50	25	6	31	15	13,9	6	M6	5,2	9,5	5,2
	GR 6 400	595	400	7x50										
	GR 6 450	670	450	8x50										
	GR 6 500	745	500	9x50										
	GR 6 550	815	550	10x50										
GR 6 600	885	600	11x50											
GR9	GR 9 200	630	200	1x100										
	GR 9 300	945	300	2x100										
	GR 9 400	1260	400	3x100										
	GR 9 500	1575	500	4x100										
	GR 9 600	1890	600	5x100										
	GR 9 700	2205	700	6x100	50	9	44	22	19,7	9	M8	6,8	10,5	6,2
	GR 9 800	2520	800	7x100										
	GR 9 900	2835	900	8x100										
	GR 9 1000	3150	1000	9x100										
	GR 9 1100	3465	1100	10x100										
GR 9 1200	3780	1200	11x100											
GR12	GR12 200	1040	200	1x100										
	GR12 300	1565	300	2x100										
	GR12 400	2090	400	3x100										
	GR12 500	2615	500	4x100										
	GR12 600	3140	600	5x100										
	GR12 700	3665	700	6x100	50	12	58	28	25,9	12	M10	8,5	13,5	8,2
	GR12 800	4190	800	7x100										
	GR12 900	4715	900	8x100										
	GR12 1000	5240	1000	9x100										
	GR12 1100	5765	1100	10x100										
GR12 1200	6290	1200	11x100											

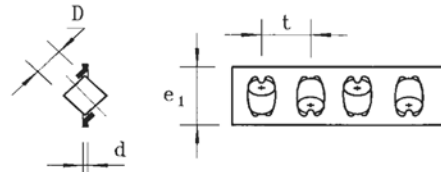
Typ CC

Non-captive crossroller cage for horizontal and vertical applications for rails GR1-GR2; only standard t pitch; material: brass.



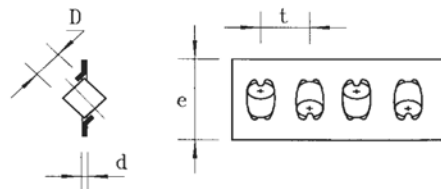
Typ AA

Cross roller cage for horizontal application. Sizes 2 ÷ 12; only standard t pitch; captive rollers; sheet metal.



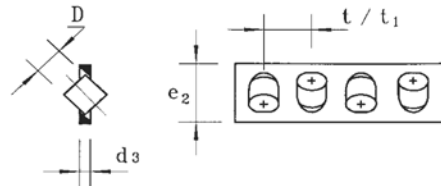
Typ BB

Cross roller cage for horizontal and vertical applications with Rails of different length with low speed. Sizes 3 ÷ 9; only standard t pitch; captive rollers; sheet metal.



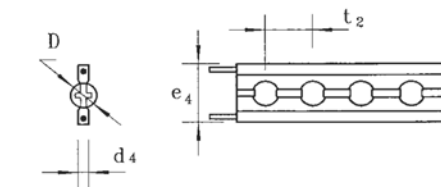
Typ DD

Cross roller cage for horizontal and vertical applications with high acceleration. Size 3 (Only standard t pitch) 6-9 (Standard t and reduced pitch t1) 12 (Only reduced pitch t1); non-captive rollers; brass.



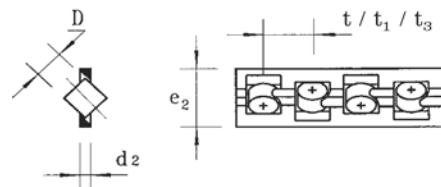
Typ PS

Captive ball cages for GR1 ÷ GR12 rails for horizontal and vertical applications; only t2 pitch; material: polyamide. PS6 ÷ PS12 reinforced with steel.



Typ PR

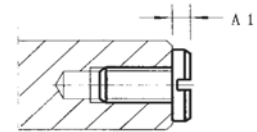
Captive cross roller for GR1 ÷ GR9 rails for horizontal and vertical applications; GR1 ÷ GR3 t pitch; GR6 t3 pitch and GR9 t1 pitch; material: polyamide.



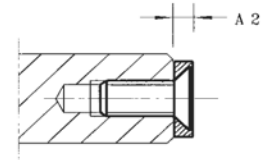
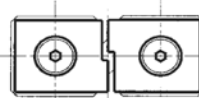
Designation	D	t	t1	t2	t3	d	d2	d3	d4	f*	e	e1	e2	e3	e4	G*	P (N)	
																	P roller	P ball
GR 1	1,5	3	-	2,2	-	0,5	0,5	-	0,45	-	-	-	3,8	3,5	3,5	-	50	9
GR 2	2	4	-	4	-	0,8	0,8	-	0,75	-	-	5,5	5,5	5,5	5	-	85	15
GR 3	3	5	-	4,2	-	0,5	1	1	1	1	12	7,5	7	-	7	13	130	25
GR 6	6	12	9	9	8,5	0,8	2,7	2,7	2,5	1,5	20	14	15	-	14	21	530	65
GR 9	9	18	14	14	-	1	4	3	3,2	2	30	19,5	20	-	20	32	1300	150
GR12	12	22	18	15,5	-	1,2	4	4	4	2,5	35	25	25	-	20	37	2500	260

*With reference to page 259 figure 10

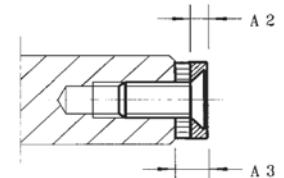
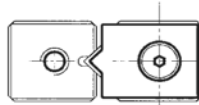
GA = For horizontal applications



GB = For horizontal and vertical applications with high accelerations (not available for GR1 rails)



GC = For horizontal and vertical applications with or without wipers. Mounted only on the longer rails (not available for GR1 ÷ GR2 rails)



Rail Type	GR1	GR2	GR3	GR6	GR9	GR12
A1	1,5	2	2	3	3	3
A2	–	3	2	3	4	5
A3	–	–	3	5	6	8

MOUNTING SCREWS WITH MODIFIED STEM

These screws offer the following advantages:

- Compensation for pitch errors in the supporting structure.
- Compensation for pitch variation during heat treating.
- Elimination of clearance through lateral screws.

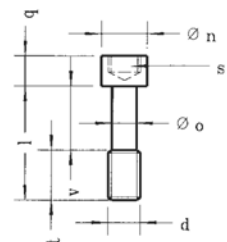
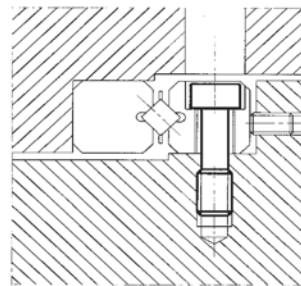


Fig. 15

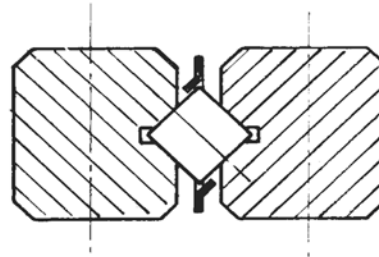
Dimension	GR3	GR6	GR9	GR12
l	12	20	30	40
Øn	5	8	8,5	11,3
Øo	2,3	3,9	4,6	6,25
d	M3	M5	M6	M8
q	3	5	6	8
v	7	12	18	23
t	5	8	12	17
s	2,5	4	5	6
Code	VM3	VM5	VM6	VM8

To simplify the ordering, thus the delivery, the following examples should be followed. We assumed, like in most cases, that one table utilizes 4 rails, 2 cages and 8 end pieces. Therefore, the information required should include:

- Number and type of rail
- Number and type of cage
- Number of rolling elements in each cage or cage length or stroke
- Number and type of end pieces
- Type of application (horizontal or vertical)

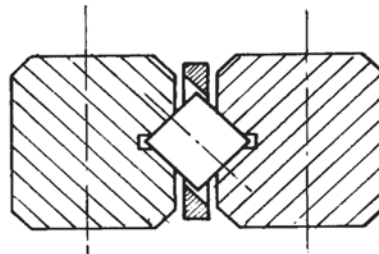
For horizontal movement (rollers)

System GR3 125 Stroke = 35 mm
4 Rails GR3 125
2 Cages AA3 with 21 rollers
8 End pieces GA3



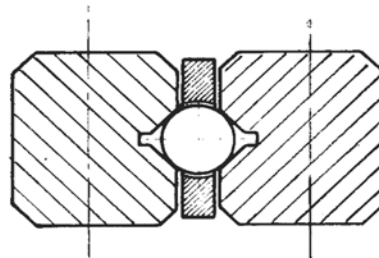
For vertical movement (Rollers)

System GR6 300 Stroke = 120 mm
4 Rails GR6 300
2 Cages DD6 with 20 rollers
8 End pieces GB6



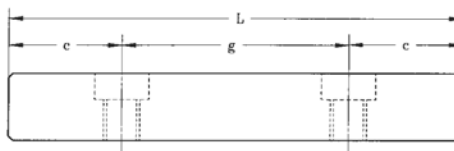
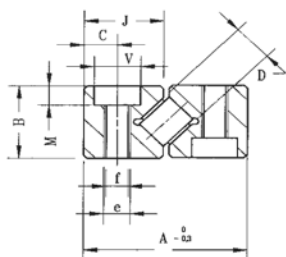
For horizontal & vertical movement (Balls) and wipers

System GR9 400 Stroke = 185 mm
Reduced Pitch t1
4 Rails GR9 400
2 Cages PS9 with 21 balls
4 End pieces with wiper GCT9



The present evolution of the GR type is passing through the realization of guideways that in spite of their smaller section are performing better features in respect of the carrying capacity and therefore of stiffness. This new kind of guideway named NG has two different sections whose dimensions are stated in the following page.





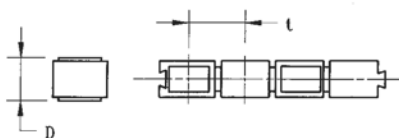
Denomination	Guideway type	Weight in g	L	g	c	D	A	B	J	C	e	f	V	M	
NG 4	NG 4 050	27	50	1x25											
	NG 4 075	41	75	2x25											
	NG 4 100	55	100	3x25											
	NG 4 125	69	125	4x25											
	NG 4 150	83	150	5x25											
	NG 4 175	97	175	6x25	12,5	4,5	19	9	9	3,5	M3	2,65	5,5	2,7	
	NG 4 200	111	200	7x25											
	NG 4 225	125	225	8x25											
	NG 4 250	139	250	9x25											
	NG 4 275	153	275	10x25											
NG 4 300	167	300	11x25												
NG 6	NG 6 100	92	100	3x25											
	NG 6 150	138	150	5x25											
	NG 6 200	184	200	7x25											
	NG 6 250	230	250	9x25	12,5	6,5	25	12	12	5	M4	3,3	7	3,2	
	NG 6 350	322	350	13x25											
	NG 6 400	368	400	15x25											

CAGES

Type BN

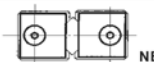
With retained rollers; for horizontal and vertical stroke
Material: delrin

Rail Type	Cage Type	t	D	C (N)
NG 4	BN 4	6,5	4,5	850
NG 6	BN 6	8,5	6,5	1800



END PIECES

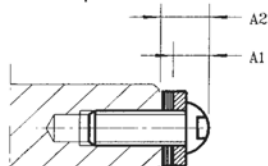
NB = for horizontal and vertical application



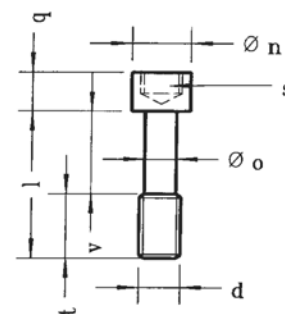
NC = for applications with guideways of different length.
They are mounted on the longest guideways.
They can be provided with race-wiper.



Rail Type	A1	A2
NG 4	4	5,5
NG 6	4	5,5



FIXING SCREWS

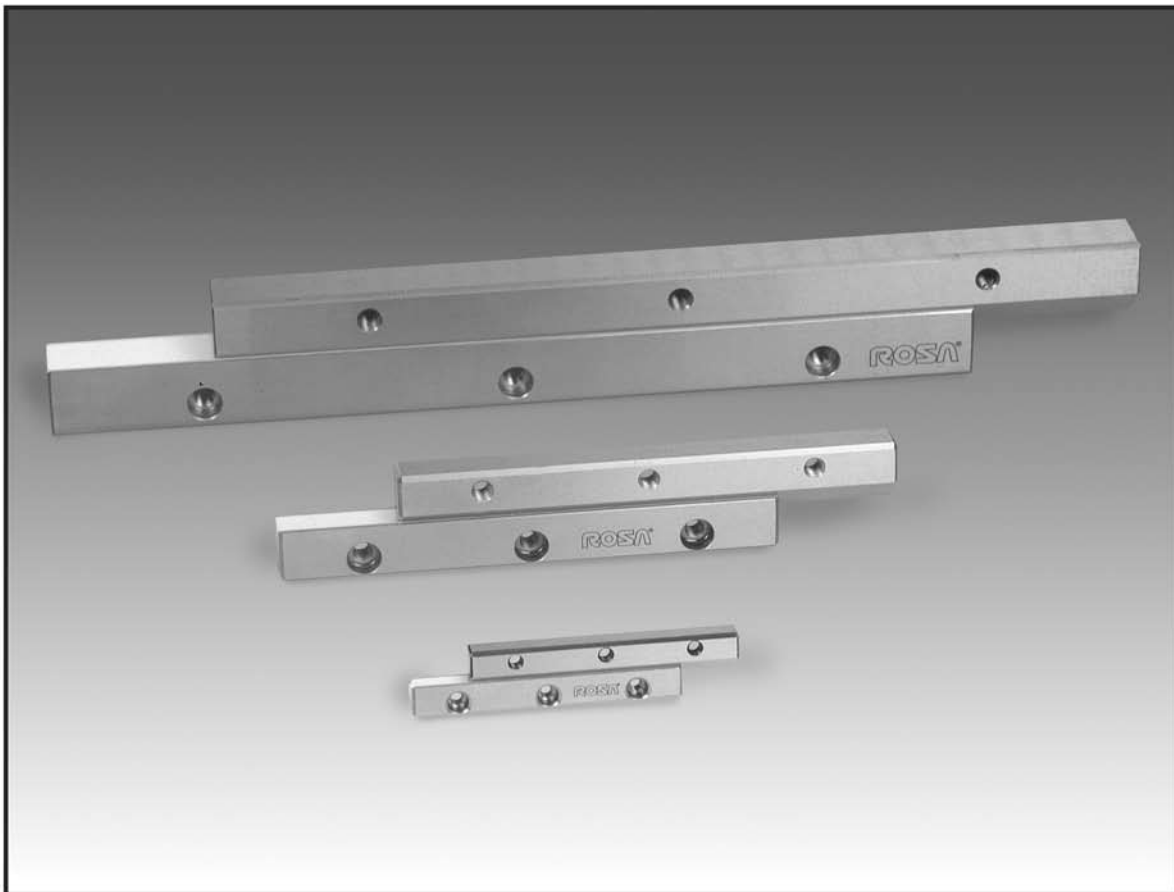


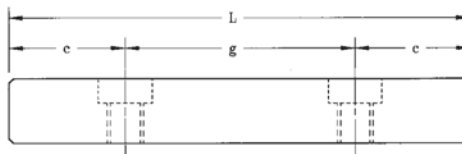
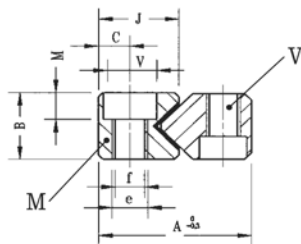
Dimensions	NG 4	NG 6
l	12	16
Øn	4,5	5,5
Øo	1,85	2,3
d	M2,5	M3
q	2,5	3
v	7	11
t	5	5
s	2	2,5
Code	VBN 4	VBN 6

M/V linear guideways have an antifriction material coating and keep identical characteristics than RVA's models (please, see page 278 for load capacity). As for the dimensions are concerned, they replace the guideways GR but clearly improving their stiffness. These dirt-proof units are used above all to exclude any vibration of the system.

Load capacity per unit in cm² changes from 4500 N (dynamic) ÷ 7500 N (static).

Rail type	Width of bearing surface
M3	0,3 cm
M6	0,6 cm
M9	1,2 cm
M12	1,6 cm



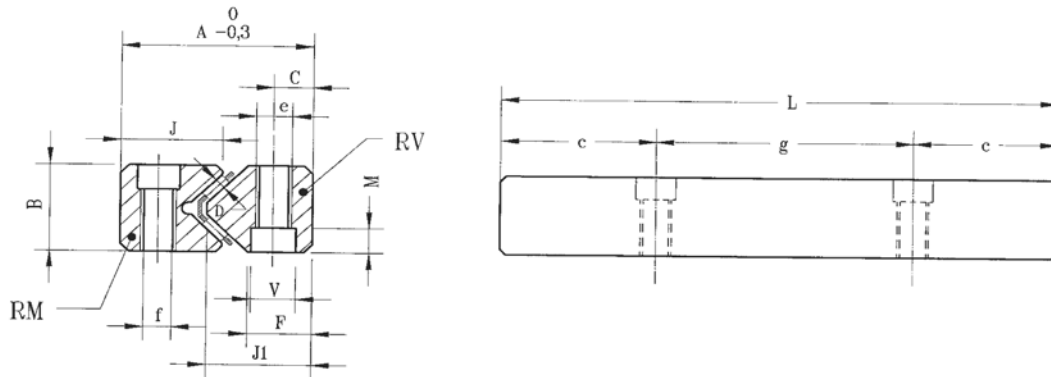


Denomination	Guideway type	Weight in g (M)	Weight in g (V)	L	g	c	A	B	J	J1	C	e	f	V	M
M/V	3 050	19	25	50	1x25	12,5	18	9	9	10,8	3,5	M4	3,3	6	3,1
	3 075	30	38	75	2x25										
	3 100	41	51	100	3x25										
	3 125	52	64	125	4x25										
	3 150	63	77	150	5x25										
	3 175	74	90	175	6x25										
	3 200	85	103	200	7x25										
	3 225	96	116	225	8x25										
	3 250	107	129	250	9x25										
	3 275	118	142	275	10x25										
3 300	130	155	300	11x25											
M/V	6 100	145	175	100	1x50	25	31	15	16	19,3	6	M6	5,3	10	5,2
	6 150	218	263	150	2x50										
	6 200	290	350	200	3x50										
	6 250	363	438	250	4x50										
	6 300	435	525	300	5x50										
	6 350	508	613	350	6x50										
	6 400	580	700	400	7x50										
	6 450	653	788	450	8x50										
6 500	725	875	500	9x50											
M/V	9 200	640	770	200	1x100	50	44	22	24	28	9	M8	6,8	11	6,2
	9 300	955	1156	300	2x100										
	9 400	1270	1543	400	3x100										
	9 500	1585	1930	500	4x100										
	9 600	1900	2316	600	5x100										
	9 700	2215	2703	700	6x100										
	9 800	2530	3089	800	7x100										
	9 900	2845	3476	900	8x100										
9 1000	3160	3862	1000	9x100											
M/V	12 200	1130	1224	200	1x100	50	58	28	33	35,5	12	M10	8,5	15	8,2
	12 300	1690	1836	300	2x100										
	12 400	2250	2448	400	3x100										
	12 500	2810	3060	500	4x100										
	12 600	3370	3672	600	5x100										
	12 700	3930	4284	700	6x100										
	12 800	4490	4896	800	7x100										
	12 900	5050	5508	900	8x100										
	12 1000	5610	6120	1000	9x100										
	12 1100	6175	6732	1100	10x100										
	12 1200	6740	7244	1200	11x100										

The same calculation criteria used for GR rails is valid for the rails RM/RV. However, the different cage designs (plastic for horizontal application and brass for both horizontal & vertical applications) should be accounted for.

- 1) Higher load ratings
- 2) Higher rigidity
- 3) Better overlapping of the rollers, especially in case of short stroke
- 4) Higher sensibility to mounting errors and impurities.





Designation	Rail Type	Type RM weight (g)	Type RV weight (g)	L	g	c	D	A	B	F	J ₁	J	C	e	f	V	M		
RM/RV	92025- 200	685	695	200	1x100														
	92025- 300	1020	1030	300	2x100														
	92025- 400	1355	1365	400	3x100														
	92025- 500	1690	1700	500	4x100														
	92025- 600	2025	2035	600	5x100														
	92025- 700	2360	2370	700	6x100	50	2	44	22	15	24,5	24	9	M8	6,8	10,5	6,2		
	92025- 800	2695	2705	800	7x100														
	92025- 900	3030	3040	900	8x100														
	92025-1000	3365	3375	1000	9x100														
	92025-1100	3700	3710	1100	10x100														
92025-1200	4035	4045	1200	11x100															
RM/RV	2025- 200	900	900	200	1x100														
	2025- 300	1365	1350	300	2x100														
	2025- 400	1830	1800	400	3x100														
	2025- 500	2295	2250	500	4x100														
	2025- 600	2760	2700	600	5x100														
	2025- 700	3225	3150	700	6x100	50	2	52	25	18	29	28	10	M10	8,5	13,5	8,2		
	2025- 800	3690	3600	800	7x100														
	2025- 900	4155	4050	900	8x100														
	2025-1000	4620	4500	1000	9x100														
	2025-1100	5085	4950	1100	10x100														
2025-1200	5550	5400	1200	11x100															
RM/RV	2535- 300	1905	1965	300	2x100														
	2535- 400	2540	2620	400	3x100														
	2535- 500	3175	3275	500	4x100														
	2535- 600	3810	3930	600	5x100														
	2535- 700	4445	4585	700	6x100	50	2,5	62	30	22	35	34	12	M12	10,5	16,5	10,2		
	2535- 800	5080	5240	800	7x100														
	2535- 900	5715	5895	900	8x100														
	2535-1000	6350	6650	1000	9x100														
	2535-1100	6985	7205	1100	10x100														
	2535-1200	7620	7860	1200	11x100														
RM/RV	3045- 400	3660	3460	400	3x100														
	3045- 500	4575	4325	500	4x100														
	3045- 600	5490	5190	600	5x100														
	3045- 700	6405	6055	700	6x100														
	3045- 800	7320	6920	800	7x100	50	3	74	35	25	40	42,5	14	M14	12,5	18,5	12,2		
	3045- 900	8235	7785	900	8x100														
	3045-1000	9150	8650	1000	9x100														
	3045-1100	10065	9515	1100	10x100														
	3045-1200	10980	10380	1200	11x100														
	RM/RV	3555- 500	6170	6100	500	4x100													
3555- 600		7410	7320	600	5x100														
3555- 700		8650	8540	700	6x100														
3555- 800		9890	9760	800	7x100														
3555- 900		11130	10980	900	8x100	50	3,5	78	45	25	45	45	14	M14	12,5	18,5	12,2		
3555-1000		12370	12200	1000	9x100														
3555-1100		13610	13420	1100	10x100														
3555-1200		14850	14640	1200	11x100														

The supply of RM and RV rails as one single piece up to a maximum length of 1600 mm is also available.

Rails type RM/RV can be equipped with needle cages. The cages are made of plastic and brass. The plastic cages are molded in single elements which can be assembled by means of dovetail snap in ends.

They are indicated for use in horizontal applications. This type of cage is supplied in the flat state. The angle necessary during assembly can be obtained by submerging the cage in oil at 80°C and cooling it.

For vertical applications the brass cage HW is recommended. The rollers in the cages are selected within 0.001 mm.

DETERMINATION OF CAGE LENGTH & LOAD RATING WITH PROTRUDING CAGES

The type in exam is RM/RV 2025-500. The stroke is 200 mm and the load 15.000 N.

For the calculation of the cage length, the formula $L_g = L - C/2$ is valid.

Thus, $L_g = 500 - 200/2 = 400$ mm.

As we previously state, the cage FF is supplied as single elements thus, each element length is assumed as the pitch which yields:

NE (number of elements) = $L_g/t = 400/32$ thus 12.5.

Therefore, if the rating for each element is 8680 N the system rating will be 104.160 N.

The condition $P > F$: $104.160 > 15.000$ N should also be verified.

If the table was mounted vertically, the cage type HW should have been chosen.



Fig. 16

Rail type	Cage	Ø D	b ₁	S	t	a	N° rollers x t	P/t (N)
9 2025-2025	FF2025 zw	2	6,8	15	32	2	7	8680
2535	FF2535 zw	2,5	9,8	20,5	45	2,4	8	17920
3045	FF3045 zw	3	13,8	26	60	3	9	33750
3555	FF3555 zw	3,5	17,8	31,5	75	3,2	10	55000

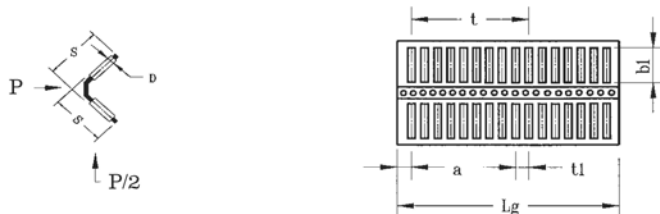


Fig. 17

Rail type	Cage	Ø D	b ₁	S	t	t ₁	a	N° rollers x t	P/t (N)
9 2025-2025	HW15	2	6,8	15	32	4,5	2	7	8680
2535	HW20	2,5	9,8	20,5	45	5,5	2,4	8	17920
3045	HW25	3	13,8	26	60	6	3	9	33750
3555	HW30	3,5	17,8	31,5	75	7	3,2	10	55000

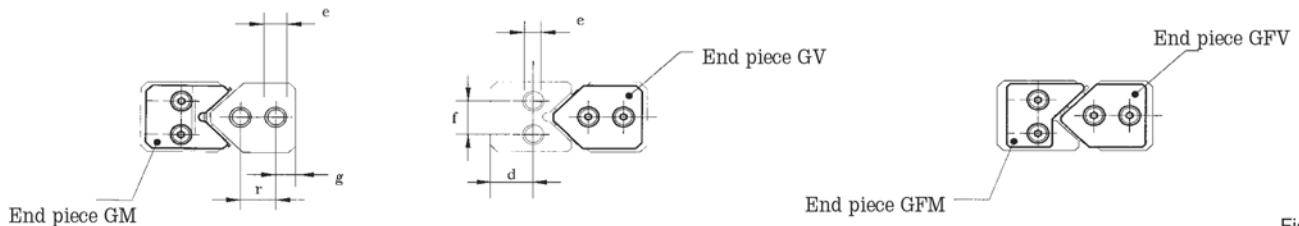
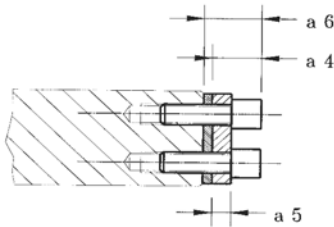


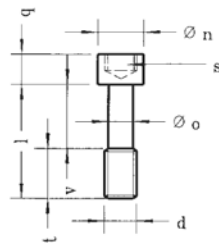
Fig. 18

* GM and GV endpieces cannot be mounted together



	RM/RV 9-2025	RM/RV 2025	RM/RV 2535	RM/RV 3045	RM/RV 3555
a4	8	9	11	11	11
a5	4	3	3	3	3
a6	10	11	13	13	13
e	M4	M6	M6	M6	M6
f	10	14	18	19	29
r	10	11	12	16	20
d	11	12	15	18	18
g	6	7	8	10	12

FIXING SCREWS



	RM/RV 9 2025	RM/RV 2025	RM/RV 2535	RM/RV 3045	RM/RV 3555
l	30	40	40	50	60
Ø n	8,5	11,3	13,9	15,8	15,8
Ø o	4,6	6,25	7,9	9,5	9,5
d	M6	M8	M10	M12	M12
q	6	8	10	12	12
v	18	23	22	25	35
t	12	17	18	25	25
s	5	6	8	10	10
Code	VM6	VM8	VM10	VM12	VM12/L

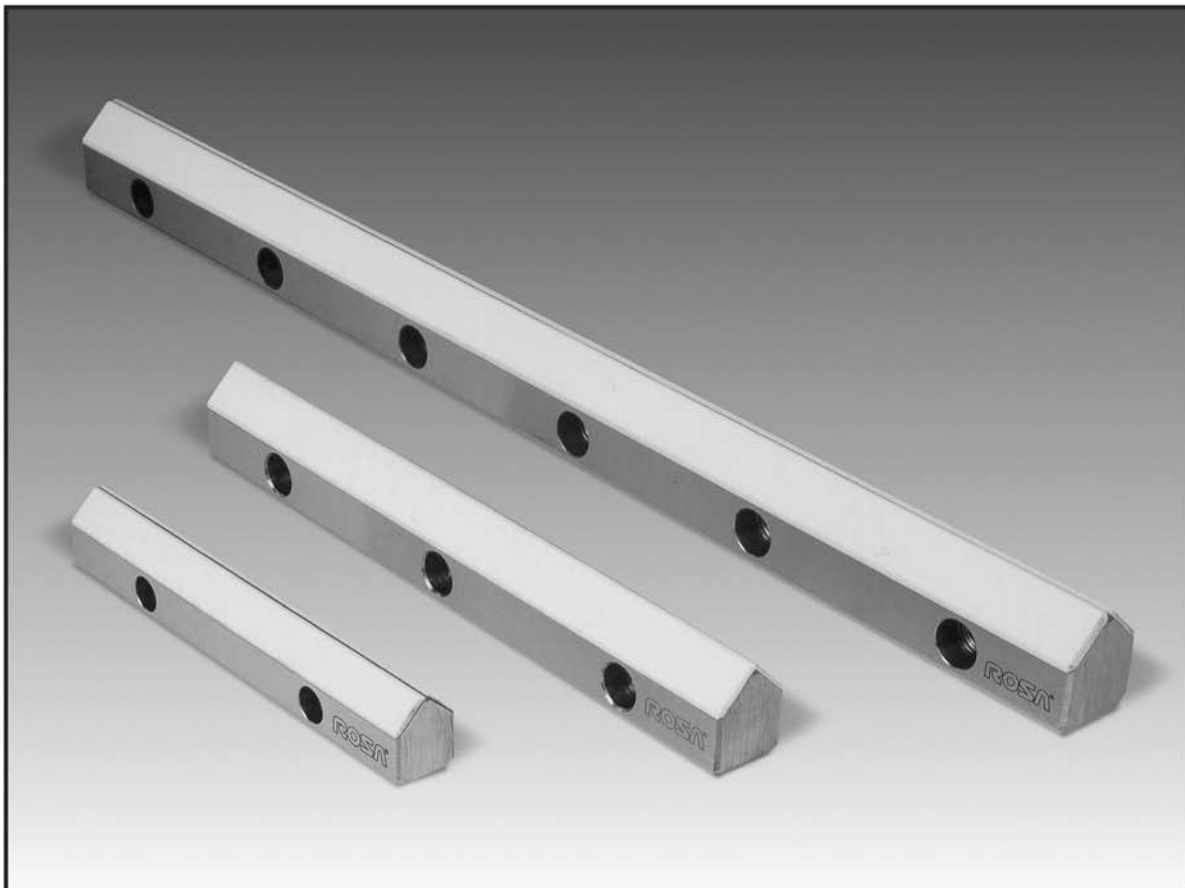
ORDERING EXAMPLE

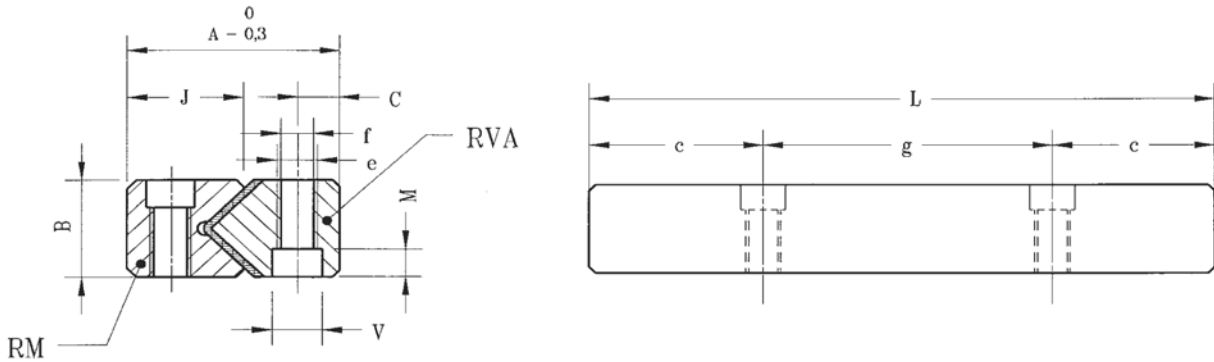
For vertical movement rails type RM/RV 2535-700 stroke = 480 mm.
 2 rails type RM 2535-700
 2 rails type RV 2535-700
 2 cages type HW 20 LG = 460 mm
 4 end pieces type GM 2535

For horizontal & vertical movement - rails of different length type RM 3045-400 match
 with rails type RV 3045-800 stroke = 400 mm.
 2 rails type RM 3045-400 chamfered
 2 rails type RV 3045-800
 2 cages type HW 25 Lg = 600 mm
 4 end pieces type GV 3045

This rail type completes the system RM/RV. The RVA has the raceways coated with antifriction material. This type is used when the speed is relatively low (20 m/min max) and the rigidity of the system is critical. A set is composed of two rails RM and two rails RVA. The rails RVA and RV are dimensionally interchangeable. In order to have a good functioning, the temperature of working must be inferior to 50°. Load capacity per unit in cm² changes from 4500 N (dynamic) ÷ 7500 N (static). Holes and oil grooves can be carried out on request on the type RVA rails.

Rail type	Width of the bearing surface
RVA 9 2025	1,05 cm
RVA 2025	1,15 cm
RVA 2535	1,5 cm
RVA 3045	1,75 cm
RVA 3555	2,45 cm



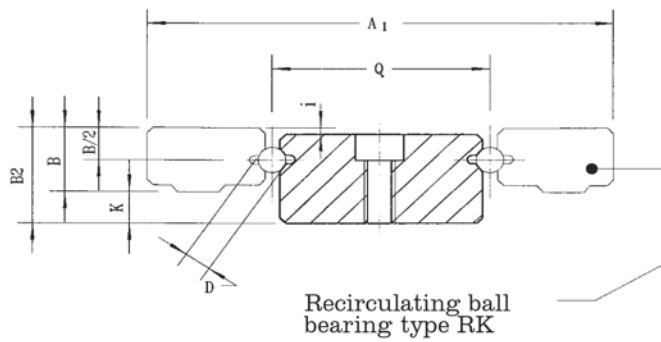
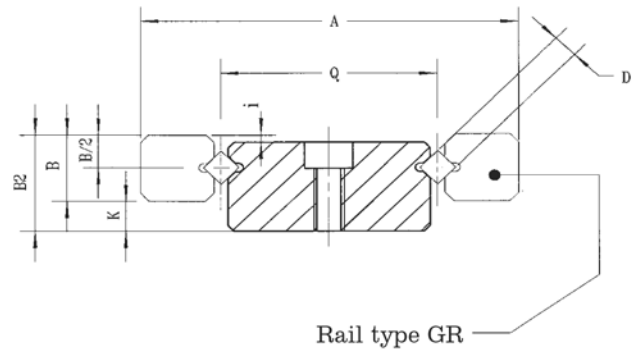


Rail type RM	Rails type RVA	Type RM weight (g)	Type RVA weight (g)	L	g	c	A	B	J	C	e	f	V	M
92025- 200	92025-200	685	695	200	1x100									
92025- 300	92025-300	1020	1030	300	2x100									
92025- 400	92025-400	1355	1365	400	3x100									
92025- 500	92025-500	1690	1700	500	4x100									
92025- 600	92025-600	2025	2035	600	5x100									
92025- 700		2360		700	6x100	50	44	22	24	9	M8	6,8	10,5	6,2
92025- 800		2695		800	7x100									
92025- 900		3030		900	8x100									
92025-1000		3365		1000	9x100									
92025-1100		3700		1100	10x100									
92025-1200		4035		1200	11x100									
2025- 200	2025-200	900	900	200	1x100									
2025- 300	2025-300	1350	1350	300	2x100									
2025- 400	2025-400	1830	1800	400	3x100									
2025- 500	2025-500	2295	2250	500	4x100									
2025- 600	2025-600	2760	2700	600	5x100									
2025- 700		3225		700	6x100	50	52	25	28	10	M10	8,5	13,5	8,2
2025- 800		3690		800	7x100									
2025- 900		4155		900	8x100									
2025-1000		4620		1000	9x100									
2025-1100		5085		1100	10x100									
2025-1200		5550		1200	11x100									
2535- 300	2535-300	1905	1965	300	2x100									
2535- 400	2535-400	2540	2620	400	3x100									
2535- 500	2535-500	3175	3275	500	4x100									
2535- 600	2535-600	3810	3930	600	5x100									
2535- 700		4445		700	6x100	50	62	30	34	12	M12	10,5	16,5	10,2
2535- 800		5080		800	7x100									
2535- 900		5715		900	8x100									
2535-1000		6350		1000	9x100									
2535-1100		6985		1100	10x100									
2535-1200		7620		1200	11x100									
3045- 400	3045-400	3660	3460	400	3x100									
3045- 500	3045-500	4575	4325	500	4x100									
3045- 600	3045-600	5490	5190	600	5x100									
3045- 700		6405		700	6x100									
3045- 800		7320		800	7x100	50	74	35	42,5	14	M14	12,5	18,5	12,2
3045- 900		8235		900	8x100									
3045-1000		9150		1000	9x100									
3045-1100		10065		1100	10x100									
3045-1200		10980		1200	11x100									
3555- 500	3555-500	6170	6100	500	4x100									
3555- 600	3555-600	7410	7320	600	5x100									
3555- 700		8650		700	6x100									
3555- 800		9890		800	7x100	50	78	45	45	14	M14	12,5	18,5	12,2
3555- 900		11130		900	8x100									
3555-1000		12370		1000	9x100									
3555-1100		13610		1100	10x100									
3555-1200		14850		1200	11x100									

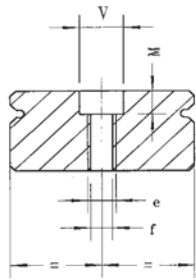
The supply of RM rails as one single piece up to a maximum length of 1600 mm is also available.

The rails type "GRD" have been designed to simplify assemblies and to increase structural rigidity. They can be used with the table TR and TRL upper portion to increase the economical benefits. They are an integral component of recirculating systems TRKD.

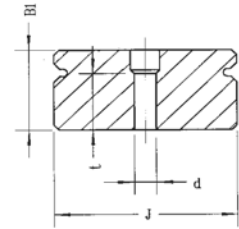
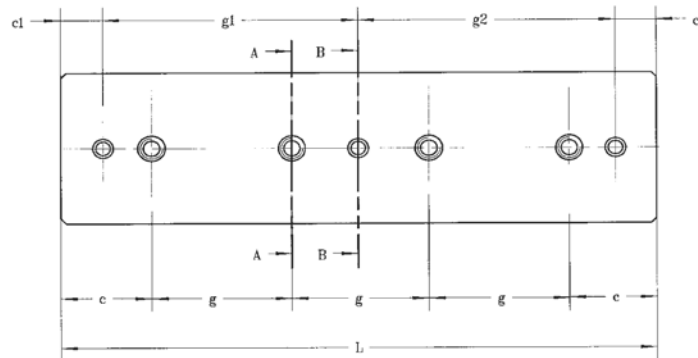




Designation	K	i	D	Q	B ₂	B	A ₁	A
GRD3 200 GRD3 300 GRD3 400 GRD3 500	4	0,5	3	28	12	8	57	46
GRD6 200 GRD6 300 GRD6 400 GRD6 500 GRD6 600 GRD6 700 GRD6 800 GRD6 900 GRD6 1000	5	1	6	45	20	15	94	76
GRD9 300 GRD9 400 GRD9 500 GRD9 600 GRD9 700 GRD9 800 GRD9 900 GRD9 1000	6	1	9	72	28	22	150	116



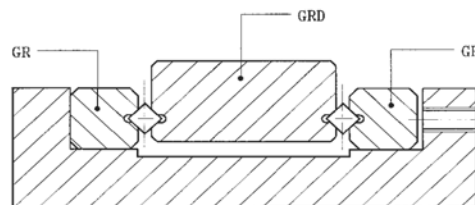
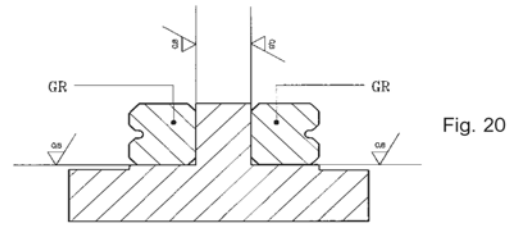
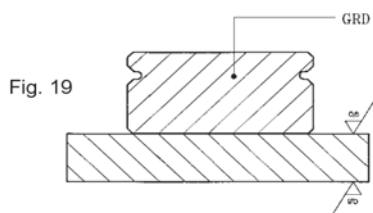
A - A



B - B

Designation	L	g	c	e	f	V	M	J	B ₁	g ₁	g ₂	c ₁	d	t
GRD3 200	200	3x50								1x175				
GRD3 300	300	5x50	25	M5	4,2	7,5	4,2	26,6	11,5	125	150	12,5	3	6,5
GRD3 400	400	7x50								187,5	187,5			
GRD3 500	500	9x50								225	250			
GRD6 200	200	1x100								1x150				
GRD6 300	300	2x100								1x250				
GRD6 400	400	3x100								175	175			
GRD6 500	500	4x100								210	240			
GRD6 600	600	5x100	50	M6	5,2	9,5	5,2	41,8	19	275	275	25	6	12
GRD6 700	700	6x100								310	340			
GRD6 800	800	7x100								375	375			
GRD6 900	900	8x100								410	440			
GRD6 1000	1000	9x100								475	475			
GRD9 300	300	2x100								1x250				
GRD9 400	400	3x100								175	175			
GRD9 500	500	4x100								210	240			
GRD9 600	600	5x100								275	275			
GRD9 700	700	6x100	50	M8	6,8	10,5	6,2	67,4	27	310	340	25	8	16
GRD9 800	800	7x100								375	375			
GRD9 900	900	8x100								410	440			
GRD9 1000	1000	9x100								475	475			

The rails "GRD" have been designed to eliminate the operations required to prepare the structure on which one normally would mount rails type "GR" (Fig. 20). They help to reduce assembly time and cost. In fact, it is sufficient to provide a ground surface upon which the rail "GRD" is mounted. They could be also used as a mobile portion as depicted in Fig. 21.



The recirculating linear ball bearings type "RK" are mainly composed of three parts. The former is a central body in coro hardened steel (hardness HRC 60 ± 2) whose purpose is to hold the charge. The balls are conveyed to the V-shaped rolling track of the rail, suitably kept by a polyamide block as to hold and give them the direction.

The recirculating linear ball bearings "RK", once coupled with rails "GR" or "GRD", allow linear movements limited only by the length of the rails themselves.

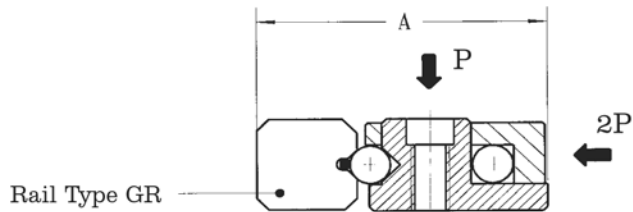
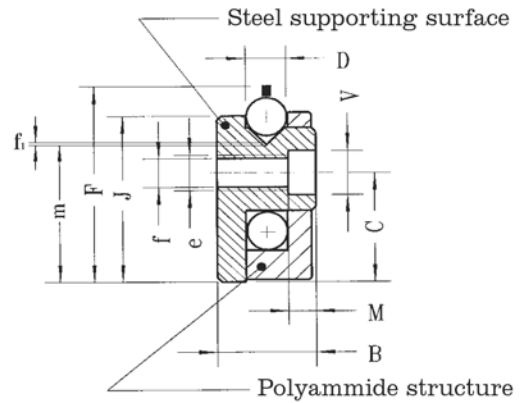
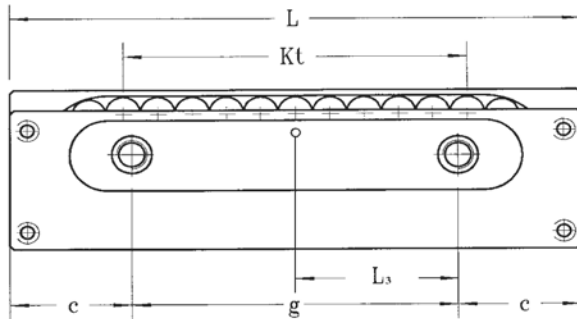
It is important to mention the possibility to use on the same way, several units with independent motion.

Max. admitted speed: 120 m/min.

Max. admitted acceleration: 50 m/sec²

The recirculating linear ball bearings "RK" (size 6 ÷ 9) can be supplied with damping elements (RKD) to reduce the noisiness. This reduce however the load capacity.





Rail Type GR

Ball bearings type	RK3075	RK6100	RKD6100	RK6150	RKD6150	RK9150	RKD9150	RK9200	RKD9200
L	75	100	100	150	150	150	150	200	200
B	8	15	15	15	15	22	22	22	22
F	16,9	29	29	29	29	45,2	45,2	45,2	45,2
g	25	50	50	2x50	2x50	100	100	100	100
c	25	25	25	25	25	25	25	50	50
J	14,7	25,7	25,7	25,7	25,7	38,7	38,7	38,7	38,7
C	9	15	15	15	15	26	26	26	26
e	M4	M6	M6	M6	M6	M8	M8	M8	M8
f	3,3	5,2	5,2	5,2	5,2	6,8	6,8	6,8	6,8
V	6	9,5	9,5	9,5	9,5	10,5	10,5	10,5	10,5
M	3,2	5,2	5,2	5,2	5,2	6,2	6,2	6,2	6,2
D	3	6	6	6	6	9	9	9	9
Kt	48	60	60	102	102	90	90	144	144
Max. allowable Load (N)	425	715	650	1170	1100	1650	1500	2550	2400
A	23,5	40	40	40	40	61	61	61	61
L ₃	12,5	25	25	25	25	50	50	50	50
m	11,5	19,7	19,7	19,7	19,7	32,4	32,4	32,4	32,4
f ₁	∅ 1,5	∅ 2	∅ 2	∅ 2	∅ 2	∅ 3	∅ 3	∅ 3	∅ 3

The rails shown below are custom made. Such types are largely used by makers of large machine tools as raceways for recirculating roller bearings. To utilize the recirculating roller bearings to their maximum potential, the raceways must have the following characteristics:

- 1) Hardness 60 ± 2 HRC
- 2) Parallelism deviation contained within 0.01 mm over length of 1700 millimeters
- 3) Surface texture of 0.3 Ra

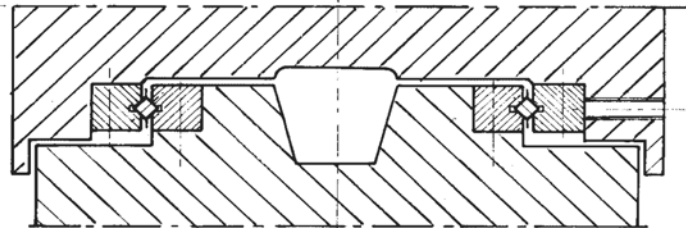
The rails produced by ROSA guarantee these characteristics in addition to interchangeability.

By not using rails, machine manufacturers may incur inconveniences which may be summarized as follows:

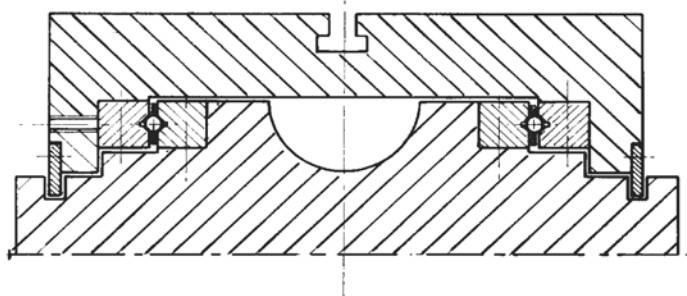
- 1) It is not always possible to heat treat machine bases.
- 2) By deriving raceways on casted basements, the limitation is represented by the heat treating method such as induction hardening, which is not suitable for use with recirculating roller bearings.
- 3) To grind raceways on a very long basement, it is necessary to use a very long machine which is very costly and not always available.



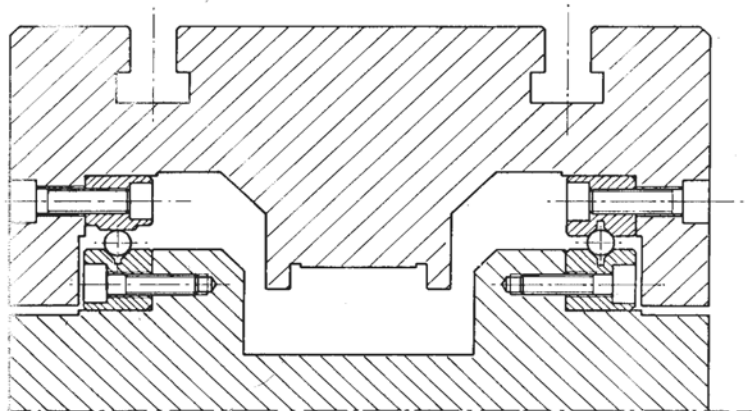
Applications of cross roller way GR type (closed arrangement system)



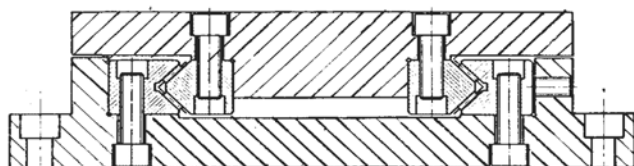
Application of ball way system GR type (closed arrangement)



Application of ball way system with rails type GR & T (open arrangement)



Application of needle way system RM/RV type (closed arrangement)



Tables type TR1-2 are derived from steel and tables type TR3-6-9 are derived from cast iron castings. They provide a clear example of applications for "GR" systems. They are carefully machined and molded to provide high precision movement. They are standardized for stroke of 10 to 950 mm and load rating of 250 N to 48100 N. The base is provided with standardized holes for mounting. The mobile portion can be used to support predetermined tooling.

The customer can drill and thread the surface to suit his application to do so, the table should be disassembled. If this is not possible, the holes should be blind and care should be taken to insure protection to avoid chip penetration. Each table utilizes rails and cages suitable to its application.

On the table type TR9 it is possible to use rails RM/RV 92025 in order to increase the table load capacity.



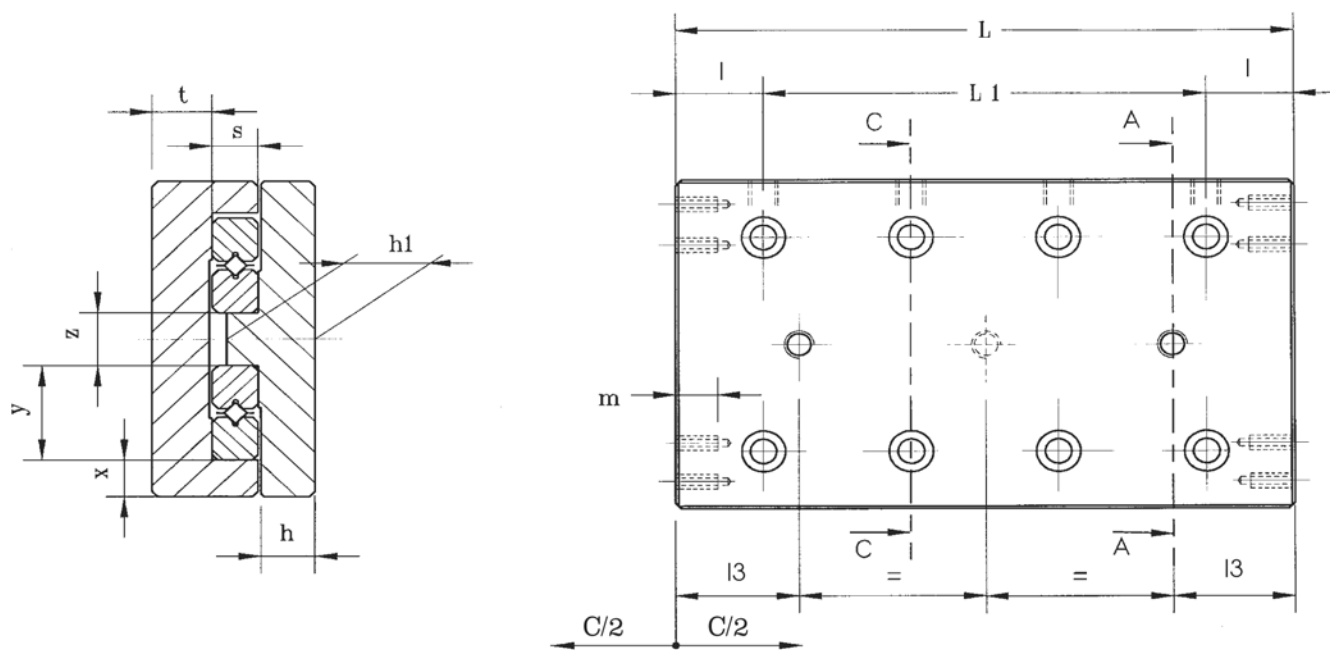


Table designation	Stroke C	L(±0,1)	L ₁	Ø Roller	h	h ₁	l	l ₃	m	s	t	x	y	z
TR1 25	10	25	1x10	1,5	5,5	9	7,5	2,5	6	4	7	3,8	8,5	5
TR1 35	18	35	2x10					4,5						
TR1 45	25	45	3x10					6						
TR1 55	32	55	4x10					7,5						
TR1 65	40	65	5x10					8,5						
TR1 75	45	75	6x10					11						
TR1 85	50	85	7x10					13,5						
TR1 95	55	95	8x10					16						
TR1 105	60	105	9x10					18,5						
TR2 35	18	35	1x15	2	6,5	11	10	3	6	6	7,8	4,8	12	6
TR2 50	30	50	2x15					4,5						
TR2 65	40	65	3x15					7						
TR2 80	50	80	4x15					9,5						
TR2 95	60	95	5x15					12						
TR2 110	70	110	6x15					14,5						
TR2 125	80	125	7x15					17						
TR2 140	90	140	8x15					19,5						
TR2 155	100	155	9x15					22						

Standardized drilling on the upper structure as per drawing and quote above for TRL1 - TRL2 (B execution).

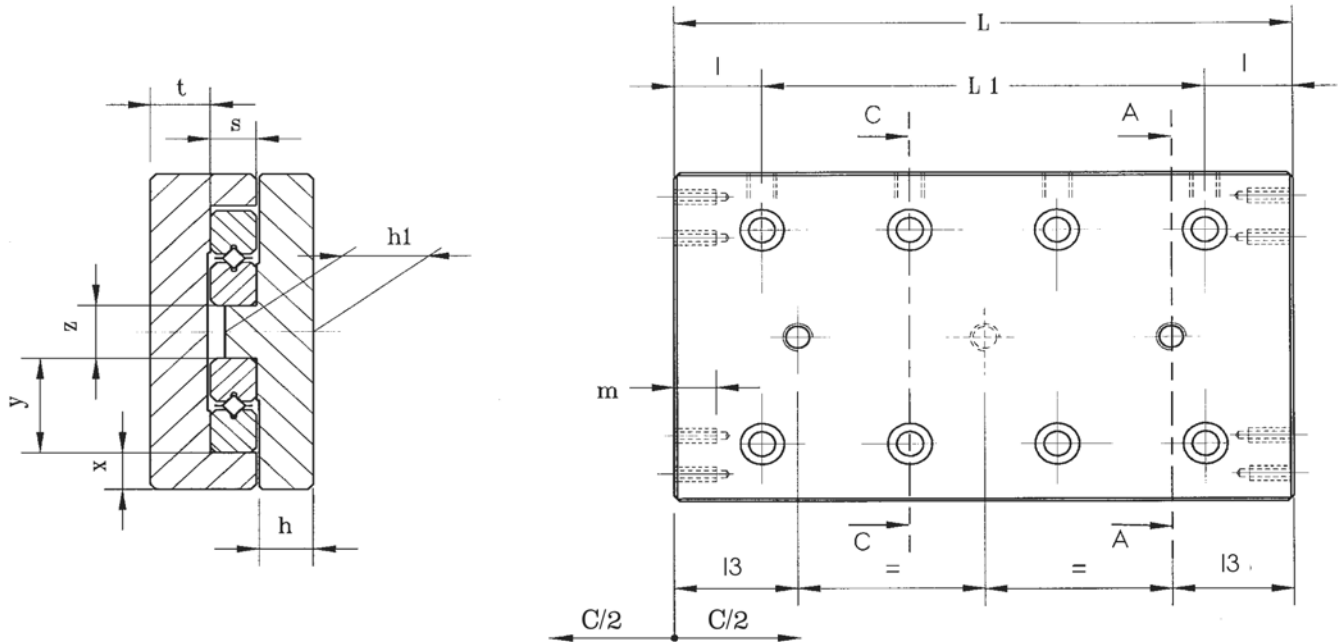


Table designation	Stroke C	L(±0,1)	L ₁	∅ Roller	h	h ₁	l	l ₃	m	s	t	x	y	z
TR3 55	30	55	1x25					5,5						
TR3 80	45	80	2x25					10,5						
TR3 105	60	105	3x25					15,5						
TR3 130	75	130	4x25	3	9	15	15	20,5	7	8	10,5	7	18	10
TR3 155	90	155	5x25					25,5						
TR3 180	105	180	6x25					30,5						
TR3 205	130	205	7x25					30,5						
TR6 110	60	110	1x50					16						
TR6 160	95	160	2x50					23,5						
TR6 210	130	210	3x50					31,5						
TR6 260	165	260	4x50	6	13	22	30	38,5	8	15	16	12	31	14
TR6 310	200	310	5x50					46,5						
TR6 360	235	360	6x50					53,5						
TR6 410	265	410	7x50					63,5						
TR9 210	130	210	1x100					27						
TR9 310	180	310	2x100					52						
TR9 410	350	410	3x100					17						
TR9 510	450	510	4x100					17						
TR9 610	550	610	5x100	9	16	29	55	17	10	22	21	14,5	44	28
TR9 710	650	710	6x100					17						
TR9 810	750	810	7x100					17						
TR9 910	850	910	8x100					17						
TR9 1010	950	1010	9x100					17						

Standardized drilling on the upper structure as per drawing and quote above for TRL3 - TRL6 (B execution).

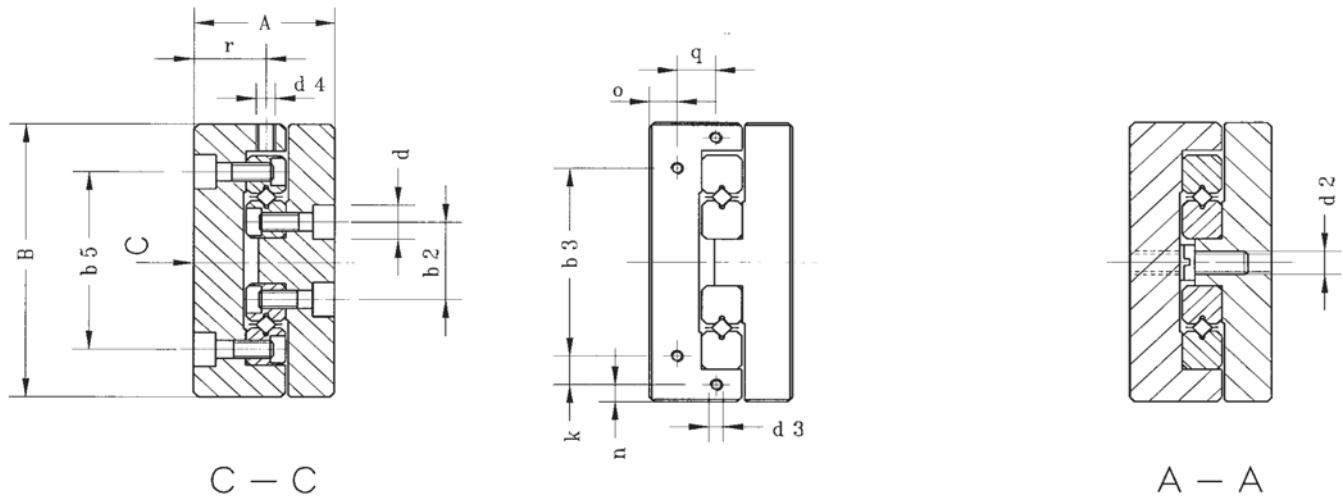


Table designation	A	B	b ₅	b ₂	b ₃	d	d ₂	d ₃	d ₄	k	n	o	q	r	Maximum allowable load (N)	Table weight (Kg)
TR1 25	17±0,1	30 ^{+0,1} _{-0,4}	18,4	8,6	12	4,1	M2	M2	M2,5	-	-	3,5	-	9	250	0,080
TR1 35															350	0,116
TR1 45															450	0,150
TR1 55															550	0,179
TR1 65															650	0,213
TR1 75															750	0,246
TR1 85															900	0,278
TR1 95															1000	0,312
TR1 105															1150	0,349
TR2 35	21±0,1	40 ^{+0,1} _{-0,4}	25	11	16	6	M3	M2	M3	-	-	3,5	-	11	425	0,183
TR2 50															595	0,263
TR2 65															850	0,348
TR2 80															1020	0,425
TR2 95															1275	0,504
TR2 110															1445	0,586
TR2 125															1700	0,670
TR2 140															1870	0,750
TR2 155															2125	0,832

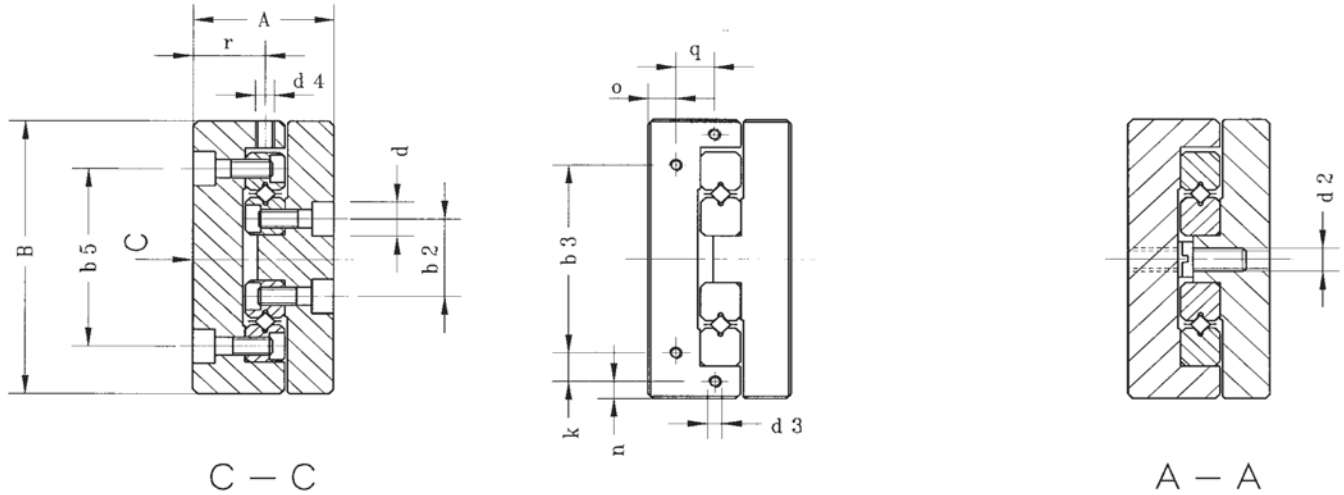


Table designation	A	B	b ₅	b ₂	b ₃	d	d ₂	d ₃	d ₄	k	n	o	q	r	Maximum allowable load (N)	Table weight (Kg)
TR3 55	28±0,1	60 ^{+0,1} _{-0,4}	39	17	40	7,5	M4	M3	M4	-	-	5,5	-	14,5	910	0,57
TR3 80															1300	0,8
TR3 105															1820	1,3
TR3 130															2210	1,26
TR3 155															2730	1,49
TR3 180															3120	1,72
TR3 205															3510	1,95
TR6 110	45±0,1	100±0,2	64	26	60	11	M5	M4	M5	16	4	8	15	23,5	3710	3,07
TR6 160															5830	4,46
TR6 210															7420	5,85
TR6 260															9540	7,24
TR6 310															11660	8,63
TR6 360															13250	10,02
TR6 410															15370	11,41
TR9 210	60±0,1	145±0,2	98	46	90	14,5	M8	M4	M6	22,5	5	11	20	32	11700	11,8
TR9 310															18200	17,3
TR9 410															20800	22,8
TR9 510															24700	28,3
TR9 610															29900	33,8
TR9 710															33800	39,3
TR9 810															39000	44,8
TR9 910															42900	50,3
TR9 1010															48100	55,8

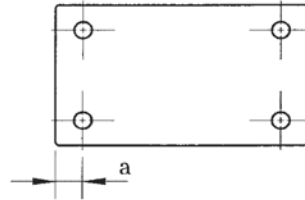
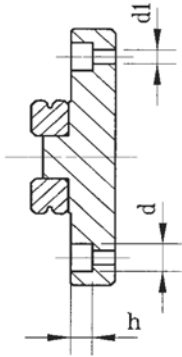


Fig. 1

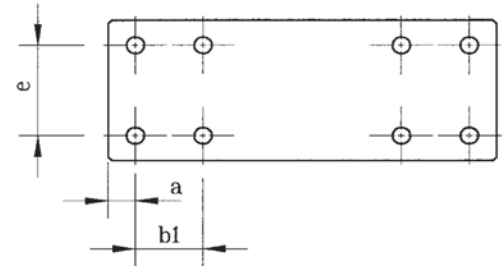


Fig. 2

The parallelism of matched tables is contained within 0.01 mm (Dimension A-A1)

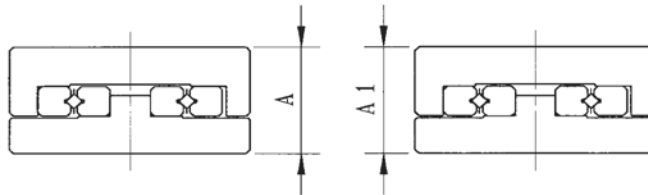
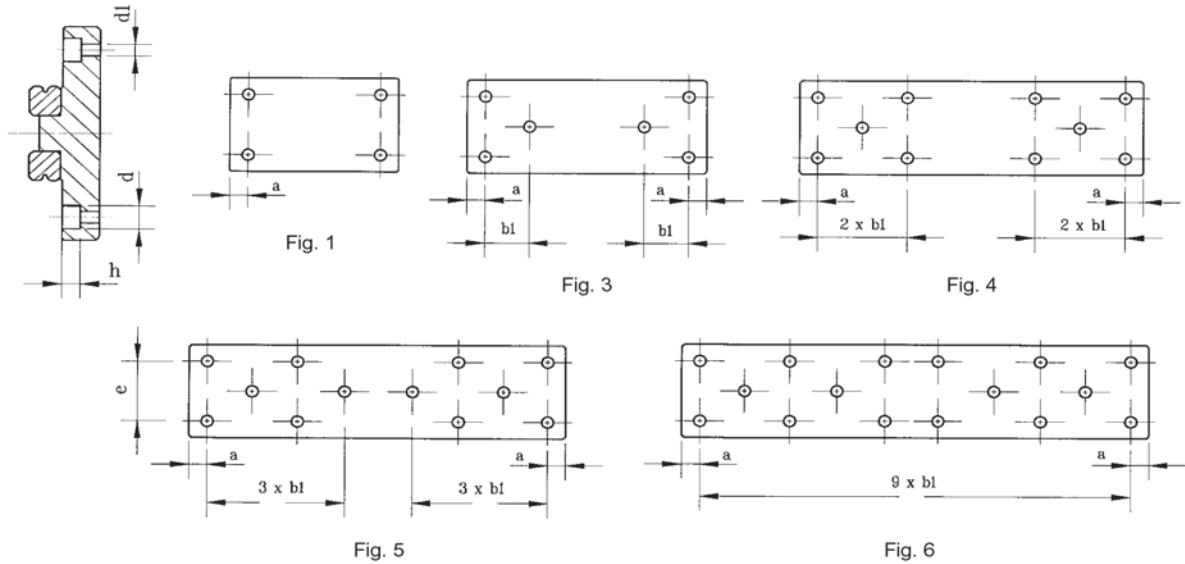


Table designation	a	b1	Fig.	e	h	d	d1
TR1 25			1				
TR1 35			1				
TR1 45			1				
TR1 55			2				
TR1 65	3,5	10	2	22	2,5	4,1	2,5
TR1 75			2				
TR1 85			2				
TR1 95			2				
TR1 105			2				
TR2 35			1				
TR2 50			1				
TR2 65			1				
TR2 80			2				
TR2 95	5	15	2	30	3,5	6	3,5
TR2 110			2				
TR2 125			2				
TR2 140			2				
TR2 155			2				



The parallelism of matched tables is contained within 0.01 mm (Dimension A-A1)

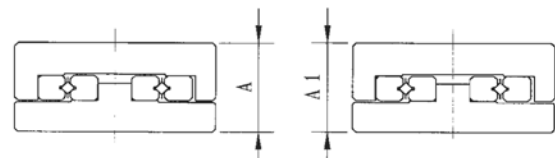
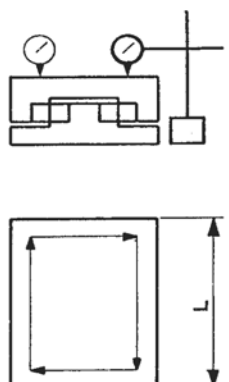
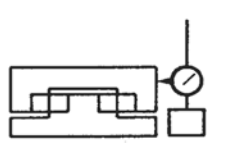
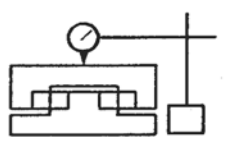
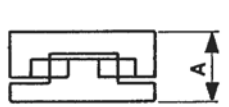
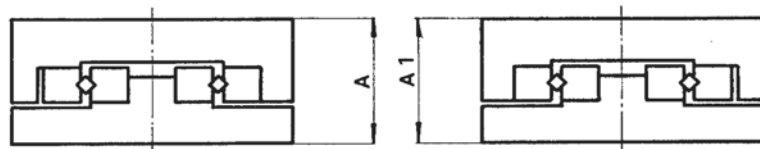


Table designation	a	b1	Fig.	e	h	d	d1
TR3 55	10	25	1	40	5	7,5	4,5
TR3 80			1				
TR3 105			1				
TR3 130			1				
TR3 155			3				
TR3 180			3				
TR3 205			4				
TR6 110	10	50	1	60	7	11	7
TR6 160			1				
TR6 210			3				
TR6 260			3				
TR6 310			3				
TR6 360			4				
TR6 410			4				
TR9 210	55	100	1	90	9	14	9
TR9 310			1				
TR9 410			3				
TR9 510			3				
TR9 610			4				
TR9 710			4				
TR9 810			5				
TR9 910			5				
TR9 1010			6				

TABLE LENGTH (mm) TOLERANCE (µm)		from 25 to 50	from 55 to 105	from 110 to 160	from 180 to 310	from 410 to 510	from 610 to 710	from 810 to 1010	
	Flatness checked on longitudinal and transversal axis of the table	Specification	5	10	15	20	25	30	40
	Parallelism (Lateral)	Specification	2	3	3	4	5	6	6
	Parallelism (Upper Portion) measured on the center line	Specification	2	2	3	3	4	4	5
	Height	Specification	± 100						

The parallelism of matched tables is contained within 0.01 mm (Dimension A-A1)

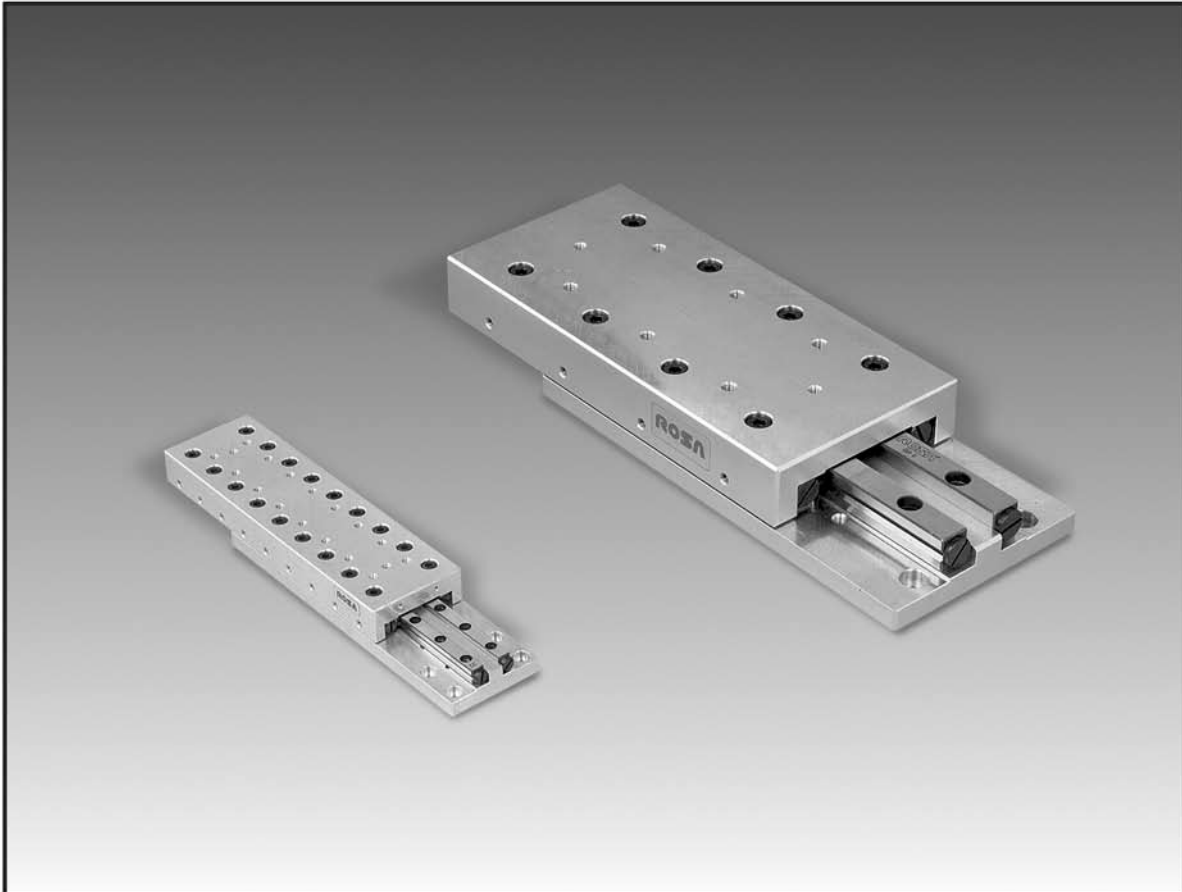


What was said previously for table TR is also valid for the series made of light alloy. However, differences as far as sizing and load rating are present. The height A is smaller for type TRL1, TRL3 and TRL6 series (see dimension table).

The series TRL6 has two additional sizes with respect to its cast iron counterpart TR6. While the series TRL3 includes four additional sizes. The load ratings are lower than series TR and so is the weight.

Therefore, the table TRL are indicated for movements with high acceleration since their mass is lower and consequently the inertia.

Tables of series TRL are supplied with attaching holes.



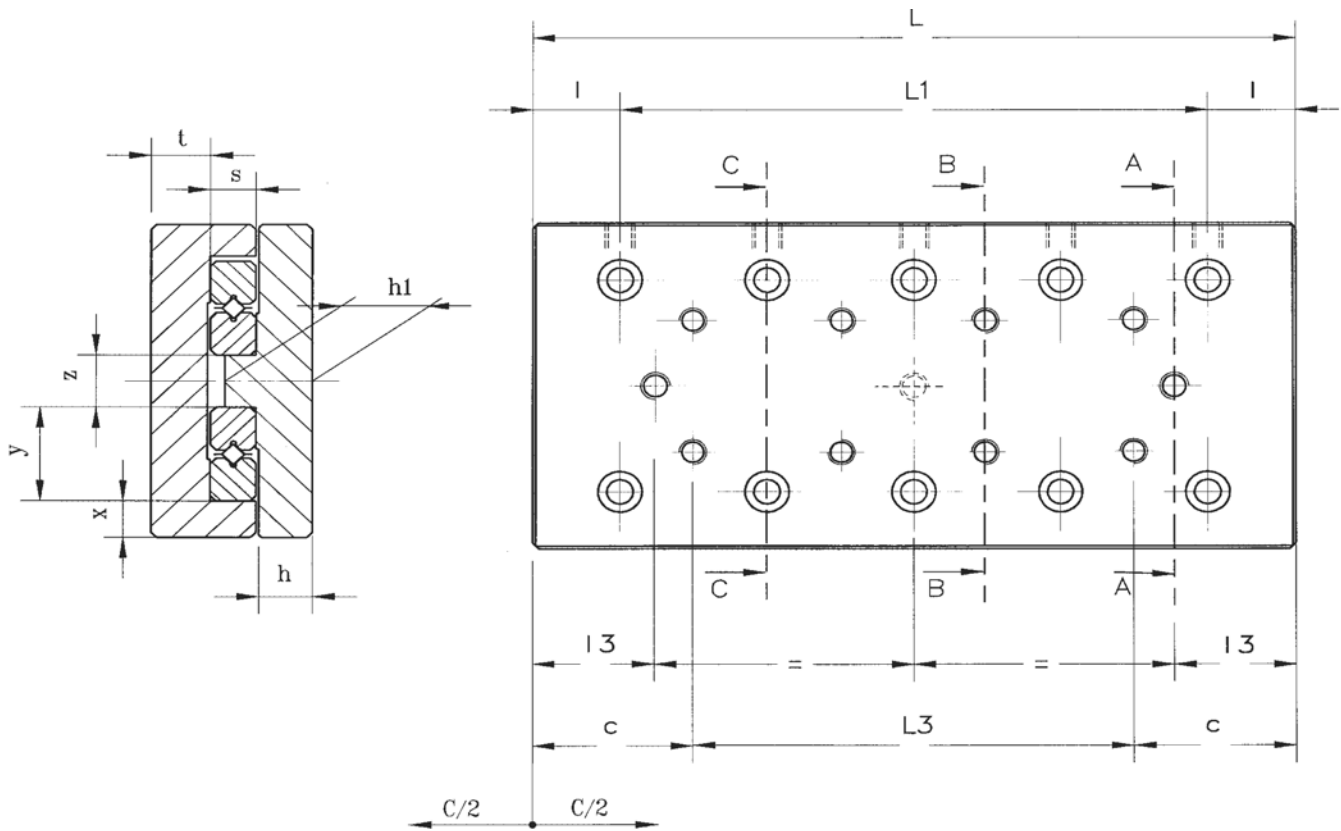


Table designation	Stroke C	L(±0,1)	Ø Roller	L1	L3	c	h	h1	l	l3	s	t	x	Y	z
TRL1 25	10	25	1,5	1x10	—	12,5	4,1	7,6	7,5	3,5	4	4,5	4	8,5	5
TRL1 35	18	35		2x10	1x10					4,5					
TRL1 45	25	45		3x10	2x10					6					
TRL1 55	32	55		4x10	3x10					7,5					
TRL1 65	40	65		5x10	4x10					8,5					
TRL1 75	45	75		6x10	5x10					11					
TRL1 85	50	85		7x10	6x10					13,5					
TRL1 95	55	95		8x10	7x10					15					
TRL1 105	60	105		9x10	8x10					17,5					
TRL2 35	18	35		2	1x15					—					
TRL2 50	30	50	2x15		1x15	4,5									
TRL2 65	40	65	3x15		2x15	7									
TRL2 80	50	80	4x15		3x15	9,5									
TRL2 95	60	95	5x15		4x15	12									
TRL2 110	70	110	6x15		5x15	14,5									
TRL2 125	80	125	7x15		6x15	17									
TRL2 140	90	140	8x15		7x15	19,5									
TRL2 155	100	155	9x15		8x15	22									

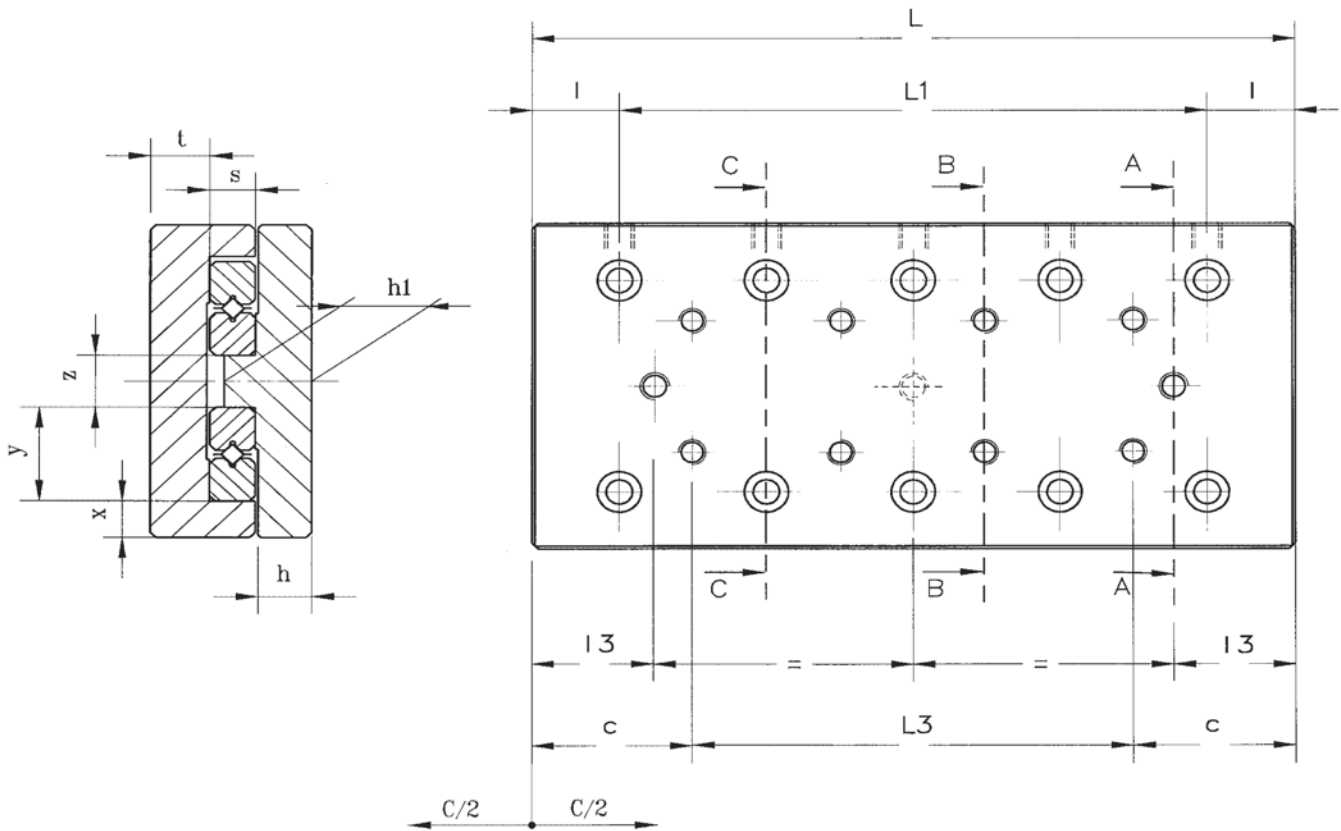


Table designation	Stroke C	L($\pm 0,1$)	\varnothing Roller	L ₁	L ₃	c	h	h ₁	l	l ₃	s	t	x	Y	z										
TRL3 55	30	55	3	1x25	—	27,5	8,2	12,5	15	5,5	8	8,5	7	18	10										
TRL3 80	45	80		2x25	1x25					10,5															
TRL3 105	60	105		3x25	2x25					15,5															
TRL3 130	75	130		4x25	3x25					20,5															
TRL3 155	90	155		5x25	4x25					25,5															
TRL3 180	105	180		6x25	5x25					30,5															
TRL3 205	130	205		7x25	6x25					30,5															
TRL3 230	155	230		8x25	7x25					30,5															
TRL3 255	180	255		9x25	8x25					30,5															
TRL3 280	205	280		10x25	9x25					30,5															
TRL3 305	230	305		11x25	10x25					30,5															
TRL6 110	60	110		6	1x50					—						55	11,5	19,5	30	16	15	13	12	31	14
TRL6 160	95	160			2x50					1x50										23,5					
TRL6 210	130	210	3x50		2x50	31																			
TRL6 260	165	260	4x50		3x50	38,5																			
TRL6 310	200	310	5x50		4x50	46																			
TRL6 360	265	360	6x50		5x50	38,5																			
TRL6 410	280	410	7x50		6x50	56																			
TRL6 460	325	460	8x50		7x50	58,5																			
TRL6 510	380	510	9x50		8x50	56																			

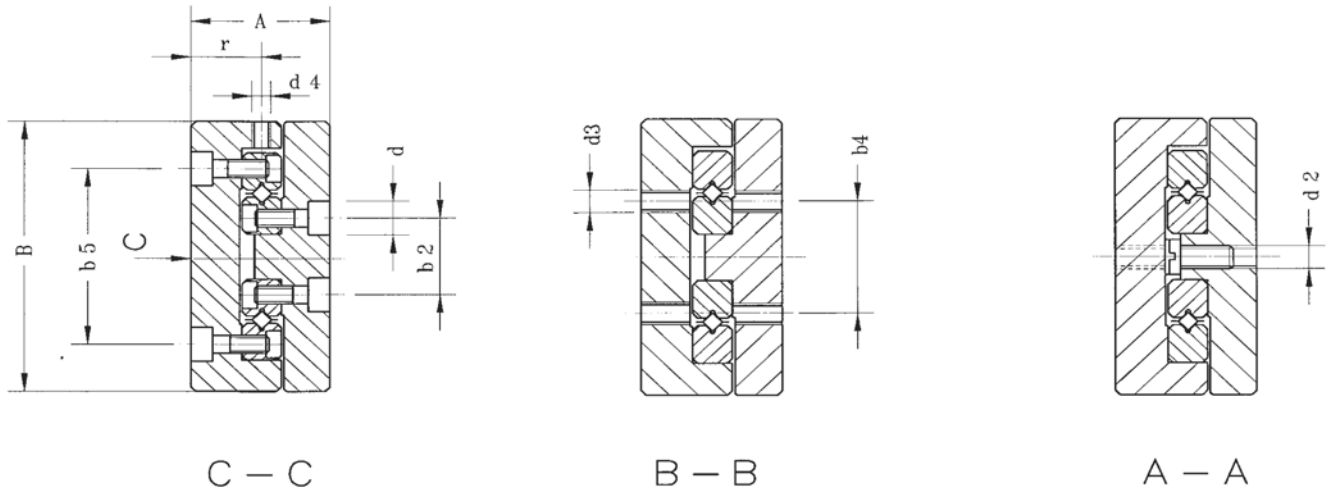


Table designation	A	B	b ₅	b ₂	b ₄	d	d ₂	d ₃	d ₄	r	Maximum allowable load (N)	Table Weight (Kg)
TRL1 25	13±0,1	30±0,2	18,4	8,6	10	4,1	M2	M2	M2,5	9	250	0,03
TRL1 35											350	0,05
TRL1 45											450	0,06
TRL1 55											530	0,08
TRL1 65											650	0,09
TRL1 75											750	0,11
TRL1 85											900	0,12
TRL1 95											1000	0,14
TRL1 105											1150	0,16
TRL2 35	21±0,1	40±0,2	25	11	15	6	M3	M3	M3	11	425	0,09
TRL2 50											595	0,15
TRL2 65											850	0,19
TRL2 80											1020	0,23
TRL2 95											1275	0,27
TRL2 110											1445	0,31
TRL2 125											1700	0,35
TRL2 140											1870	0,39
TRL2 155											2125	0,43

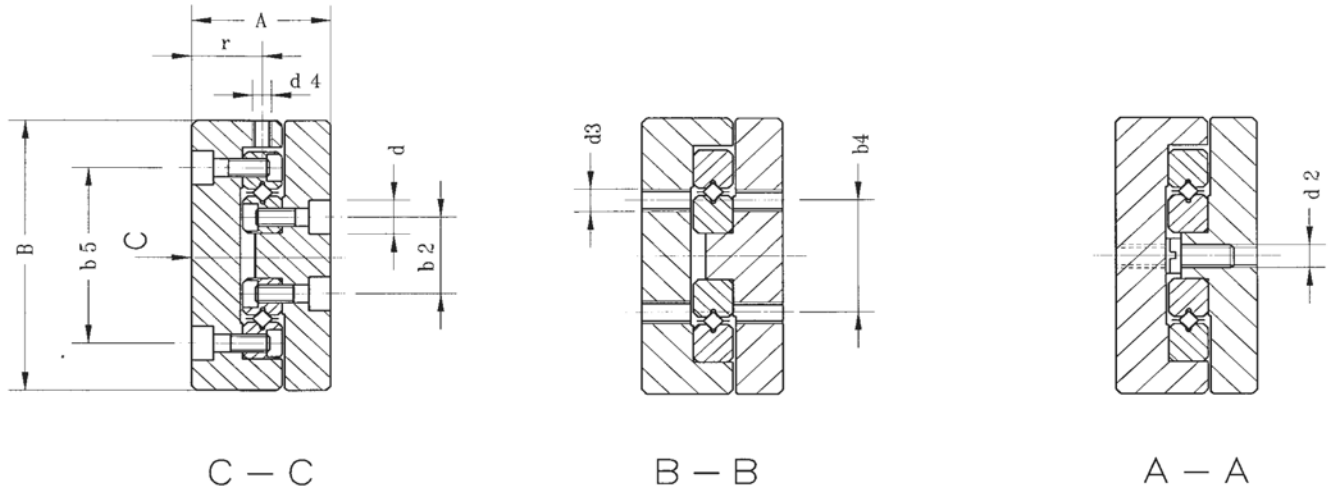


Table designation	A	B	b ₅	b ₂	b ₄	d	d ₂	d ₃	d ₄	r	Maximum allowable load (N)	Table weight (Kg)
TRL3 55	25±0,1	60±0,2	39	17	25	7,5	M4	M4	M4	12,5	910	0,29
TRL3 80											1300	0,42
TRL3 105											1820	0,55
TRL3 130											2220	0,68
TRL3 155											2730	0,81
TRL3 180											3120	0,94
TRL3 205											3510	1,07
TRL3 230											3770	1,2
TRL3 255											4160	1,33
TRL3 280											4420	1,46
TRL3 305											4820	1,59
TRL6 110											40±0,1	100±0,2
TRL6 160	5830	2,25										
TRL6 210	7420	3										
TRL6 260	9540	3,75										
TRL6 310	11660	4,5										
TRL6 360	12720	5,25										
TRL6 410	14840	6										
TRL6 460	16430	6,75										
TRL6 510	18020	7,5										

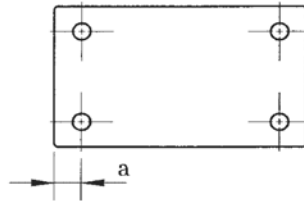
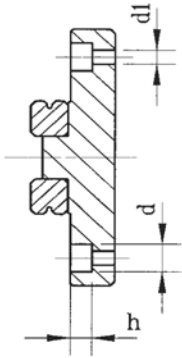


Fig. 1

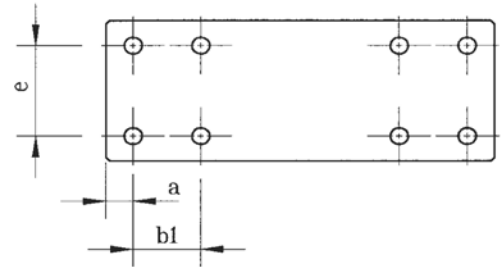


Fig. 2

The parallelism of matched tables is contained within 0.01 mm (Dimension A-A1)

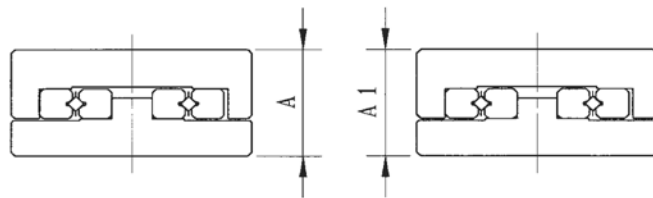


Table designation	a	b1	Fig.	e	h	d	d1
TRL1 25			1				
TRL1 35			1				
TRL1 45			1				
TRL1 55			2				
TRL1 65	3,5	10	2	22	2,5	4,1	2,5
TRL1 75			2				
TRL1 85			2				
TRL1 95			2				
TRL1 105			2				
TRL2 35			1				
TRL2 50			1				
TRL2 65			1				
TRL2 80			2				
TRL2 95	5	15	2	30	3,5	6	3,5
TRL2 110			2				
TRL2 125			2				
TRL2 140			2				
TRL2 155			2				

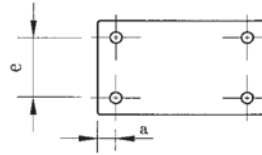
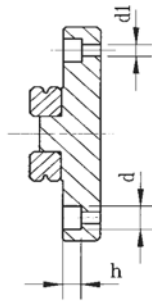


Fig. 1

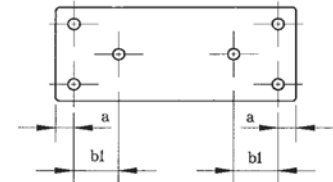


Fig. 3

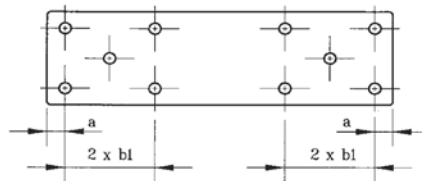


Fig. 4

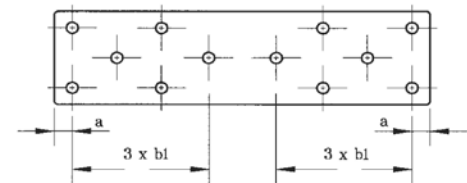


Fig. 5

The parallelism of matched tables is contained within 0.01 mm (Dimension A-A1)

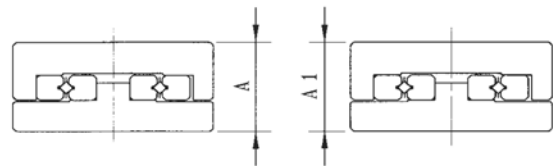
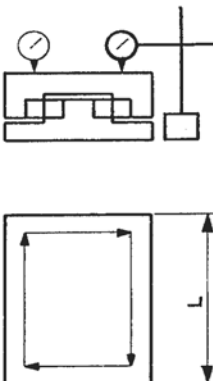
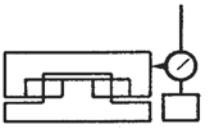
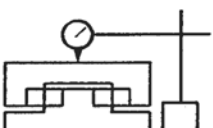
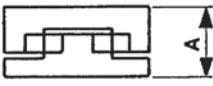


Table designation	a	b1	Fig.	e	h	d	d1
TRL3 55	10	25	1	40	5	7,5	4,5
TRL3 80			1				
TRL3 105			1				
TRL3 130			1				
TRL3 155			3				
TRL3 180			3				
TRL3 205			4				
TRL3 230			4				
TRL3 255			5				
TRL3 280			5				
TRL3 305			5				
TRL6 110	10	50	1	60	7	11	7
TRL6 160			1				
TRL6 210			3				
TRL6 260			3				
TRL6 310			3				
TRL6 360			3				
TRL6 410			4				
TRL6 460			4				
TRL6 510			5				

TABLE LENGTH (mm) TOLERANCE (µm)		from 25 to 50	from 55 to 105	from 110 to 160	from 180 to 310	from 410 to 510		
	Flatness checked on longitudinal and transversal axis of the table	Specification	10	10	15	20	25	
	Parallelism (Lateral)	Specification	4	5	6	8	9	
	Parallelism (Upper Portion) measured on the center line	Specification	2	4	6	8	9	
	Height	Specification	± 100					

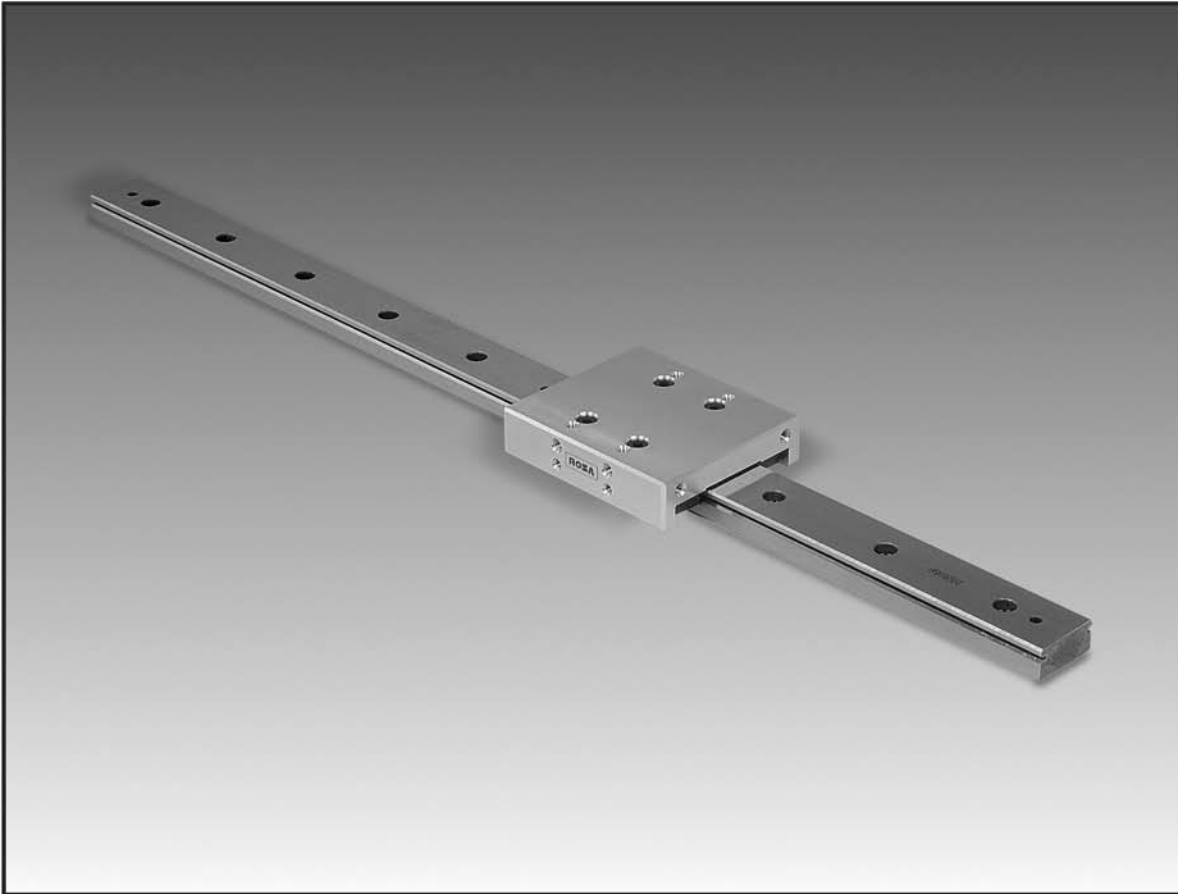
The tables TRKD are composed of an upper structure made of aluminium alloy which incorporates two recirculating linear ball bearings. This unit rides on a rail type GRD.

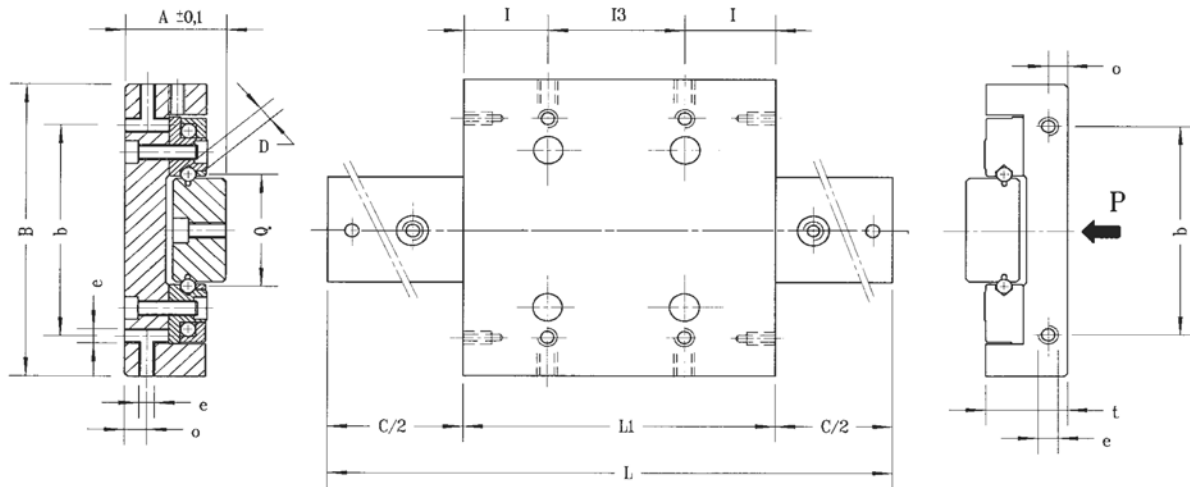
Such an assembly allows for long travel distance, limited only by the rail length. The rail GRD was previously described. It is obvious that the performance of the system is directly related to the type of recirculating linear ball bearing employed.

The ratings vary between 850 N and 3300 N and the maximum velocity is 120 m/min.

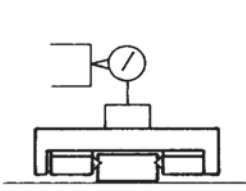
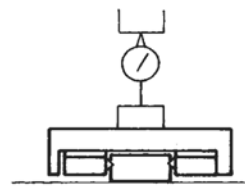
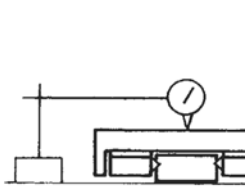
Max admitted acceleration: 50m/sec²

It is possible to assemble more translating units on the same rail-their height matching can be requested when ordering.





Designation	Stroke C	A	B	L	L ₁	Q	L _g	D	b	e	I	I ₃	o	t	Maximum allowable load (N)
TRKD3 200	120	22,5	70	200	80	28	48	3	53	M4	27,5	25	5	18,5	850
TRKD3 300	220														
TRKD3 400	320														
TRKD3 500	420														
TRKD6 200	95	36	120	200	105	45	60	6	86	M6	27,5	50	8	31	1430
TRKD6 300	195														
TRKD6 400	295														
TRKD6 500	395														
TRKD6 600	495														
TRKD6 700	595														
TRKD6 800	695														
TRKD6 900	795														
TRKD6 1000	895														
TRKD9 300	145	49	180	300	155	72	90	9	126	M8	27,5	100	10	43	3300
TRKD9 400	245														
TRKD9 500	345														
TRKD9 600	445														
TRKD9 700	545														
TRKD9 800	645														
TRKD9 900	745														
TRKD9 1000	845														

Tolerance μm			
Designation	Lateral parallelism checked on the entire stroke	Parallelism checked on the entire stroke	Parallelism of upper portion measured on the center line
TRKD3 200	10	4	15
300	10	5	20
400	16	7	20
500	24	7	20
TRKD6 200	10	4	15
300	10	5	20
400	18	8	20
500	24	8	20
600	10	8	25
700	15	9	25
800	18	9	25
900	24	9	25
1000	26	10	25
TRKD9 300	10	5	20
400	10	6	25
500	10	7	25
600	10	8	30
700	12	9	30
800	12	9	30
900	14	10	30
1000	14	10	30



INTRODUCTION T-2

1.0 ROLLING CONTACT BEARINGS

 1.1 General T-2

 1.2 Construction and Types of Ball Bearings T-4

 1.3 Bearing Selection Factors T-5

 1.4 Bearing Loads T-7

 1.5 Determination of Bearing Size T-7

 1.6 Mounting of Ball Bearings T-21

 1.7 Uground Ball Bearings T-23

 1.8 Roller Bearings T-24

 1.9 Lubrication and Surface Finishes T-26

2.0 SINTERED-METAL BEARINGS

 2.1 General Properties T-31

 2.2 Sizing Sintered Bearings T-32

 2.3 Clearances..... T-32

 2.4 Press Fits T-35

 2.5 Standardization T-36

 2.6 Conclusion T-39

3.0 PLASTIC AND NONMETALLIC BEARINGS

 3.1 General Characteristics T-39

 3.2 Properties of Plastic and Nonmetallic Bearing Materials T-39

 3.3 Load-Carrying Ability of Plastic Bearings T-42

 3.4 Coefficient of Friction vs. Load for Various Materials T-45

 3.5 Example T-46

 3.6 Lubrication T-46

 3.7 Conclusion T-47

EQUIVALENT PRECISION CLASSES OF DIFFERENT STANDARDS T-47

APPENDIX A - CHARACTERISTICS AND ADVANTAGES OF FRELON® LINED LINEAR BEARINGS T-48

APPENDIX B - TECHNICAL DATA ON ROD ENDS AND SPHERICAL BEARINGS T-49

APPENDIX C - TOLERANCES FOR SINTERED BEARINGS T-56

ACKNOWLEDGMENTS T-57

INTRODUCTION

Ball and roller bearings are used widely in instruments and machines in order to minimize friction and power loss. While the concept of the ball bearing dates back at least to Leonardo da Vinci, their design and manufacture has become remarkably sophisticated.

This technology was brought to its present state of perfection only after a long period of research and development. The benefits of such specialized research can be obtained when it is possible to use a standardized bearing of the proper size and type. However, such bearings cannot be used indiscriminately without a careful study of the loads and operating conditions. In addition, the bearing must be provided with adequate mounting, lubrication and sealing.

Design engineers have usually two possible sources for obtaining information which they can use to select a bearing for their particular application:

- a) Textbooks
- b) Manufacturers' catalogs

Textbooks are excellent sources; however, they tend to be overly detailed and aimed at the student of the subject matter rather than the practicing designer. They, in most cases, contain information on how to design rather than how to select a bearing for a particular application.

Manufacturers' catalogs, in turn, are also excellent and contain a wealth of information which relates to the products of the particular manufacturer. These catalogs, however, fail to provide alternatives – which may divert the designer's interest to products not manufactured by them.

Our Company, however, provides the broadest selection of many types of bearings made by different manufacturers. For this reason, we are interested in providing a condensed overview of the subject matter in an objective manner, using data obtained from different texts, handbooks and manufacturers' literature. This information will enable the reader to select the proper bearing in an expeditious manner.

If the designer's interest exceeds the scope of the presented material, a list of references is provided at the end of the Technical Section.

At the same time, we are expressing our thanks and are providing credit to the sources which supplied the material presented here.

The information deals with:

- a) Rolling Contact Bearings
 - b) Sintered-Metal Sliding Contact Bearings
- and
- c) Plastic and Nonmetallic Sliding Contact Bearings

1.0 ROLLING CONTACT BEARINGS

1.1 General

Rolling contact bearings can be divided into three basic groups:

- a) Ball Bearings
 - b) Thrust Bearings
- and
- c) Roller Bearings

Each of these groups can further be divided into subgroups. Rather than enumerating the subgroups, they will be shown in **Fig. 1-1** and **Fig. 1-2**.

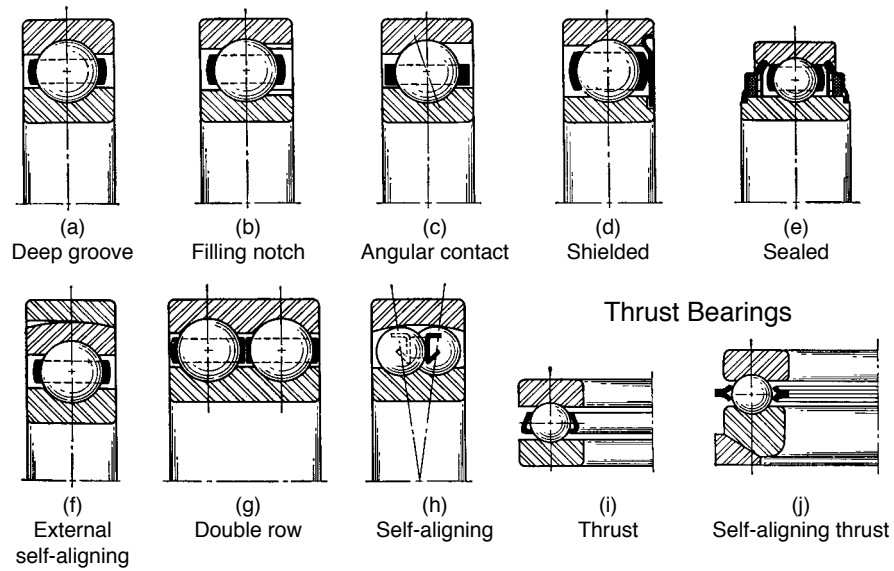


Fig. 1-1 Radial and Thrust Ball Bearings

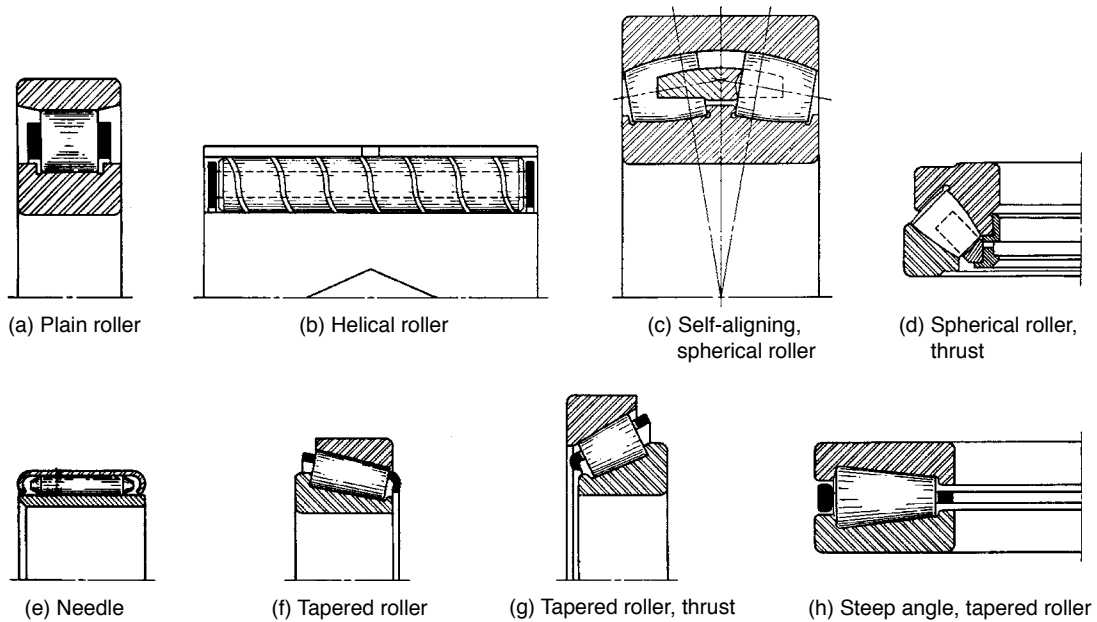


Fig. 1-2 Radial and Thrust Roller Bearings

1.2 Construction and Types of Ball Bearings

A ball bearing usually consists of four parts: an inner ring, an outer ring, the balls and the cage or separator. To increase the contact area and permit larger loads to be carried, the balls run in curvilinear grooves in the rings. The radius of the groove is slightly larger than the radius of the ball, and a very slight amount of radial play must be provided. The bearing is thus permitted to adjust itself to small amounts of angular misalignment between the assembled shaft and mounting. The separator keeps the balls evenly spaced and prevents them from touching each other on the sides where their relative velocities are the greatest.

Ball bearings are made in a wide variety of types and sizes. Single-row radial bearings are made in four series, extra light, light, medium, and heavy, for each bore, as illustrated in **Fig. 1-3(a)**, **(b)**, and **(c)**. The heavy series of bearings is designated by 400. Most, but not all, manufacturers use a numbering system so devised that if the last two digits are multiplied by 5, the result will be the bore in millimeters. The digit in the third place from the right indicates the series number. Thus, bearing 307 signifies a medium-series bearing of 35-mm bore. For additional digits, which may be present in the catalog number of a bearing, refer to manufacturer's details. Some makers list deep groove bearings and bearings with two rows of balls. For bearing designations of **Quality Bearings & Components (QBC)**, see special pages devoted to this purpose.

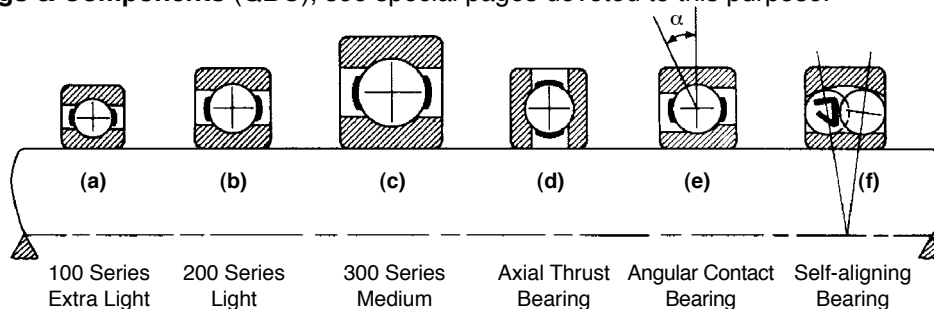


Fig. 1-3 Types of Ball Bearings

The radial bearing is able to carry a considerable amount of axial thrust. However, when the load is directed entirely along the axis, the thrust type of bearing should be used. The angular contact bearing will take care of both radial and axial loads. The self-aligning ball bearing will take care of large amounts of angular misalignment. An increase in radial capacity may be secured by using rings with deep grooves, or by employing a double-row radial bearing.

Radial bearings are divided into two general classes, depending on the method of assembly. These are the Conrad, or nonfilling-notch type, and the maximum, or filling-notch type. In the Conrad bearing, the balls are placed between the rings as shown in **Fig. 1-4(a)**. Then they are evenly spaced and the separator is riveted in place. In the maximum-type bearing, the balls are inserted through a filling notch ground into each ring, as shown in **Fig. 1-4(b)**. Because more balls can be

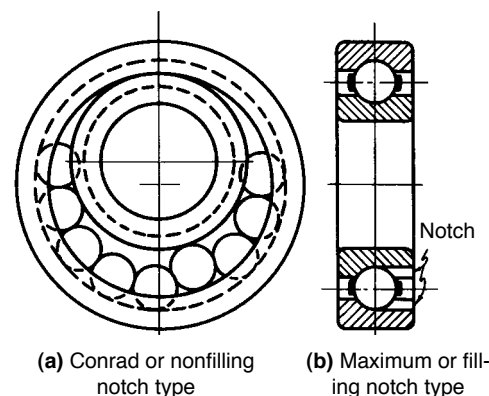


Fig. 1-4 Methods of Assembly for Ball Bearings

placed in such bearings, their load capacity is greater than that of the Conrad type. However, the presence of the notches limits the load-carrying capacity of these bearings in the axial direction.

High-carbon chromium steel 52100 and 440C stainless steel are used for balls and rings, and are treated to high strength and hardness. The surfaces are smoothly ground and polished. The commonly accepted minimum hardness for bearing components is 58 Rockwell C. This material is not suitable for temperatures over 350° F. For higher temperatures, steels especially developed for high-temperature service should be used. The dimensional tolerances are very small; the balls must be very uniform in size. The stresses are extremely high because of the small contact areas, and the yield point of the material may be exceeded at certain points. Because of the high values of the fluctuating stresses, antifriction bearings are not designed for unlimited life, but for some finite period of service determined by the fatigue strength of the materials. A specified speed and number of hours of expected service must therefore accompany the given load values for these bearings.

1.3 Bearing Selection Factors

Bearings are basically antifriction devices. For this reason, the friction characteristics of different bearing types have to be examined.

In addition to the rolling resistance, other factors which contribute to the friction are as follows:

1. Sliding between the rolling elements and the race. When the rolling elements are curved, all points in contact do not have the same linear velocity, because of their differing radii of rotation. In Fig. 1-5, for example, a point A on the ball will have a definite linear velocity if no sliding occurs. However, a second point B on the ball will have less linear velocity than A because of its smaller radius of rotation. But point B on the race actually has a slightly greater linear velocity than A. This introduces sliding in both backward and forward directions. Other factors which introduce sliding are the inevitable inaccuracies in geometry and other deviations from true rolling.
2. The sliding action between the rolling element and the separator. Although contact takes place at the poles, where the velocity is lowest, some sliding action is present.
3. In roller bearings, the sliding action between the rolling elements and the guide flanges.
4. The losses between the bearing parts and the lubricant and between the different particles of the lubricant.

Palmgren¹ gives the following frictional coefficients for antifriction bearings:

Self-aligning ball bearings	f = 0.0010
Cylindrical roller bearing	f = 0.0011
Thrust ball bearings	f = 0.0013
Single-row deep-groove ball bearings	f = 0.0015
Tapered and spherical roller bearings	f = 0.0018
Needle bearings	f = 0.0045

All these coefficients are referred to the bearing bore. They are for run-in bearings, under

¹ See reference at the end of the Technical Section.

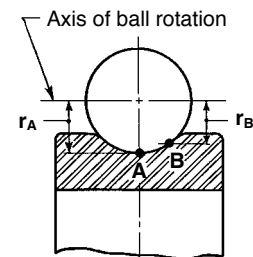


Fig. 1-5 Sliding caused by Geometry of Bearing

normal conditions, with good lubrication. When determining the total losses in a given application, the seal friction must not be ignored since it may be considerable.

In addition to considerations related to friction, attention must be given to speed requirements. Permissible speeds are influenced by bearing size, properties, lubrication detail and operating temperatures. The permissible speed varies inversely with mean bearing diameter.

Some guidelines for selecting bearings can be summarized as follows:

- Ball bearings are the less expensive choice in the smaller sizes and under lighter loads, while roller bearings are less expensive for larger sizes and heavier loads.
- Roller bearings are more satisfactory under shock or impact loading than ball bearings.
- Ball-thrust bearings are for pure thrust loading only. At high speeds, a deep-groove or angular-contact ball bearing usually will be a better choice, even for pure thrust loads.
- Self-aligning ball bearings and cylindrical roller bearings have very low friction coefficients.
- Deep-groove ball bearings are available with seals built into the bearing so that the bearing can be prelubricated to operate for long periods without attention.

The following **Table 1-1** attempts to summarize and tabulate various considerations which influence the selection of the appropriate bearings:

Relative rating

- good
- ▣ intermediate
- ◐ poor
- ◑ none
- ⊠ does not apply
- not available or known

NOTE: This table is only a general guide – ratings may change when considering special types or treatments.

Table 1-1 Bearing Selection Factors*

Selection Factors	Bearing Types																									
	Ball						Roller						Journal						Thrust				Ext. press.⑤		Gas ⑥	
	2a	2b	2c	2d	2e	2f	3a	3b	3c	3d	3e	3f	8a	8b	8c	8d	8e	8f	12a	12b	12c	12d	capillary ⑥	variable flow	pneumostatic	pneumodynamic
Low starting friction	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
Low running friction	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
Low noise	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Small diameter ①	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
Short length ①	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐
High accuracy	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
Most available	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
High radial load ②	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
High thrust load ②	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
High dynamic load ②	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
Tolerate misalignment	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
Tolerate dirt	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
Low initial cost	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
High speed	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
High temperature ③	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
Simple lube system	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣
High stability ④	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠
Easy for designer	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣

① with a given load (radial or thrust) ② with a given size ③ above 450°F ④ applies to high speed fluid-film bearings
 ⑤ journal or thrust type ⑥ restrictor controlled (liquid)

* See reference at the end of the Technical Section.

1.4 Bearing Loads

The first step in sizing a suitable ball bearing for a given application is the determination of the loads which it has to support. In this section, we list some of the most frequently occurring mechanical configurations and the bearing loads imposed by them.

(a) Radial Shaft Load Between Bearings

P = radial load
 R_1, R_2 = bearing loads
 l_1, l_2 = distances from radial load to bearings

$$R_1 = \frac{l_2 P}{l_1 + l_2} \quad (1)$$

$$R_2 = \frac{l_1 P}{l_1 + l_2} \quad (2)$$

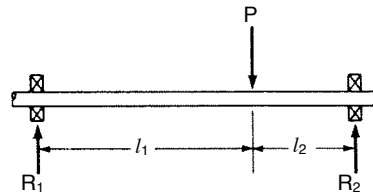


Fig. 1-6 Radial Load Between Bearings

(b) Overhung Radial Load

Notation same as in paragraph (a).

$$R_1 = \frac{l_2 P}{l_1 - l_2} \quad (3)$$

$$R_2 = \frac{l_1 P}{l_1 - l_2} \quad (4)$$

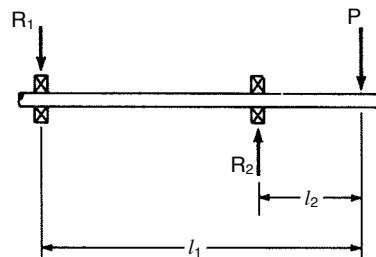


Fig. 1-7 Overhung Radial Load

For cases other than those shown above, the rules of static distribution of loads on a beam should be considered. The shaft which is supported by bearings is nothing else but a beam subjected to forces which result in radial loading of bearings.

1.5 Determination of Bearing Size

(a) Basic Definitions

In the course of many years of experience with ball bearings and extensive testing, it has been found that the prediction of the load capacity of a ball bearing is a statistical event related to the fatigue life of the bearing. This makes the sizing of ball bearings more difficult than that of many other machine elements.

A basic phenomenon in ball bearings is that ball bearing life has been found to be inversely proportional to the cube of the bearing load. This means that when the load is doubled, the life expectancy of the bearing is reduced by a factor of eight. This phenomenon has been studied extensively and has led to the adoption of an industry-wide national standard for rating ball bearings pioneered by the American Bearing Manufacturers Association (formerly Anti-Friction Bearing Manufacturers Association, Inc.), 1200 19th Street, N.W., Suite 300, Washington, D.C. 20036-2433.

The following represents a summary of the load rating of ball bearings of less than one inch in diameter, according to ANSI-AFBMA Standard 9-1978: "Load Rating and Fatigue Life for Ball Bearings" – reprinted with the permission of the American National Standards Institute, Inc., 11 West 42nd Street, 13th Floor, New York, N.Y. 10036.

Ball bearings were formerly rated on the basis of the compressive stress in the most heavily loaded ball. Except for static loads, experience has shown that the actual cause of failure is fatigue. Fatigue characteristics are thus used for load rating and are dependent to a large extent on experimental results.

The life of a ball bearing is the life in hours at some known speed, or the number of revolutions, that the bearing will attain before the first evidence of fatigue appears on any of the moving elements. Experience has shown that the life of an individual ball bearing cannot be precisely predicted. Fatigue characteristics are thus used for load ratings.

Even if ball bearings are properly mounted, adequately lubricated, protected from foreign matter, and are not subject to extreme operating conditions, they can ultimately fatigue. Under ideal conditions, the repeated stresses developed in the contact areas between the balls and the raceways eventually can result in fatigue of the material which manifests itself as spalling of the load carrying surfaces. In most applications, the fatigue life is the maximum useful life of a bearing. This fatigue is the criterion of life used as the basis for the first part of this standard.

The material in the standard which follows assumes bearings having nontruncated contact area, hardened good quality steel as the bearing material, adequate lubrication, proper ring support and alignment, nominal internal clearances, and adequate groove radii. In addition, certain high-speed effects such as ball centrifugal forces and gyroscopic moments are not considered.

The following nomenclature and definitions are used in life testing of bearings. A multitude of identical bearings are tested under same conditions:

RATING LIFE is the life at which 10 percent of bearings have failed and 90 percent of them are still good. This value is designated as L_{10} and is expressed in millions of revolutions.

LIFE of an individual ball bearing is the number of revolutions (or hours at some given constant speed) designated as L which the bearing runs before the first evidence of fatigue develops in the material of either ring (or washer) or of any of the rolling elements.

MEDIAN LIFE is the life at which 50 percent of bearings failed and 50 percent are still good. It is designated as L_{50} , which is generally not more than five times the RATING LIFE, L_{10} .

BASIC LOAD RATING "C" for a radial or angular contact ball bearing is the calculated, constant, radial load which a group of apparently identical bearings with stationary outer ring can theoretically endure for a RATING LIFE of one million revolutions of the inner ring. For a thrust ball bearing, it is the calculated, constant, centric, thrust load which a group of apparently identical bearings can theoretically endure for a RATING LIFE of one million revolutions of one of the bearing washers. The basic load rating is a reference value only of the base value of one million revolutions RATING LIFE having been chosen for ease of calculation. Since applied loading as great as the basic load rating tends to cause local plastic deformation of the rolling surfaces, it is not anticipated that such heavy loading would normally be applied.

(b) Determination of Basic Load Rating

The basic load rating C for a rating life of one million revolutions for radial and angular contact ball bearings, except filling slot bearings, with balls not larger than 1 in. diameter, is given by the equation:

$$C = f_c(i \cos \alpha)^{0.7} Z^{2/3} D^{1.8} \quad (\text{lbs.}) \quad (5)$$

where:

- i = number of rows of balls in the bearing
- α = nominal angle of contact (angle between line of action of ball load and plane perpendicular to bearing axis)
- Z = number of balls per row

D = ball diameter

f_c = a constant from **Table 1-2**, as determined by the value of $(D \cos \alpha)/d_m$

d_m = pitch diameter of ball races

NOTE: For balls larger than 1 inch diameter, the exponent for D is 1.4.

To get a better feel for the meaning of one million revolutions, it is attained in 8 hrs at a speed of 2,084 rpm. Most ball bearings, however, may have intended life many times exceeding one million revolutions.

In the above formula, d_m represents the pitch diameter of the ball races. It can be expressed as follows:

$$d_m = \frac{A - B}{2} + B = \frac{A + B}{2} \quad (6)$$

A and B are dimensions as shown. However, assuming that inner ring and outer ring wall thicknesses are the same, A becomes outside diameter, and B the bore of the bearing.

Values of f_c are shown in **Table 1-2** for different values of $(D \cos \alpha)/d_m$.

RATING LIFE L_{10} in millions of revolutions for a ball bearing application can be calculated from:

$$L_{10} = \left(\frac{C}{P}\right)^3 \quad (7)$$

where:

C = the basic load rating as previously defined

and P = the load.

(c) Illustrative Examples

Example 1

Consider an ABEC 3 single row, radial ball bearing having 10 balls of 1/16" diameter, 0.300" inner race diameter and 0.452" outer race diameter in a single shield configuration.

$\alpha = 0^\circ$ (radial bearing)

Z = 10 (number of balls)

D = 1/16" (ball diameter)

and $d_m = \frac{1}{2} (0.300 + 0.452) = 0.391$ " (pitch diameter of ball races).

Therefore, $\left(\frac{D \cos \alpha}{d_m}\right) = \frac{0.062 \times 1}{0.391} = 0.16$

From **Table 1-2** this value yields (from third column) a value of $f_c=4530$. Substituting these values in Equation (5) for C, we obtain:

$$C = 4530 \times 1 \times 10^{2/3} \times 0.062^{1.8} = 143 \text{ lbs}$$

This means that for a load of P = 143 lbs, the rating life of this ball bearing will be one million revolutions and 90% of a group of such ball bearings will be expected to complete or exceed this value.

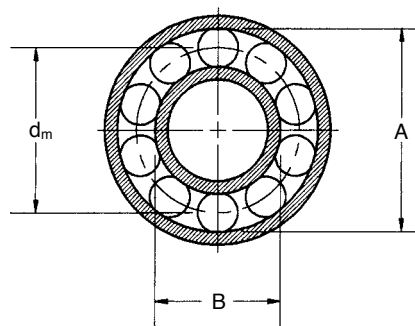


Table 1-2* Values of f_c

$\frac{D \cos \alpha}{d_m}$	Single Row Radial Contact; Single & Double Row Angular Contact, Groove Type ⁽¹⁾		Double Row Radial Contact Groove Type		Self-Aligning	
	Metric ⁽²⁾	Inch ⁽³⁾	Metric ⁽²⁾	Inch ⁽³⁾	Metric ⁽²⁾	Inch ⁽³⁾
0.05	46.7	3550	44.2	3360	17.3	1310
0.06	49.1	3730	46.5	3530	18.6	1420
0.07	51.1	3880	48.4	3680	19.9	1510
0.08	52.8	4020	50.0	3810	21.1	1600
0.09	54.3	4130	51.4	3900	22.3	1690
0.10	55.5	4220	52.6	4000	23.4	1770
0.12	57.5	4370	54.5	4140	25.6	1940
0.14	58.8	4470	55.7	4230	27.7	2100
0.16	59.6	4530	56.5	4290	29.7	2260
0.18	59.9	4550	56.8	4310	31.7	2410
0.20	59.9	4550	56.8	4310	33.5	2550
0.22	59.6	4530	56.5	4290	35.2	2680
0.24	59.0	4480	55.9	4250	36.8	2790
0.26	58.2	4420	55.1	4190	38.2	2910
0.28	57.1	4340	54.1	4110	39.4	3000
0.30	56.0	4250	53.0	4030	40.3	3060
0.32	54.6	4160	51.8	3950	40.9	3110
0.34	53.2	4050	50.4	3840	41.2	3130
0.36	51.7	3930	48.9	3730	41.3	3140
0.38	50.0	3800	47.4	3610	41.0	3110
0.40	48.4	3670	45.8	3480	40.4	3070

NOTES:

- (1) a. When calculating the basic load rating for a unit consisting of two similar, single row, radial contact ball bearings, in a duplex mounting, the pair is considered as one, double row, radial contact ball bearing.
- b. When calculating the basic load rating for a unit consisting of two, similar, single row, angular contact ball bearings in a duplex mounting, "Face-to-Face" or "Back-to-Back", the pair is considered as one, double row, angular contact ball bearing.
- c. When calculating the basic load rating for a unit consisting of two or more similar, single angular contact ball bearings mounted "in Tandem", properly manufactured and mounted for equal load distribution, the rating of the combination is the number of bearings to the 0.7 power times the rating of a single row ball bearing. If the unit may be treated as a number of individually interchangeable single row bearings, this footnote (1) c. does not apply.
- (2) Use to obtain C in newtons when D is given in mm.
- (3) Use to obtain C in pounds when D is given in inches.

*Reprinted by permission of the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036. (from ANSI-AFBMA Std. 9-1978)

Suppose now it is desired to determine the “L” life of this bearing when operating at 200 rpm and a load of 50 lbs, the life being evaluated in hours of operation.

Let the life in hours be denoted by L, and let N denote the rpm of the bearing. We then have:

$$L = \frac{10^6 L_{10}}{60 N} = \left(\frac{C}{P} \right)^3 \frac{10^6}{60 N} \quad (8)$$

Substituting N = 200, P = 50 and C = 143 into Equation (8), we obtain L = 1949 hours.

NOTE: L₁₀ is bearing life in millions of revolutions; L is bearing life in hours.

A table showing required life at constant operating speed has been given by N. Chironis (“Today’s Ball Bearings”, *Product Engineering*, December 12, 1960, pp. 63-77, table on p. 68). This table is reproduced below with the permission of McGraw-Hill Book Company, New York, N.Y.

Table 1-3 Required Life at Constant Operating Speed
 (data from SKF Industries)

Type of Machine	Life in Hours of Operation
Instruments and apparatus which are only infrequently used. Ex.: demonstration apparatus, devices for operation of sliding doors.	500
Aircraft Engines.	500–2000
Machines for service of short duration or intermittent operation, where service interruptions are of minor importance. Ex.: hand tools, lifting tackle in machinery shops, hand-driven machines in general, farm machinery, assembly cranes, charging machines, foundry cranes, household machines.	4000–8000
Machines for intermittent service where dependable operation is of great importance. Ex.: auxiliary machines in power stations, conveying-equipment in production lines, elevators, general-cargo cranes, machine tools less frequently used.	8000–12000
Machines for 8-hour service which are not always fully utilized. Ex.: machines in general in the mechanical industries, cranes for continuous service, blowers, jackshafts.	20000–30000
Machines for continuous operation (24-hour service). Ex.: separators, compressors, pumps, mainline shafting, roller beds and conveyor rollers, mine hoists, stationary electric motors.	40000–60000
Machines for 24-hour service where dependability is of great importance. Ex.: pulp and paper machines, public power stations, mine pumps, public pumping stations, machines for continuous service aboard ships.	100000–200000

In order to provide data for larger size bearings as well as additional examples, **Table 1-4** is given.

Table 1-4 Dimensions and Basic Load Ratings for Conrad-Type Single-Row Radial Ball Bearings

Bearing No.	Bore		Outside Diameter		Width		Balls		Capacity, lbs	
	mm	inch	mm	inch	mm	inch	No. Z	Dia. D	Dynamic C	Static P _{st}
102	15	0.5906	32	1.2598	9	0.3543	9	3/16	965	550
202			35	1.3780	11	0.4331	7	1/4	1340	760
302			42	1.6535	13	0.5118	8	17/64	1660	930
103	17	0.6693	35	1.3780	10	0.3937	10	3/16	1040	640
203			40	1.5748	12	0.4724	7	5/16	1960	1040
303			47	1.8504	14	0.5512	6	3/8	2400	1240
104	20	0.7874	42	1.6535	12	0.4724	9	1/4	1620	980
204			47	1.8504	14	0.5512	8	5/16	2210	1280
304			52	2.0472	15	0.5906	7	3/8	2760	1530
105	25	0.9843	47	1.8504	12	0.4724	10	1/4	1740	1140
205			52	2.0472	15	0.5906	9	5/16	2420	1520
305			62	2.4409	17	0.6693	8	13/32	3550	2160
106	30	1.1811	55	2.1654	13	0.5118	11	9/32	2290	1590
206			62	2.4409	16	0.6299	9	3/8	3360	2190
306			72	2.8346	19	0.7480	8	1/2	5120	3200
107	35	1.3780	62	2.4409	14	0.5512	11	5/16	2760	2010
207			72	2.8346	17	0.6693	9	7/16	4440	2980
307			80	3.1496	21	0.8268	8	17/32	5750	3710
108	40	1.5748	68	2.6772	15	0.5906	13	5/16	3060	2450
208			80	3.1496	18	0.7087	9	1/2	5640	3870
308			90	3.5433	23	0.9055	8	5/8	7670	5050
109	45	1.7717	75	2.9528	16	0.6299	13	11/32	3630	2970
209			85	3.3465	19	0.7480	9	1/2	5660	3980
309			100	3.9370	25	0.9843	8	11/16	9120	6150
110	50	1.9685	80	3.1496	16	0.6299	14	11/32	3770	3260
210			90	3.5433	20	0.7874	10	1/2	6070	4540
310			110	4.3307	27	1.0630	8	3/4	10680	7350
111	55	2.1654	90	3.5433	18	0.7087	13	13/32	4890	3950
211			100	3.9370	21	0.8268	10	9/16	7500	5710
311			120	4.7244	29	1.1417	8	13/16	12350	8660
112	60	2.3622	95	3.7402	18	0.7087	14	13/32	5090	4560
212			110	4.3307	22	0.8661	10	5/8	9070	6890
312			130	5.1181	31	1.2205	8	7/8	14130	10100
113	65	2.5591	100	3.9370	18	0.7087	15	13/32	5280	4950
213			120	4.7244	23	0.9055	10	11/16	10770	8460
313			140	5.5118	33	1.2992	8	15/16	16010	11600
114	70	2.7559	110	4.3307	20	0.7874	14	15/32	6580	6080
214			125	4.9213	24	0.9449	10	11/16	10760	8740
314			150	5.9055	35	1.3780	8	1	18000	13260

Example 2:

Find the value of C for a 207 radial bearing.

Solution:

By **Table 1-4**: $d_m = \frac{1}{2} (2.8346 + 1.3780) = 2.1063$ in

$$\frac{D \cos \alpha}{d_m} = \frac{0.4375}{2.1063} = 0.208$$

By **Table 1-2**: $f_c = 4550$

By **Table 1-4**: $D = \frac{7}{16} = 0.4375$ in

$$\log D = 9.64098 - 10$$

$$1.8 \log D = 9.35376 - 10$$

$$D^{1.8} = 0.2258 \sqrt[3]{}$$

$$Z = 9, \quad Z^{2/3} = \sqrt[3]{9^2} = 4.327$$

From Equation (5) for C: $C = 4550 \times 4.327 \times 0.2258 = 4440$ lbs,
 load for 1 million revolutions with
 90 percent probability that it will
 be attained or exceeded.

(d) Relationship between Load and Number of Revolutions

In some cases, it is needed to determine the new value of the permitted loading when the number of revolutions N is changed.

Experimentally, it was proven that:

$$\frac{N_1}{N_2} = \frac{P_2^3}{P_1^3} \quad (9)$$

where N is number of revolutions and P is radial load.

Furthermore, it was established that

$$10^6 C^3 = N_1 P_1^3 = N_2 P_2^3 = N_3 P_3^3 \dots \text{is a constant,}$$

or subsequently: $N_1 = \frac{10^6 C^3}{P_1^3} \quad (10)$

It has to be made clear that C is the basic load rating in lbs for a rating life of 1 million revolutions, and this fact establishes the above relationship.

If a bearing has a rating life expressed in number of revolutions designated by N, the life of the bearing expressed in hours, designated by L, can be found from:

$$N = 60 n L$$

where n is the actual speed in rpm of the bearing.

Example 3

For Example 2 where we found $C = 4440$ lbs, find the radial load P_1 for a rating life of 500 hours, at 1500 rpm.

$$P_1^3 = \frac{10^6 C^3}{N_1} = \frac{10^6 C^3}{60 n L}$$

Apply: $C = 4.440$ lbs, $n = 1500$ rpm, and $L = 500$ hrs

$$P_1^3 = \frac{10^6 \times 4.440^3}{60 \times 1500 \times 500} = 1.945 \cdot 10^6$$

$$P_1 = 10^2 \times \sqrt[3]{1.945} = 1250 \text{ lbs}$$

(e) Combined Axial and Radial Loads

This condition is dealt with by ANSI-AFBMA Standard 9-1978 which defines the combined load to be expressed as:

$$P = C_1 (X \cdot i \cdot F_r + Y \cdot F_a) \quad (11)$$

Table 1-5 Shock and Impact Factors

Type of Load	C_1
Constant or steady	1.0
Light shocks	1.5
Moderate shocks	2.0
Heavy shocks	3.0 and up

where value C_1 is a service factor which is shown in **Table 1-5**.

In the above equation:

i = race rotation factor equal 1 for inner ring rotation, 1.2 for outer ring rotation.

F_r and F_a are radial and axial components, respectively, of the load.

X and Y are factors to be used as shown in **Table 1-6**.

NOTE: Y is the axial or thrust factor determined from the value of

$$\frac{F_a}{i Z D^2}$$

Table 1-6 Values of X and Y

Bearing Type				Single Row Bearings		Double Row Bearings											
				$(F_a/F_r) > e$		$(F_a/F_r) \leq e$		$(F_a/F_r) > e$		e							
				X	Y	X	Y	X	Y								
Radial Contact Groove Ball Bearings	$\frac{F_a}{C_o}$	$\frac{F_a}{i Z D^2}$		0.56	2.30	1	0	0.56	2.30	0.19							
		Newtons	lbf														
	0.014	0.172	25														
	0.028	0.345	50														
	0.056	0.689	100														
	0.084	1.03	150														
	0.11	1.38	200														
	0.17	2.07	300														
	0.28	3.45	500														
	0.42	5.17	750														
0.56	6.89	1000															
Angular Contact Groove Ball Bearings with Contact Angle 5°	$\frac{F_a}{C_o}$	$\frac{F_a}{i Z D^2}$		For this type use the X, Y and e values applicable to single row radial contact bearings.		1	0.78	0.78	2.78	0.23							
		Newtons	lbf														
	0.014	0.172	25														
	0.028	0.345	50														
	0.056	0.689	100														
	0.085	1.03	150														
	0.11	1.38	200														
	0.17	2.07	300														
	0.28	3.45	500														
	0.42	5.17	750														
0.56	6.89	1000															
10°	0.014	0.172	25	0.46	1.88	1	0.75	0.75	2.18	0.29							
	0.029	0.345	50														
	0.057	0.689	100														
	0.086	1.03	150														
	0.11	1.38	200														
	0.17	2.07	300														
	0.29	3.45	500														
	0.43	5.17	750														
	0.57	6.89	1000														
15°	0.015	0.172	25	0.44	1.47	1	0.72	0.72	1.65	0.38							
	0.029	0.345	50														
	0.058	0.689	100														
	0.087	1.03	150														
	0.12	1.38	200														
	0.17	2.07	300														
	0.29	3.45	500														
	0.44	5.17	750														
	0.58	6.89	1000														
20°			0.43	1.00	1	0.65	0.65	0.65	1.63	0.57							
25°			0.41	0.87													
30°			0.39	0.76													
35°			0.37	0.66													
40°			0.35	0.57													
Self-aligning Ball Bearings				0.40	$0.40 \cot \alpha$	1	$0.42 \cot \alpha$	0.65	$0.65 \cot \alpha$	$1.5 \tan \alpha$							

- (1) Two similar, single row, angular contact ball bearings mounted "Face-to-face" or "Back-to-back" are considered as one, double row, angular contact bearing.
- (2) Values of X, Y and e for a load or contact angle other than shown in **Table 5-5** are obtained by linear interpolation.
- (3) Values of X, Y and e shown in **Table 5-5** do not apply to filling slot bearings for applications in which ball-raceway contact areas project substantially into the filling slot under load.
- (4) For single row bearings, when $F_a/F_r \leq e$, use $X = 1$ and $Y = 0$.

*Reprinted by permission of the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036 (for ANSI-AFBMA Std. 9-1978).

Example 4

For a bearing dealt with in Example 2, assume that it carries a combined load of 400 lbs radially and 300 lbs axially at 1200 rpm. The outer ring rotates, and the bearing is subjected to moderate shock. Find the rating life of this bearing in hours.

Solution:

$$\frac{F_a}{i Z D^2} = \frac{300}{9 \times 0.4375^2} = 174$$

$$Y = 1.50$$

$$C_1 = 2$$

$$P = 2(0.56 \times 1.2 \times 400 + 1.5 \times 300) = 1440 \text{ lbs equivalent radial load}$$

$$N = \frac{10^6 C^3}{P^3} = 60 n L$$

$$L = \frac{10^6 C^3}{60 n P^3} = \frac{10^6 \times 4440^3}{60 \times 1200 \times 1440^3} = 410 \text{ hr, it will be attained or exceeded.}$$

life with 90 percent probability that

NOTE: The impact load on a bearing should not exceed the static capacity as given by **Table 1-4** or the race may be damaged by Brinelling from the balls. This load may be exceeded somewhat if the bearing is rotating and the duration of the load is sufficient for the bearing to make one or more complete revolutions while the load is acting.

Example 5

What change in the loading of a ball bearing will cause the expected life to be doubled?

Solution:

Let N_1 and P_1 be the original life and load for the bearing. Let N_2 and P_2 be the new life and load.

Then: $N_2 = 2N_1$

By Equation (9):

$$P_2^3 = \frac{N_1 P_1^3}{N_2} = \frac{N_1 P_1^3}{2N_1} = 0.5 P_1^3$$

$$P_2 = \sqrt[3]{0.5 \times P_1} \quad \text{or}$$

$$P_2 = 0.794 P_1$$

Hence a reduction of the load to 79 percent of its original value will cause a doubling of the expected life of a ball bearing.

(f) Variable Loading of Bearings

Ball bearings frequently operate under conditions of variable load and speed. Design calculations should take into account all portions of the work cycle and should not be based solely on the most severe operating conditions. The work cycle should be divided into a number of portions in each of which the speed and load can be considered as constant.

Suppose P_1, P_2, \dots are the loads on the bearing for successive intervals of the work cycle. Let

N_1 be the life of the bearing, in revolutions, if operated exclusively at the constant load P_1 . Let there be N_1' applications of load P_1 . Then N_1'/N_1 represents the proportion of the life consumed in this portion of the cycle.

Let N_2 be the life of the bearing, in revolutions, if operated exclusively at load P_2 . Let there be N_2' applications of load P_2 . Then N_2'/N_2 represents the proportion of the life consumed by load P_2 .

A corresponding statement can be made for each portion of the work cycle. The sum of these proportions represents the total life of the bearing or unity. Then:

$$\frac{N_1'}{N_1} + \frac{N_2'}{N_2} + \frac{N_3'}{N_3} + \dots = 1 \quad (12)$$

Let N_c be the life of the bearing under the combined loading. Let $N_1' = \alpha_1 N_c$ where α_1 represents the proportion of the total life, consumed under load P_1 . In a similar way, $N_2' = \alpha_2 N_c$, $N_3' = \alpha_3 N_c$, and so on. Substitution in Equation (12) yields:

$$\frac{\alpha_1}{N_1} + \frac{\alpha_2}{N_2} + \frac{\alpha_3}{N_3} + \dots = \frac{1}{N_c}$$

Using Equation (10):

$$N_1 = \frac{10^6 C^3}{P_1^3}, \quad N_2 = \frac{10^6 C^3}{P_2^3}, \dots \text{ and so on.}$$

Combining these last two equations we can obtain:

$$\frac{1}{N_c} = \frac{\alpha_1 P_1^3}{10^6 C^3} + \frac{\alpha_2 P_2^3}{10^6 C^3} + \dots, \text{ or multiplying both sides of the equation by } 10^6 C^3$$

$$\frac{10^6 C^3}{N_c} = \alpha_1 P_1^3 + \alpha_2 P_2^3 + \dots \quad (13)$$

From previous definition of α it is obvious that $\alpha_1 + \alpha_2 + \dots$ must equal unity. The application of this equation will be demonstrated by the following examples.

Example 6

A ball bearing is to operate on the following work cycle:

Radial load of 1400 lbs at 200 rpm for 25% of the time

Radial load of 2000 lbs at 500 rpm for 20% of the time

Radial load of 800 lbs at 400 rpm for 55% of the time

Total rpm is to be 1100.

Additional conditions:

The inner ring rotates; loads are steady. Find the minimum value of the basic rating load C for a suitable bearing for this application if the required life is 7 years at 4 hours per day.

	Assumed interval, min	rpm	In assumed interval, rev.
$P_1 = 1400$ lbs	0.25	200	50
$P_2 = 2000$ lbs	0.20	500	100
$P_3 = 800$ lbs	0.55	400	220
	1.00		370 rpm

Since both the load as well as the speed for the particular load varies, we have to establish the actual work cycle per minute.

The following table should be constructed:

$$\text{Then } \alpha_1 = \frac{50}{370}, \alpha_2 = \frac{100}{370}, \alpha_3 = \frac{220}{370}$$

A working year is assumed to consist of 250 days.

Total life duration of the bearing expressed in hours will become $7 \times 250 \times 4 = 7000$ hours, whereas this expressed in number of revolutions becomes:

$$N_c = 7000 \times 60 \times 370 = 1554 \times 10^5 \text{ revolutions.}$$

Inputting this data in the formula (13), previously derived in **1.5 (f)**:

$$\frac{10^6 C^3}{N_c} = \alpha_1 P_1^3 + \alpha_2 P_2^3 + \alpha_3 P_3^3 \dots,$$

$$\text{we obtain: } \frac{50}{370} \times 1400^3 + \frac{100}{370} \times 2000^3 + \frac{220}{370} \times 800^3 = (3708 + 21622 + 3044) \times 10^5$$

$$\frac{10^6 C^3}{N_c} = 28374 \times 10^5$$

$$\frac{C^3}{N_c} = 2837.4$$

$$C^3 = 2837.4 \times N_c = 2837.4 \times 1554 \times 10^5 = 44093 \times 10^7$$

$$C = 7610 \text{ lbs}$$

In order to choose the appropriate bearing, we refer to **Table 1-4** from which we find that a bearing such as No. 308 should be satisfactory, keeping in mind there is but a 90 percent probability that the required life will be attained or exceeded.

Example 7

A 306 radial ball bearing with inner ring rotation has a 10-sec work cycle as follows:

For 2 seconds	For 8 seconds
$F_r = 800 \text{ lbs}$	$F_r = 600 \text{ lbs}$
$F_a = 400 \text{ lbs}$	$F_a = 0 \text{ lbs}$
$n = 900 \text{ rpm}$	$n = 1200 \text{ rpm}$
Light shock	Steady load

Find the rating life of this bearing in hours and in years of 250 working days of 2 hours each.

Solution:

Since the bearing chosen is No. 306, from **Table 1-4**:

$$Z = 8, D = 0.5 \text{ and } i = 1.$$

$$\frac{F_a}{i Z D^2} = \frac{400}{1 \times 8 \times 0.5^2} = 200$$

From Table 1-6 for this value of 200, a value for Y will be 1.45 and X will be 0.56.

From Equation (11) and **Table 1-5**, for the combined axial and radial loads with light shock and 2-second duration:

$$P_1 = C_1 (X_i F_r + Y F_a) = 1.5 (0.56 \times 1 \times 800 + 1.45 \times 400)$$

$$P_1 = 1542 \text{ lbs (equivalent radial load)}$$

Since P_2 is a pure radial load:

$$P_2 = F_r = 600 \text{ lbs}$$

The number of revolutions for the 2-second time duration will be:

$$\frac{900}{60} \times 2 = 30$$

whereas for the 8-second time duration will be:

$$\frac{1200}{60} \times 8 = 160$$

The combined total number of revolutions in 10 seconds is:

$$30 + 160 = 190$$

then,

$$\alpha_1 = \frac{30}{190} = \frac{3}{19}, \quad \alpha_2 = \frac{160}{190} = \frac{16}{19}$$

From formula (13)

$$\frac{10^6 C^3}{N_c} = \alpha_1 P_1^3 + \alpha_2 P_2^3$$

Using $C = 5120$ in **Table 1-4** for bearing No. 306:

$$\frac{10^6 \times 5120^3}{N_c} = \frac{3}{19} \times 1542^3 + \frac{16}{19} \times 600^3 = 578.9 \times 10^6 + 181.9 \times 10^6 = 760.8 \times 10^6$$

$$N_c = \frac{5120^3}{760.8} = \frac{134218 \times 10^6}{760.8} = 176 \times 10^6 = L_{10} \times 10^6$$

This is the number of revolutions the bearing will endure. The total number of revolutions during the 10-second operation was established as being 190. Therefore, the number of revolutions per minute will be:

$$n = \frac{190}{10} \times 60 = 1140 \text{ rpm}$$

From Equation (8):

$$L = \frac{10^6 L_{10}}{60 \times n} = \frac{175 \times 10^6}{60 \times 1140} = 2558 \text{ hours}$$

This expressed in years of operation will become

$$\frac{2558}{2 \times 250} = 5.12 \text{ years of life with 90 percent probability of service, assuming 2 hours of operation per day}$$

(g) Static Loading of Bearings

Up to this point we have been dealing with dynamic loading of bearings. This is the condition when there is relative motion between the rings of the bearings and the balls that are rotating. If this is not the case, as a result of static concentrated loads of the balls against the races, the depressions of the balls into the races will gradually enlarge, and permanent indentations will remain. The static capacity is ordinarily defined as the maximum allowable static load that does not impair the running characteristics of the bearing to make it unusable.

This permanent deformation under the balls is known as Brinnelling and takes place at moderate to high loads. The magnitude of the permissible load is found by methods given in the standards. Calculations for the bearings of **Table 1-4** have been made and are shown in the column headed P_{st} .

When very smooth and quiet operation is required, the loading should be no more than about one-half the static capacity.

Back and forth rotation of the shaft through small angles can cause early failure of bearings unless the load is very light. Lubrication is difficult because the oil or grease may not be replenished back of a ball or roller before the motion is reversed.

(h) Effect of Increased Confidence Levels

When a bearing is installed, there is no way of knowing whether it is one of the 90 percent that are good or one of the 10 percent that will not attain the rating life. In other words, one can have but 90 percent confidence that the bearing will achieve or exceed its rating life, usually designated L_{10} .

In some cases, a greater degree of reliability is required. The expected life will of course be reduced as the reliability is made higher. Let an adjusting factor a_1 be taken such that life L_n is equal to $a_1 L_{10}$. Factors a_1 for different values of the reliability are given in **Table 1-7**. Life L_{10} is the rating life.

Table 1-7 Constants for Designing at Different Confidence Levels

Reliability (%)	L_n	Life Adjustment Factor, a_1
90	L_{10}	1.00
95	L_5	0.62
96	L_4	0.53
97	L_3	0.44
98	L_2	0.33
99	L_1	0.21

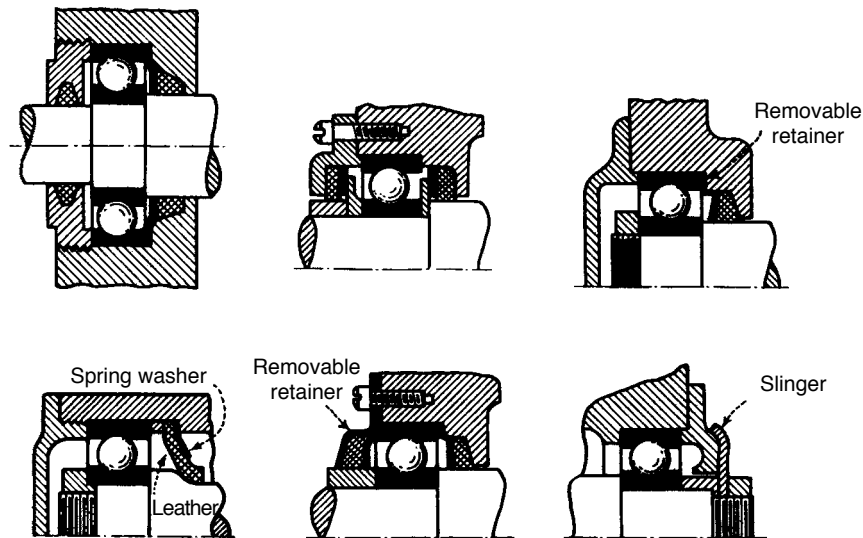


Fig. 1-8

1.6 Mounting of Ball Bearings

For a rotating shaft, relative rotation between shaft and bearing is usually prevented by mounting the inner ring with a press fit and securing it with a nut threaded on the shaft. Excessive interference of metal must be avoided in press fits, or the stretching of the inner ring may decrease the small but requisite internal looseness of the bearing.

The tolerances for shafts and housings as a function of their respective sizes are given in **Tables 1-8** and **1-9**. Please note that the nominal sizes are given in millimeters, however, the tolerances themselves are given in inches.

Although the outer ring, when the shaft rotates, is mounted more loosely than the inner ring, rotational creep between the ring and housing should be prevented. When two bearings are mounted on the same shaft, the outer ring of one of them should be permitted to shift axially to care for any differential expansion between shaft and housing. Several examples of typical mounting details with oil retainers are shown in **Fig. 1-8**. The catalogs of the various manufacturers contain useful illustrations of this kind, as well as other practical information.

Shafts or spindles in machine tools and precision equipment that must rotate without play or clearance in either the radial or axial directions can be mounted on preloaded ball bearings. The preloading, which removes all play from the bearing, can be secured in a number of different ways. For example, suppose the outer rings of the bearings at **A** in **Fig. 1-9** project a small but controlled amount beyond the inner rings. When the inner rings are brought into contact at **B** by means of the locknut, the balls will be displaced in the rings an amount sufficient

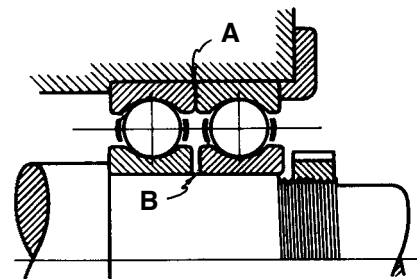


Fig. 1-9 Method for obtaining preloading in ball bearings

Table 1-8 Deviation of Shaft Diameters from Nominal Dimensions (inches)

Fit inner ring to shaft		Push fit	Push fit to wringing fit	Wringing fit	Drive fit		Light force fit		Force fit		Heavy force fit	
Nominal dia. (mm)		g6	h6	h5	j5	j6	k5	k6	m5	m6	n6	p6
Over	Incl.											
3	6	-0.0002 -0.0005	0 -0.0003	0 -0.0002	+0.0002 -0.0000							
6	10	-0.0002 -0.0006	0 -0.0004	0 -0.0002	-0.0002 -0.0006	-0.0003 -0.0001						
10	18	-0.0002 -0.0007	0 -0.0004	0 -0.0003	-0.0002 -0.0007	-0.0003 -0.0001	-0.0004 -0.0000	-0.0005 -0.0000				
18	30	-0.0003 -0.0008	0 -0.0005	0 -0.0004	-0.0003 -0.0008	-0.0004 -0.0002	-0.0004 -0.0001	-0.0006 -0.0001	-0.0007 -0.0003	-0.0008 -0.0003	-0.0011 -0.0006	
30	50	-0.0004 -0.0010	0 -0.0006	0 -0.0004	-0.0004 -0.0010	-0.0004 -0.0002	-0.0005 -0.0001	-0.0007 -0.0001	-0.0008 -0.0004	-0.0010 -0.0004	-0.0013 -0.0007	-0.0017 -0.0010
50	80	-0.0004 -0.0011	0 -0.0007	0 -0.0005	-0.0004 -0.0011	-0.0005 -0.0003	-0.0006 -0.0001	-0.0008 -0.0001	-0.0009 -0.0004	-0.0012 -0.0004	-0.0015 -0.0008	-0.0020 -0.0013
80	120	-0.0005 -0.0013	0 -0.0009	0 -0.0006	-0.0005 -0.0013	-0.0005 -0.0004	-0.0007 -0.0001	-0.0010 -0.0001	-0.0011 -0.0005	-0.0014 -0.0005	-0.0018 -0.0009	-0.0023 -0.0015
120	180	-0.0006 -0.0015	0 -0.0010	0 -0.0007	-0.0006 -0.0015	-0.0006 -0.0004	-0.0008 -0.0001	-0.0011 -0.0001	-0.0013 -0.0006	-0.0016 -0.0006	-0.0020 -0.0011	-0.0027 -0.0017

Table 1-9 Deviation of Housing Bores from Nominal Dimensions (inches)

Fit inner ring to shaft		Close running fit	Slide fit		Push fit		Wringing fit		Drive fit		Heavy drive fit		Light force fit	
Nominal dia. (mm)		G7	H8	H7	J7	J6	K6	K7	M6	M7	N6	N7	P6	P7
Over	Incl.													
10	18	-0.0002 -0.0009	0 -0.0011	0 -0.0007	-0.0003 -0.0004	-0.0002 -0.0002	-0.0004 -0.0001	-0.0005 -0.0002	-0.0006 -0.0002	-0.0007 0	-0.0008 -0.0004	-0.0009 -0.0002	-0.0010 -0.0006	-0.0011 -0.0004
18	30	-0.0003 -0.0011	0 -0.0013	0 -0.0008	-0.0004 -0.0005	-0.0002 -0.0003	-0.0004 -0.0001	-0.0006 -0.0002	-0.0007 -0.0002	-0.0008 0	-0.0009 -0.0004	-0.0011 -0.0003	-0.0012 -0.0007	-0.0014 -0.0006
30	50	-0.0004 -0.0013	0 -0.0015	0 -0.0010	-0.0004 -0.0006	-0.0002 -0.0004	-0.0005 -0.0001	-0.0007 -0.0003	-0.0008 -0.0002	-0.0010 0	-0.0011 -0.0005	-0.0013 -0.0003	-0.0015 -0.0008	-0.0017 -0.0007
50	80	-0.0004 -0.0016	0 -0.0018	0 -0.0012	-0.0005 -0.0007	-0.0002 -0.0005	-0.0006 -0.0002	-0.0008 -0.0004	-0.0009 -0.0002	-0.0012 0	-0.0013 -0.0006	-0.0015 -0.0004	-0.0018 -0.0010	-0.0020 -0.0008
80	120	-0.0005 -0.0019	0 -0.0021	0 -0.0014	-0.0005 -0.0009	-0.0002 -0.0006	-0.0007 -0.0002	-0.0010 -0.0004	-0.0011 -0.0002	-0.0014 0	-0.0015 -0.0004	-0.0018 -0.0004	-0.0020 -0.0012	-0.0023 -0.0009
120	180	-0.0006 -0.0021	0 -0.0025	0 -0.0016	-0.0006 -0.0010	-0.0003 -0.0007	-0.0008 -0.0002	-0.0011 -0.0005	-0.0013 -0.0003	-0.0016 0	-0.0018 -0.0008	-0.0020 -0.0005	-0.0024 -0.0014	-0.0027 -0.0011
180	250	-0.0006 -0.0024	0 -0.0028	0 -0.0018	-0.0006 -0.0012	-0.0003 -0.0009	-0.0009 -0.0002	-0.0013 -0.0005	-0.0015 -0.0003	-0.0018 0	-0.0020 -0.0009	-0.0024 -0.0006	-0.0028 -0.0016	-0.0031 -0.0013
250	315	-0.0007 -0.0027	0 -0.0032	0 -0.0020	-0.0006 -0.0014	-0.0003 -0.0010	-0.0011 -0.0002	-0.0014 -0.0006	-0.0016 -0.0004	-0.0020 0	-0.0022 -0.0010	-0.0026 -0.0006	-0.0031 -0.0019	-0.0035 -0.0014
315	400	-0.0007 -0.0030	0 -0.0035	0 -0.0022	-0.0007 -0.0015	-0.0003 -0.0011	-0.0011 -0.0003	-0.0016 -0.0007	-0.0018 -0.0004	-0.0022 0	-0.0024 -0.0010	-0.0029 -0.0006	-0.0034 -0.0020	-0.0039 -0.0016
400	500	-0.0008 -0.0033	0 -0.0038	0 -0.0025	-0.0008 -0.0017	-0.0003 -0.0013	-0.0013 -0.0003	-0.0018 -0.0007	-0.0020 -0.0004	-0.0025 0	-0.0026 -0.0011	-0.0031 -0.0007	-0.0037 -0.0022	-0.0043 -0.0018
500	630	-0.0009 -0.0035	0 -0.0041	0 -0.0027	-0.0009 -0.0018	-0.0003 -0.0014	-0.0014 -0.0003	-0.0019 -0.0008	-0.0022 -0.0005	-0.0027 0	-0.0029 -0.0012	-0.0034 -0.0007	-0.0041 -0.0024	-0.0046 -0.0020

to remove all looseness from the bearing. Close attention must be paid to dimensions and tolerances to secure just enough projection of the ring to remove the play, but not so much as to induce excessive pressure or binding of the balls. The bearing at the other end of the shaft must be arranged for free axial movement of the outer ring. The bearings in **Fig. 1-9** can be separated if desired with one bearing at each end of the shaft. Although this arrangement will remove the looseness from both ends of the shaft, serious stresses may be induced by a temperature difference between shaft and housing. Preloaded, double-row radial bearings are made by some manufacturers.

1.7 Unground Ball Bearings

The foregoing discussion has referred to ball bearings of the highest quality of materials and workmanship. Other bearings of lower quality can be purchased for installations requiring less accuracy or where cost is the controlling factor. The rings are made on automatic screw machines and are hardened but not ground.

Different types of construction are in use. The bearing of **Fig. 1-10(a)** has the outer ring split by a plane perpendicular to the axis. The bearing is assembled by spinning the edges of the bushing, which is slipped over the outer rings. The bearing of **Fig. 1-10(b)** has a split inner ring, and is made by staking the bore of the inner ring as shown. Various additional features, such as pulleys, gears, castor wheels, and so on, can be incorporated as an integral part of the outer ring. **Fig. 1-10 (c)** shows a sheave-idler in which the outer ring is formed by the stampings comprising the sheave. Unground ball bearings are frequently cheaper than an equivalent plain bushing.

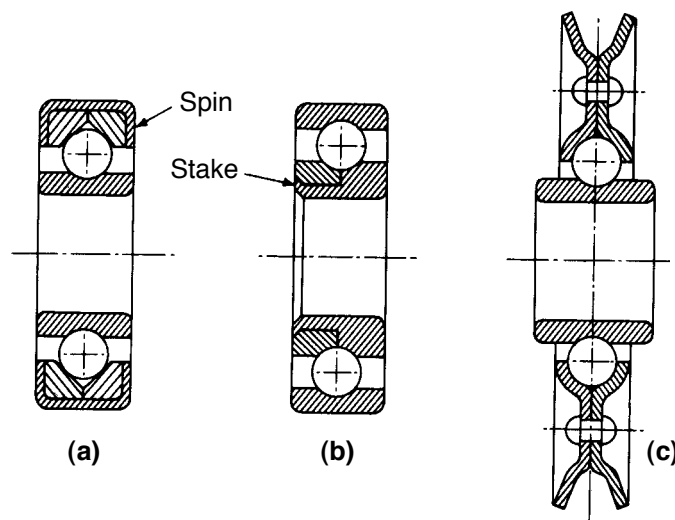


Fig. 1-10 Types of Unground Ball Bearings

1.8 Roller Bearings

Several roller bearings are shown in **Fig. 1-2** as well as in **Fig. 1-11**. These types of bearings are usually used when shock and impact loads are present, or when large bearings are needed.

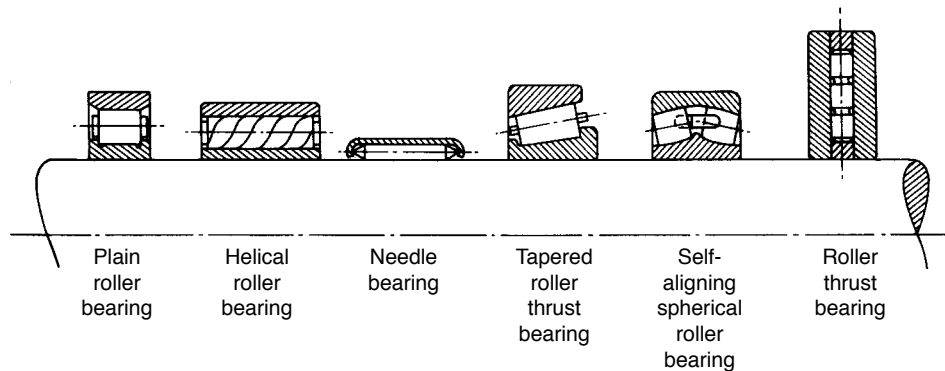


Fig. 1-11 Types of Roller Bearings

A roller bearing, in general, consists of the same four elements as a ball bearing: the two rings, the cage, and the rollers. Some typical examples of roller bearings are shown in **Fig. 1-11**. Means of mounting roller bearings are shown in **Fig. 1-12**.

In a plain roller bearing, the flanges on the rings serve to guide the rollers in the proper direction. When the flanges are omitted from one of the rings, as shown in **Fig. 1-11**, the rings can then be displaced axially with respect to each other, and no thrust component can be carried.

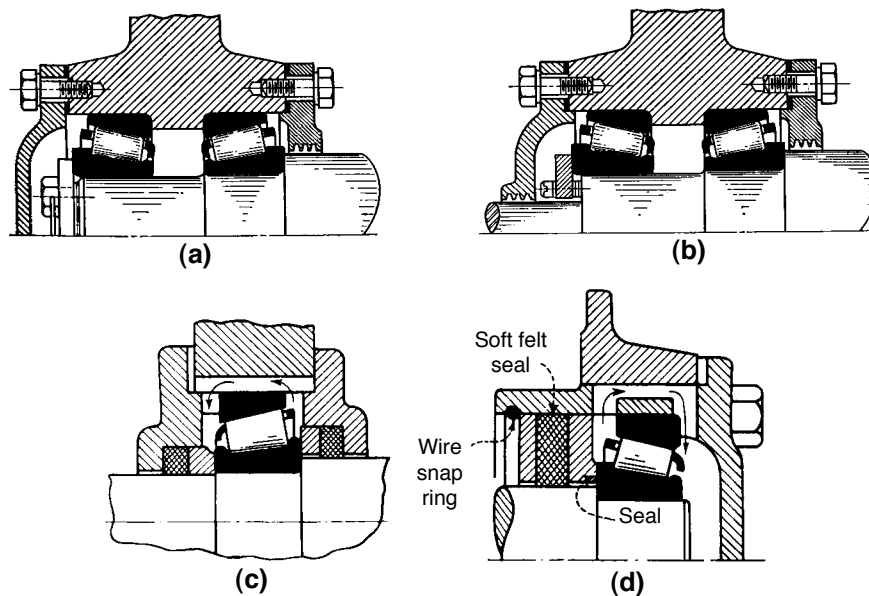


Fig. 1-12 Details of Mounting of Roller Bearings

In addition to the radial load, the tapered roller bearing can carry a large axial component whose magnitude depends on the angularity of the rollers. The radial load will also produce a thrust component. The outer ring is separable from the remainder of the bearing. In this type of

bearing, it is possible to make adjustment for the radial clearance. Two bearings are usually mounted opposed to each other, and the clearance is controlled by adjusting one bearing against the other. Double-row tapered roller bearings are also available.

Roller bearings in general can be applied only where the angular misalignment caused by shaft deflection is very slight. This deficiency is not present in the spherical roller bearing. It has excellent load capacity and can carry a thrust component in either direction.

In the helical roller bearing, the rollers are wound from strips of spring steel, and afterwards are hardened and ground to size. If desired, the rollers can bear directly on the shaft without an inner ring, particularly if the shaft surface has been locally hardened. This bearing has been successfully applied under conditions of dirty environment.

The needle bearing has rollers that are very long as compared to their diameters. Cages are frequently not used, and the inner ring may or may not be present. The outer ring may consist of hardened thin-walled metal as shown in **Fig. 1-13**; the housing in which the bearing is mounted must have sufficient thickness to give adequate support. The friction of needle bearings is several times as great as for ordinary cylindrical roller bearings. Because of the tendency of the unguided rollers to skew, needle bearings are particularly adapted to oscillating loads, as in wrist pins, rocker arms, and universal joints. For continuous rotation, needle bearings are usually suitable where the loading is intermittent and variable so that the needles will be frequently unloaded and thus tend to return to their proper locations. When the application involves angular misalignment of the shaft, two short bearings end to end usually are better than one bearing with long rollers. The needle bearing is low-priced and requires very little radial space.

Spherical roller bearings, **Figures 1-12** and **1-13**, can be used when the shaft has angular misalignment.

Thrust bearings can be constructed by the use of straight or tapered rollers.

Roller bearings are selected by a process similar to that used for ball bearings. They must be chosen, however, in accordance with the recommendations given in the catalog of the manufacturer of the particular type of bearing under consideration.

Roller bearings are usually made of case-hardened steels. The carburized case or exterior should have a hardness of 58-63 R_c. The core is softer with a hardness of 25-40 R_c. Certain plain-carbon and alloy steels have been found suitable for roller bearing service. The maximum temperature is limited to about 350° F.

The separator, cage, or retainer for conventional bearings is usually a stamping of low-carbon steel. For higher speeds or precision service, the separator is machined from a suitable copper alloy, such as bronze. Cages are also made of a solid lubricant material for use where



Fig. 1-13 Self-Aligning Spherical Roller Bearing for Radial and Thrust Loads

conventional types of lubrication cannot be used.

1.9 Lubrication and Surface Finishes

Rolling contact bearings have to be lubricated in addition to having exceedingly good surface finishes.

The life of a rolling element bearing depends to a large extent on the smoothness of the contacting surfaces – the balls, rollers, and races. Typical surface roughness dimensions for production bearings are as follows:

Balls	2– 3 $\mu\text{in rms}$
Ball races	6–10 $\mu\text{in rms}$
Rollers	8–12 $\mu\text{in rms}$
Roller races	10–20 $\mu\text{in rms}$

These are in terms of microinches or millionths of an inch, usually written μin .

The unit of measurement of the surface roughness is rms which stands for “root-mean-square height”. This value is obtained by drawing a diamond point instrument over the surface with a magnified readout. These measurements are taken at equidistant points on the profile, squaring these values, adding them, dividing the sum by the number of readings taken and taking the square root of this average.

There are calibrated specimens available and surface roughness can be established by comparison to the specimen.

Surface finishes of bearings vary considerably from manufacturer to manufacturer. They are usually not given specifically for each product.

As far as lubrication is concerned, in general, the application environment will usually dictate the proper lube required. Today’s lubrication selection has varied greatly over the past few years. Modern methods of mixing, compounding and blending various additives and bases has become a very exact science, a far cry from late 1940 when almost all lubricants were a refined petroleum product.

Operational conditions such as temperature, loads, speed, environment and torque available, will determine what type should be used – oil, grease or dry films. Oil fluid is the base lubricant for nearly all bearings, whereas grease is an oil that has been thickened. The use of lubrication will reduce friction and wear, prevent corrosion or oxidation and help to prevent heat buildup within the bearing. Other benefits that result from proper lubrication are quietness, lower torque and extended life. Lubrication selection is very important to good bearing performance. The following tables of lubrications shown are the most widely used by bearing users today. Due to the constant change of product demand and scientific technology, we recommend that a QBC engineer be consulted if you cannot locate a suitable lubrication in the following charts.

Unless otherwise specified by the customer, QBC will supply bearings with an oil lubrication meeting military specifications (MIL-L-6085A) or grease meeting (MIL-G-23827A).

The numbering system developed by QBC incorporates a lubrication code. This gives the user an opportunity to specify the lubricant required as per **Table 1-10**. In case the code numbers assigned do not cover the lubricant required, **Tables 1-11** thru **1-13** list the lubricants available on special orders.

Table 1-10 Available Lubricants

Lubricant Code	Brand Name	Basic Type Oil	Operating Temp. °F	Uses
01	*Windsor L245X (MIL-L-6085A)	Synthetic oil	-65 to +300	Light general purpose instrument oil
15	DuPont Krytox 143 AC	Fluorinated oil	-30 to +550	High temperature stability with good lubricity properties
49	AeroShell #7 (MIL-G-23827A)	Diester	-100 to +300	Wide temperature range; good general purpose grease
54	Texaco Low Temp EP (MIL-G-23827A)	Synthetic Ester	-65 to +250	Low torque at cold temperature
20	*Exxon Beacon 325	Synthetic grease	-65 to +250	General purpose grease
39	*Exxon Andok C	Channeling petroleum grease	-20 to +250	Smooth running, long life with minimum migration
13	Toray SH44M	Silicone grease	-25 to +350	Higher temperature stability
48	*Mobil 28 (MIL-G-81322)	Synthetic hydrocarbon	-65 to +350	Wide temperature range, good low temperature torque, general purpose
72	Multemp PS No. 2	Petroleum grease	-60 to +250	Low torque, general purpose grease
75	Chevron SRI-2	Mineral grease	-20 to +350	High speed, high load grease
83	*Shell Alvania X2	Mineral grease	-30 to +250	Long life
10	DuPont Krytox 240AC (MIL-G-27617)	Fluorinated grease	-30 to +550	High temperature stability with good lubricity properties
12	KYODO SRL	Synthetic grease	-40 to +300	Low noise and low torque applications
25	NIG-ACE W	Synthetic grease	0 to +300	Low noise and low torque applications
40	Isoflex JL 032R	Synthetic grease	-60 to +250	High speed, low torque grease
04	U-1494	Synthetic grease	-40 to +350	High speed, high load applications

*Most popular and readily available lubrication.

If no lubrication is called out, QBC will ship bearings with one of these general purpose lubricants.

Table 1-11 Oil Lubricants Available on Special Order

Manufacturer & Trade Name	Mil. Spec	Oper. Range, °F	Type	Pouring Point, °F	Flash Point, °F	Viscosity CS 75°F/210°F
Anderson Oil Co. LS252	MIL-17353A	-65/250	Diester	-75	340	7.6/1.9
Bendix Corp. P10	MIL-L-6085A	-70/350	Diester	-80	420	23.4/3.8
Bray Oil Co. NPT3A 885 NPT9	MIL-L-6085	-65/175 -50/400 -30/350	Diester Diester Ester	-90 -85 -50	400 410 495	19/3.5 1875/9 710/55
Dow Corning DC200 DC510 DC550 FS1265	VVL1078 MIL-L-27694	-40/550 -70/500 -40/450 -50/300	Silicone Silicone Silicone Silicone	-50 -80 -50 -30	600 600 600 500	Various Various 125/20 Various
DuPont, E.I. Krytox 143 AB		-45/450	Perfluor	-45	500	85/10.3
Exxon Corp. P15A Aviation Inst. Oil Univis P12 Univis P38	MIL-L-7808 MIL-L-7870 MIL-L-6085A MIL-L-6085	-65/300 -65/290 -75/300 -65/300	Diester Petroleum Diester Diester	-75 -70 -90 -70	450 300 410 415	22/3.5 17/2.6 30/3.6 72/37
General Electric Versilube F44 Versilube F50 Versilube SF81 Versilube SF96	MIL-S-81087	-100/500 -100/400 -40/400 -40/400	Silicone Silicone Silicone Silicone	-100 -100 -55 -50	550 550 600 600	70/15 75/22 Various 40/16.5
Gulf Oil Co. Synthetic Fluid#6		-50/275	Mineral	-90	295	3200/12
Houghton Oil Cosmolube 270A	MIL-L-6085A	-65/250	Diester	-70	365	15/3.5
Mobil Oil SHC824 XRL743A		-50/350 -50/350	Synthetic Synthetic	-65 -65	455 520	100/6.5 100/6.5
MPS Corp. MO119		-30/250	Synthetic	-80	455	119 @ 100°F
Shell Oil Co. Aeroshell #3 Aeroshell #12 Aeroshell #4	MIL-L-7870 MIL-L-6085A MIL-H-5606	-70/240 -70/300 -70/500	Petroleum Diester Petroleum	-75 -70 -85	275 365 215	16.5/2.3 21.5/3.5 859/10.4
Tenneco Chemical Anderol L401D Anderol L423	MIL-L-6085A	-75/260 -80/350	Diester Synthetic	-80 -100	430 370	19.7/3.4 200/5.1

Table 1-12 Greases Available on Special Order

Manufacturer & Trade Name	Mil. Spec	Oper. Range, °F	Base Oil	Thickener	Color
American Oil Co.					
Rykon Premium #2		-10/200	Mineral	Arylurea	Reddish Pink
Rykon Premium #3		-20/250	Mineral	Arylurea	Lavender
Supermil ASU31052	MIL-G-25013	-100/450	Silicone	Arylurea	Amber
Supermil ASU72832	MIL-G-23827A	-100/250	Diester	Lithium	
Bray Oil Co.					
Braycote 627S	MIL-G-23827	-100/300	Ester	Organic	Lt. Brown
Braycote 637S	MIL-G-25537	-65/260	Mineral	Calcium Soap	Lt. Brown
601		-100/390	Polyether	Tetrafluor	Off White
Chevron Oil Co.					
BRB-2	MIL-G-3545C	-20/350	Mineral	Polyurea	Blue Green
OHT		+20/300	Mineral	Sodium	Greenish
NRR335		-65/300	Synthetic Aeromatic	Sodium	Maroon
Dow Corning					
Molykote BR2 Plus		-20/300	Mineral	Lithium	Black
Molykote 33		-100/350	Silicone	Lithium	Gray
Molykote 41		-0/550	Silicone	Lithium	Black
Molykote 44	MIL-G-46886A	-100/400	Silicone	Lithium	Dark Amber
Molykote 55M	MIL-G-4343	-65/350	Silicone	Lithium	Tan
DuPont, E.I.					
Krytox 240AA	MIL-G-27617	-30/450	Fluor Carbon	Vidax	White
Krytox 240AB	MIL-G-27617	-30/450	Fluor Carbon	Vidax	White
Krytox 240AZ	MIL-G-27617	-65/300	Fluor Carbon	Vidax	White
Krytox 240AC	MIL-G-27617	-30/550	Perfluor	Tetrafluor	White
Exxon Corp.					
Andok B	MIL-G-18709A	-20/250	Mineral	Sodium	Brown
Andok 260	MIL-G-3545C	-20/250	Mineral	Sodium	Amber
General Electric					
Versilube G351	MIL-L-15719A	-40/400	Silicone	Lithium	Cream
Houghton E.F.					
Cosmolube 615	MIL-L-4343	-65/375	Silicone	Lithium	Lt. Brown
Kyodo Yushi					
PS #2		-60/230	Diester	Lithium	White
Mobil Oil					
BRB #23	MIL-L-7711	-0/250	Petroleum	Sodium	Tan
Mobil 24	MIL-G-25013	-100/550	Silicone	Organic	Reddish
Mobil 27	MIL-G-23827	-65/325	Carbon	Non Soap	Tan

Table 1-13 Greases Available on Special Order

Manufacturer & Trade Name	Mil. Spec	Oper. Range, °F	Base Oil	Thickener	Color
NYE Rheolube					
703A		-30/250	Mineral	Sodium	Tan
716B		-60/300	Polyol Ester	Lithium	Tan
781D		-95/390	Silicone	Lithium	Off White
899RP		-130/480	Fluorether	PTFE	White
2000		-60/260	Hydrocarbon	Organic	Red
Rheo Temp 500	MIL-G-3278A	-65/350	Diester	Sodium	Blue
Shell Oil					
Aeroshell #5	MIL-G-3545C	-20/300	Petroleum	Microgel	Dark Brown
Aeroshell #6	MIL-G-24139	-40/250	Mineral	Microgel	Amber
Aeroshell #7	MIL-G-23827A	-100/300	Diester	Microgel	Amber
Aeroshell #14	MIL-G-23827	-65/250	Mineral	Calcium Soap	Tan
Aeroshell #17	MIL-G-21164	-100/300	Diester	Microgel	Dark Grey
Aeroshell #22	MIL-G-81322A	-80/350	Diester	Microgel	Dark Grey
Alvania #3	MIL-G-81322C	-30/275	Mineral	Lithium	Amber
Cyprina #3	MIL-G-18709	-0/250	Mineral	Lithium	Lt. Tan
Dolium R #2		-30/300	Mineral	Ashless	Amber
Darina	MIL-G-18709	-0/300	Mineral	Microgel	Amber
Royal Lubricant					
Royco 13D	MIL-G-25013	-100/450	Silicone	Teflon	Lavender
Royco 21	MIL-G-7421	-100/250	Diester	Lithium	Brownish
Royco 22MS	MIL-G-81827	-80/360	Diester	Clay	Black
Royco 27A	MIL-G-23827	-100/300	Diester	Lithium	Brownish
Royco 37	MIL-G-25537	-65/250	Mineral	Calcium Soap	Tan
Royco 64C	MIL-G-21164	-65/250	Diester	Lithium	Black
Tenneco Chem. (Huls)					
Anderol 753A		-40/300	Diester	Lithium	Lt. Brown
Anderol 757		-40/300	Diester	Lithium	Lt. Brown
Anderol 761		-40/400	Diester	Silica	Lt. Brown
Anderol 793A	MIL-G-3278A	-65/300	Diester	Lithium	Lt. Amber
Anderol 794		-65/250	Diester	Lithium	Lt. Amber
Anderol 795		-65/300	Diester	Lithium	Off White
Texaco Oil Co.					
Premium RB		-30/325	Mineral Syn-	Lithium	Orange
Low Temp EP	MIL-G-23827	-65/250	thetic Mineral	Lithium	Purplish Brown
Regal AFB #2	MIL-G-18709	-40/250	Parafin	Lithium	Green
Unitemp 500	MIL-G-3278A	-65/350	Diester	Sodium	Blue

2.0 SINTERED-METAL BEARINGS

2.1 General Properties

Sintered-metal self-lubricating bearings are based on powder-metallurgy technology. They are economical, suitable for high production rates and can be manufactured to precision tolerances.

General properties of porous-metal bearing materials have been described in *Machine Design* magazine (Vol. 54, #14, June 17, 1982, pp. 131-132), with whose permission the following material is reprinted:

Sintered-metal self-lubricating bearings are widely used in home appliances, small motors, machine tools, aircraft and automotive accessories, business machines, instruments and farm and construction equipment.

Most porous-metal bearings consist of either bronze or iron which has interconnecting pores. These voids take up to 10% to 35% of the total volume. In operation, lubricating oil is stored in these voids and feeds through the interconnected pores to the bearing surface. Any oil which is forced from the loaded zone of the bearing is reabsorbed by capillary action. Since these bearings can operate for long periods of time without additional supply of lubricant, they can be used in inaccessible or inconvenient places where relubrication would be difficult.

Many variations are possible to meet specific requirements. From 1% to 3.5% graphite is frequently added to enhance self-lubricating properties. High porosity with a maximum amount of lubricating oil is used for high-speed light-load applications, such as fractional-horsepower motor bearings. A low-oil-content low-porosity material with a high graphite content is more satisfactory for oscillating and reciprocating motions where it is hard to build up an oil film.

Powder producers can control powder characteristics such as purity, hydrogen loss, particle size and distribution, and particle shape. Each of these properties in some way affects performance. In the bronze system, for example, shrinkage increases as particle size of tin or copper powder in the mix decreases. Graphite additions result in growth but always lower the strength of the bearings. Lubricants used in the mix have only a slight influence on dimensional change, but a more pronounced effect on the apparent density and flow rate.

After sintering, the bearing must be sized to the specific dimensions. Sizing reduces interconnected porosity and produces greater strength, lower ductility and a smooth finish.

Bronze: The most common porous bearing material. It contains 90% copper and 10% tin. These bearings are wear-resistant, ductile, conformable, and corrosion-resistant. Their lubricity, embeddability and low cost give them a wide range of applications from home appliances to farm machinery.

Leaded Bronzes: Have a 20% reduction of the tin content of the usual 90-10 bronze and 4% reduction in copper. Lead content is 14% to 16% of total composition and results in a lower coefficient of friction and good resistance to galling in case the lubricant supply is interrupted. These alloys also have higher conformability than the 90-10 bronzes.

Copper-Iron: The inclusion of iron in the composition boosts compressive strength although the speed limit drops accordingly. These materials are useful in applications involving shock and heavy loads, and should be used with hardened shafts.

Hardenable Copper-Iron: The addition of 1.5% free carbon to copper-iron materials allows them to be heat-treated to a particle hardness of Rockwell C65. They provide high impact resistance and should be used with hardened and ground shafts.

Iron: Combine low cost with good bearing qualities, widely used in automotive applications, toys, farm equipment, and machine tools. Powdered-iron is frequently blended with up to 10% copper for improved strength. These materials have a relatively low limiting value of PV (on the V side), but have high oil-volume capacity because of the high porosity. They have good resistance to wear, but should be used with hardened and ground steel shafts.

Leaded Iron: Provide improved speed capability, but are still low-cost bearing materials.

Aluminum: In some applications they provide cooler operation, greater tolerance for mis-alignment, lower weight and longer oil life than porous bronze or iron. The limiting PV value is 50000, the same as for porous bronze and porous iron.

2.2 Sizing Sintered Bearings

The load-carrying capacity of porous-metal bearings can be measured by a friction/wear criterion, which is a measure of the heat generated by the bearing. It is called the PV factor. The PV factor, as its name implies, is the product of the bearing load, P, expressed in pounds per square inch of projected bearing area, and the surface velocity of the shaft expressed in feet per minute.

If d = inside bearing diameter (in)

l = length of bearing (in)

F = bearing load (lbs)

and N = shaft speed (rpm), then:

$$P = \frac{F}{ld} \quad (\text{lbs/in}^2) \quad (14)$$

$$V = \frac{\pi dN}{12} \quad (\text{ft/min}) \quad (15)$$

and hence,
$$PV = \left(\frac{F}{ld}\right)\left(\frac{\pi dN}{12}\right) = \frac{\pi FN}{12l} = \frac{0.262 FN}{l} \quad (16)$$

Most engineering data relating to the PV factor lists an upper limit to the factor; i.e., a value which should not be exceeded for satisfactory bearing operation. The working value of the PV factor, however, is often less than this upper limit, such as in the case where the sliding velocity is not sufficiently high to maintain an adequate lubricating film. In addition, the PV limit is affected by the static load-carrying capacity of the material, which should not be exceeded. The latter is a function of environmental factors, bearing clearances, geometry and the nature of the load (continuous, intermittent or shock loading). Detailed information on these considerations is usually furnished by the metal manufacturer. General guidelines are summarized in **Table 2-1**.

2.3 Clearances

As in all bearings, satisfactory operation of porous-metal bearings require suitable clearances between shaft and housing. While guidelines depend on the materials used and the nature of the application, a representative chart showing recommended bearing clearances for porous-bronze and porous-iron bearings is given in **Figure 2-1**.

We carry a full line of both thick and thin wall bushings. Please consult the tables in this section of the handbook for information on recommended shaft size and bore diameter to be used with various bushing sizes.

Table 2-1 General Guidelines for the PV Factor in Porous-Metal Bearings

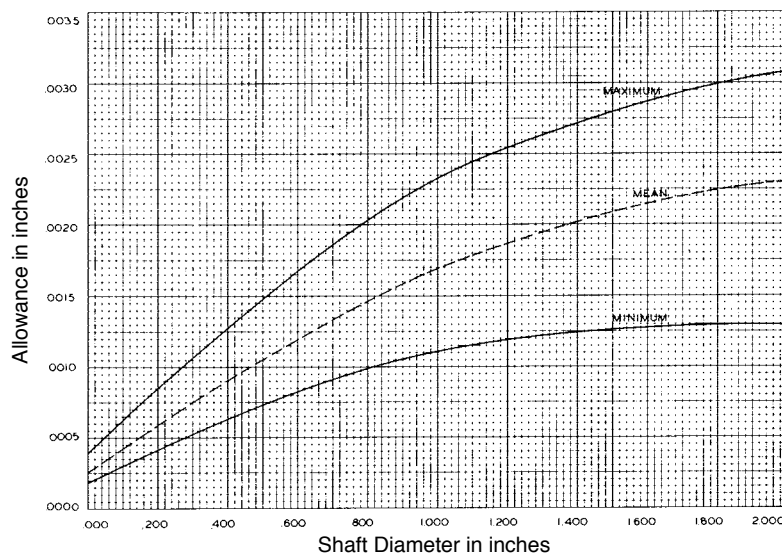
Limiting conditions for operation of porous bearings can be expressed as a PV factor. Since P = load, psi; V = surface velocity, fpm; the PV value gives an index of frictional heat generated on a unit area of the bearing surface. A maximum value of 50000 is common for porous bearings. For long-time running with no additional lubrication, 20000 should be a limit in selecting loads for various speeds. For thrust bearings, a maximum PV of 10000 should be used.

Provision to replenish the oil supply is desirable when the PV factor approaches the maximum under continuous operation for extended periods of time, or for high temperatures. For such cases, oil can be applied to the OD or ends of the bearing. From there it is drawn, by capillary action, into the bearing and metered to the shaft. A reservoir of grease next to the bearing also can be helpful.

Material	PV	Static P (psi)	Dynamic P (psi)	V (fpm)
Bronze	50000	8000	2000	1200
Lead-Bronze	60000	3500	800	1500
Copper-Iron	35000	20000	4000	225
Hardenable Copper-Iron	75000	50000	8000	35
Iron	30000	10000	3000	400
Bronze-Iron	35000	10500	2500	800
Lead-Iron	50000	4000	1000	800
Aluminum	50000	4000	2000	1200

Under certain conditions these recommended values can be exceeded but with a sacrifice in service life.

Reprinted with the permission of *Machine Design* magazine, Vol. 54, #14, June 17, 1982, p. 131.



The upper curve (maximum) and all allowances above the mean are suggested for iron-based bearings only. The chart is representative of average conditions, and each application needs to be evaluated individually.

Fig. 2-1 Recommended Bearing Clearances*

*Reprinted with the permission of Keystone Carbon Company, St. Mary's, PA, from Keystone Porous-Bronze and Porous-Iron Bearings, **Fig. B-34**, p. 9.

SINTERED BEARINGS INSTALLATION DATA
Table 2-2 Thin Wall Bearings

Nominal Hole Size		Hole to Accommodate Bearing		Bearing Outside Diameter		Interference	
Fractional	Decimal	Min.	Max.	Min.	Max.	Min.	Max.
3/16	.1875	.1875	.1885	.1895	.1905	.0010	.0030
1/4	.2500	.2500	.2510	.2520	.2530		
5/16	.3125	.3125	.3135	.3145	.3155		
3/8	.3750	.3750	.3760	.3770	.3780		
7/16	.4375	.4375	.4385	.4395	.4405		
1/2	.5000	.5000	.5010	.5020	.5030		
9/16	.5625	.5625	.5635	.5645	.5655		
5/8	.6250	.6250	.6260	.6270	.6280		
11/16	.6875	.6875	.6885	.6890	.6905		
3/4	.7500	.7500	.7510	.7525	.7535	.0015	.0035
13/16	.8125	.8125	.8135	.8150	.8160		
7/8	.8750	.8750	.8760	.8775	.8785		

Nominal Hole Size		Bearing Hole Size After Close - In		Shaft Size		Clearance	
Fractional	Decimal	Min.	Max.	Min.	Max.	Min.	Max.
1/8	.1250	.1250	.1260	.1235	.1245	.0005	.0025
3/16	.1875	.1875	.1885	.1860	.1870		
1/4	.2500	.2500	.2510	.2485	.2495		
5/16	.3125	.3125	.3135	.3105	.3115	.0010	.0030
3/8	.3750	.3750	.3760	.3730	.3740		
7/16	.4375	.4375	.4385	.4355	.4365		
1/2	.5000	.5000	.5010	.4980	.4990		
9/16	.5625	.5625	.5635	.5605	.5615		
5/8	.6250	.6250	.6260	.6230	.6240		

Table 2-3 Thick Wall Bearings

Nominal Hole Size		Hole to Accommodate Bearing		Bearing Outside Diameter		Interference	
Fractional	Decimal	Min.	Max.	Min.	Max.	Min.	Max.
1/4	.2500	.249	.250	.251	.252	.001	.003
5/16	.3125	.311	.312	.313	.314		
3/8	.3750	.374	.375	.376	.377		

Nominal Hole Size		Bearing Hole Size After Close - In		Shaft Size		Clearance	
Fractional	Decimal	Min.	Max.	Min.	Max.	Min.	Max.
1/8	.1250	.1245	.1255	.1230	.1240	.0005	.0025
3/16	.1375	.1375	.1385	.1360	.1370		
1/4	.2500	.2500	.2510	.2485	.2495		

2.4 Press Fits

A press fit is used when available space and torque to be transmitted is limited. Tolerances of mating parts have to be closely controlled to assure a minimum and avoid all excessive interference.

Formulas for press fit are:

$$p = \frac{eE}{2d} \left[1 - \left(\frac{d}{D} \right)^2 \right] \text{ and } T = \frac{p}{2} pmd^2L,$$

from here $T = 0.785mdLeE \left[1 - \left(\frac{d}{D} \right)^2 \right]$ (lb in) (17)

$$S = \frac{2P}{1 - \left(\frac{d}{D} \right)^2} \text{ or } S = \frac{eE}{d} \quad (18)$$

where:

p = unit pressure on the interfering surfaces (lb/in²)

e = amount of interference (in)

E = modulus of elasticity (psi)

d = shaft diameter (in)

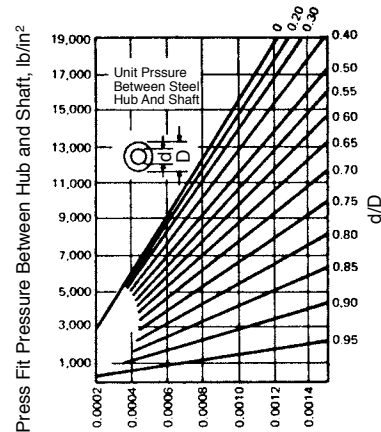
m = coefficient of friction (assume 0.1-0.2)

L = length of interference surfaces (in)

S = combined stress resulting from circumferential tension and radial compression (psi)

T = slip torque (to be divided by safety factor of 2) (lb in)

Graph gives value of p for different d/D ratios and different values of e.



Allowance Per Inch of Shaft Diameter, e

By permission, *Product Engineering*, May 1960

Table 2-4

Running Clearance		Running Clearance		
Proper running clearance for bearings depends, to a great extent, on the particular item. Only minimum recommended clearances for oil-impregnated bearings used with ground steel shafting are listed.		Shaft Size in.	Clearance, min. in.	
			Bronze Base	Iron Base
		Up to 0.760	0.0005	0.001
		0.761 to 1.510	0.001	0.0015
		1.511 to 2.510	0.0015	0.002
		Over 2.510	0.002	0.0025

Press Fits		Recommended Press Fits		
Plain cylindrical journal bearings are commonly installed by press fitting the bearing into a housing with an insertion arbor. For housings rigid enough to withstand the press fit without appreciable distortion and for bearings with thickness approximately one-eighth of the bearing outside diameter, the press fits shown are recommended.		Outside Dia. in.	Press Fit, in.	
			Minimum	Maximum
		Up to 0.760	0.001	0.003
		0.761 to 1.510	0.0015	0.004
		1.511 to 2.510	0.002	0.005
		2.511 to 3.010	0.002	0.006
		Over 3.010	0.002	0.007

Oil-impregnated sintered bearings are manufactured under strictly controlled conditions, and are subjected to in-process inspection. They are tested for radial crushing strength of magnitude:

$$P = \frac{K L T^2}{D - T} \quad (\text{lbs})$$

where:

- D = O.D. of bearing (in)
- T = wall thickness of bearing (in)
- L = bearing length (in)
- K = strength constant = 22500

Should additional shaft to bearing clearance be required, a ball burnishing operation should be used for the following reasons:

- a) to maintain concentricity
- b) to maintain surface finish of I.D.
- c) to reduce contamination of surface

The required size of the bearing can be determined from equations:

- 1) $P = \frac{W}{L d}$ (lbs/in²) (load on projected bearing areas not to exceed 1000 psi)
- 2) $V = \frac{d \pi N}{12}$ (ft/min) (surface speed at bearing I.D. not to exceed 1000 ft/min)
- 3) $PV = \frac{W N \pi}{12L}$ (PV factor – not to exceed 50000)

where:

- W = bearing load (lbs)
- L = bearing length (in)
- N = shaft speed (rpm)
- d = bearing I.D. (in)

Above values are reasonable for the following conditions: continuous rotation, oil impregnation without additional lubrication.

2.5 Standardization

American Society for Testing of Materials (ASTM, 100 Ban-Harbor Drive, W. Conchohocken, PA 19428, Tel. 610-832-9500) publishes detailed specifications dealing with Sintered Bronze Bearings. It is designated as B438-83 (published in 1983). The most significant data pertaining to products listed in this catalog can be summarized as follows:

Table 2-5 Material Composition

Material	%
Copper	87.5 – 90.5
Iron	1.0 Max.
Lead	(a)
Carbon (Graphite Max.)	1.75 Max.
Tin	9.5 – 10.5
Zinc	—
Acid Insolubles	—
Total Other Elements	0.5

(a) included in other elements

Table 2-6 Physical & Mechanical Properties

Characteristic	Value
Density (g/cm ³)	6.4 – 6.8
Porosity (% by volume)	19 min.
“K” Strength Constant	26500
Tensile Strength (psi)	14000
Elongation (% per in)	1
Yield Strength in Compression (psi)	11000

Table 2-7 Miscellaneous Designations

Organization	Designation
ASTM	B-438-83 Grade 1, Type 2
Military	MIL-B-5687D Type 1, Grade 1
MPIF Standard 35	CT-1000-K26
SAE	
New	841
Old	Type 1 Class A
AMS	4805

Table 2-8 Tolerances of Plain and Flanged Bearings


	Over (in)	Up to & Including	Tolerance
Inside & Outside Diameters (in)	—	1/2	+ .000 – .001
	1/2	1	+ .000 – .001
	1	1-1/2	+ .000 – .001
	1-1/2	2-1/2	+ .000 – .0015
	2-1/2	3-1/2	+ .000 – .002
	3-1/2	4-1/2	+ .000 – .0025
Length (in)	—	1-1/2	± .005
	1-1/2	3	± .0075
	3	4-1/2	± .010
Flange Diameter, Based on Flange OD	—	1-1/4	± .005
	1-1/4	2-1/2	± .010
	2-1/2	4	± .015
	4	4-1/2	± .025
Flange Thickness, Based on Flange OD	—	1-1/4	± .0025
	1-1/4	2-1/2	± .005
Flange Fillets, Radii, Based on Body OD	—	1	1/32 ± .010
	1	2	3/64 ± .010
	2	2-1/2	1/16 ± .010
	2-1/2	4	3/32 ± 1/64
Concentricity, ID with Respect to OD (Maximum Total Dial Indicator Reading) Based on ID	—	1	.003
	1	1-1/2	.003
	1-1/2	3	.004
	3	4-1/2	.005

2.6 Conclusion

Sintered bearings are used widely in instruments and general machinery, in which their self-lubricating characteristics and load-carrying ability is very desirable. When properly designed, they can be both economical and highly functional.

Their manufacturing method consists of briquetting the metal powder mixtures to the proper density. Subsequently, they are sintered for different duration subject to the temperatures. Sintered bearings are then sized to obtain the required dimensional characteristics. This is followed by inspection and impregnation with a lubricating oil.

3.0 PLASTIC AND NONMETALLIC BEARINGS

3.1 General Characteristics

Among the significant characteristics of plastic bearings, the following are noteworthy:

- Self-lubricating
- Low wear rates
- Relatively high performance rating (PV) among sleeve bearing materials
- Bearing O.D.'s compatible with standard sintered bronze sizes for upgrading existing equipment
- Kinetic and static coefficient of friction virtually the same under heavy loads
- Extremely low coefficient of friction, as shown in **Figure 3-1**
- Lightweight
- Ability to conform under load
- Resistance to chemicals

The design characteristics of plastic and nonmetallic bearings bear both similarities and differences relative to those of porous-metal bearings. This will now be described in greater detail.

3.2 Properties of Plastic and Nonmetallic Bearing Materials

Plastics (such as acetal, nylon, PTFE), carbon graphite and other nonmetallic materials have been increasingly used as self-lubricating bearings. Their composition has been refined over many years so as to obtain favorable bearing characteristics. These include low friction, corrosion resistance, ability to conform under load (plastic bearings), ability to function over wide temperature ranges and substantial load-carrying capability. Although temperature ranges, dimensional stability and load limitations of plastic bearings are in general less than for metallic bearings, plastic bearings are remarkably versatile and economical.

A summary of characteristics of representative plastic and nonmetallic materials has been given by *Machine Design* magazine (Vol. 54, #14, June 17, 1982, p. 132) with whose permission the following material is reprinted.

Phenolics: Composite materials consisting of cotton fabric, asbestos, or other fillers bonded with phenolic resin. The good compatibility of the phenolics makes them easily lubricated by various fluids.

They have replaced wood bearings and metals in such applications as propeller and rubber-shaft bearings in ships, and electrical switch-gear, rolling-mill and water-turbine bearings. In small instruments and clock motors, laminated phenolics serve as structural members as well as a bearing material. They have excellent strength and shock resistance, coupled with resistance to water, acid, and alkali solutions.

Some precautions must be observed with phenolic bearings. Thermal conductivity is low, so heat generated by bearing friction cannot readily be transmitted through the bearing liner. Consequently, larger, heavily-loaded bearings must have a generous feed of water or lubricating oil to carry away heat. Some swelling and warping of these bearings occurs in the larger sizes, so larger-than-normal shaft clearances are required.

Nylon: Although the phenolics have predominated in heavy-duty applications, they are frequently replaced by nylon, which has the widest use in bearings. Nylon bushings exhibit low friction and require no lubrication. Nylon is quiet in operation, resists abrasion, wears at a low rate, and is easily molded, cast, or machined to close tolerances. Possible problems with cold flow at high loads can be minimized by using a thin liner of the material in a well-supported metal sleeve.

Improvement in mechanical properties, rigidity, and wear-resistance is obtained by adding fillers such as graphite and molybdenum disulfide to nylon. While the maximum recommended continuous service temperature for ordinary nylon is 170°F, and 250°F for heat-stabilized compositions, filled-nylon parts resist distortion at temperatures up to 300°F.

PTFE: Has an exceptionally low coefficient of friction and high self-lubricating characteristics, resistance to attack by almost any chemical, and an ability to operate under a wide temperature range. High cost combined with low load capacity has frequently caused PTFE resin to be selected only in some modified form. PTFE is used as a bearing material in automotive knuckle and ball joints, chemical and food processing equipment, aircraft accessories, textile machinery, and business machines.

Although unmodified PTFE can be used to a PV value of only 1000, PTFE filled with fiberglass, graphite, or other inert materials, can be used at PV values up to 10000 or more. In general, higher PV values can be used with PTFE bearings at low speeds where its coefficient of friction may be as low as 0.05 to 0.1.

One bearing material combines the low friction and good wear resistance of lead-filled PTFE with the strength and thermal conductivity of a bronze and steel supporting structure. A plated steel backing is covered with a thin layer of sintered, spherical, bronze particles. The porous bronze is then impregnated with a mixture of PTFE and lead to provide a thin surface layer. Service temperatures of -330°F to +536°F are possible.

Woven PTFE fabrics are often readily handled and applied. With their resistance to cold flow, they are used as bearings in a wide variety of high-load applications as automotive thrust washers, ball-and-socket joints, aircraft controls and accessories, bridge bearings, and electrical switch gear. To provide a strong bond to either steel or other rigid backing material, a secondary fiber such as polyester, cotton, or glass is commonly interwoven with the PTFE. The woven fabric then is bonded to a steel backing.

Improved versions of this type of bearing have woven or braided “socks” (of PTFE and a bondable material). The bearing sleeve is then filament wound with a fiberglass-epoxy shell. These bearings have been reported to carry dynamic loads as high as 50000 psi.

Acetal: Components made from acetal rod are dimensionally stable even under extremely wet or humid conditions and will not swell like nylon in these conditions. Additionally, it resists most organic solvents. Natural white acetal is an USDA/FDA approved material for food processing applications. Acetal is relatively easy to machine and does not burr easily. Acetal is a generic descriptive name for two polymers: Celcon® – a copolymer made by Celanese – and Delrin® – a homopolymer made by E. I. DuPont Nemours. Both types are tough enough and strong enough to replace metal for many applications.

Acetron® NS: is a patented acetal-based compound containing special solid lubricants which help provide superior performance in bearing and wear applications. These lubricants are uniformly dispersed in the base acetal, providing a premium, internally lubricated compound with high Pressure Velocity (PV) capabilities, a low coefficient of friction, and an extremely good “k” factor.

Table 3-1 Wear Rate, Coefficient of Friction and Limiting PV Data

Acetal	Wear Factor “k” (1)	Comparative Wear Rate to Acetron® NS	Coefficient of Friction		Limiting PV (4)
			Static (2)	Dynamic (3)	
Acetron® NS	48	1.0	.18 – .19	.20 – .21	8750
Delrin AF Blend	57	1.2	.18 – .19	.19 – .20	8300
Delrin AF	65	1.4	.18 – .19	.19 – .20	11000
Delrin 500 CL (a)	176	3.7	.22 – .24	.23 – .25	3500
Acetron® GP	200	4.2	.22 – .25	.22 – .28	2700
Turcite A	213	4.4	.29 – .34	.20 – .23	6560

(1) Measured on 1/2” I.D. journal at 5000 PV (118 fpm & 42.2 psi)
 $K = h/PVT \times 10^{-10}$ (in³ min/ft lb hr) where:
 h = radial wear (in)
 P = normal pressure (psi)
 V = sliding speed (fm)
 T = test duration (hrs)

(2) Measured on thrust washer bearing under a normal load of 50 lbs. Gradually increasing torque was applied until the bearing completed a 90° rotation in about one second.

(3) Measured on thrust washer testing machine, unlubricated @ 20 fpm & 250 psi.

(4) Limiting PV (Test valued — unlubricated @ 100 fpm (lb ft/in² min)

(a) Equivalent to DSM’s MC® 901.

The additive system which delivers the lubrication is a patented composite. With it, the solid lubricants firmly locked in the acetal matrix are always exposed to the bearing surface. It’s this constant source of lubrication which enables Acetron® NS acetal to outperform other bearing materials. It also provides lubrication during break-in of bearings and for enhanced wear-resistance.

Because the acetal and solid lubrication do not absorb significant quantities of moisture, Acetron® NS acetal is stable in both wet and dry environments. It is highly recommended for precision, close tolerance parts.

The presence of the lubricant system in the acetal matrix also allows very free machining. The result is a very competitively priced product which will outperform other filled acetals in most bearing and wear applications, and give it a noticeable advantage over more expensive, premium-priced, internally lubricated acetal compositions.

Polyamide, Polysulfone, Polyphenylene Sulfide: High-temperature materials with excellent resistance to both chemical attack and burning. With suitable fillers, these moldable plastics are useful for PV factors to 20000 and 30000. Polyamide molding compounds employing graphite as a self-lubricating filler show promise in bearing, seal, and piston ring applications at temperatures to 500°F. Polyphenylene sulfide can be applied as a coating through use of a slurry spray, dry powder, or fluidized bed. These coating techniques require a final bake at about 700°F.

Ultrahigh-Molecular-Weight Polyethylene: Resists abrasion and has a smooth, low-friction surface. Often an ideal material for parts commonly made from acetal, nylon, or PTFE materials.

Carbon-Graphite: The self-lubricating properties of carbon bearings, their stability at temperatures up to 750°F, and their resistance to attack by chemicals and solvents, give them

important advantages in fields where other bearing materials are unsatisfactory. Carbon-graphite bearings are used where contamination by oil or grease is undesirable, as in textile machinery, food handling machinery, and pharmaceutical processing equipment. They are used as bearings in and around ovens, furnaces, boilers and jet engines where temperatures are too high for conventional lubricants. They are also used with low-viscosity and corrosive liquids in such applications as metering devices or pumps for gasoline, kerosene, hot and cold water, sea water, chemical process streams, acids, alkalis, and solvents.

The composition and processing used with carbon bearings can be varied to provide characteristics required for particular applications. Carbon-graphite has from 5% to 20% porosity. These pores can be filled with a phenolic or epoxy resin for improved strength and hardness, or with oil or metals (such as silver, copper, bronze, cadmium, or babbitt) to improve compatibility properties.

3.3 Load Carrying Ability of Plastic Bearings

In **Section 2.2** of sintered metal bearings, the meaning and formulas for calculation of PV factor was dealt with.

For different plastic materials, the following values of PV and load capacities apply:

Table 3-2

Bearing Material	Load Capacity (psi)	Max. Temp. (°F)	Max. Speed (fpm)	PV Limit (Unlubricated)
Phenolics	6000	200	2500	15000
Nylon	2000	200	600	3000
PTFE	500	500	50	1000
Filled PTFE	2500	500	1000	10000
PTFE fabric	60000	500	150	25000
Polycarbonate	1000	220	1000	3000
Acetal	2000	200	600	3000
Carbon-graphite	600	750	2500	15000
Rubber	50	150	4000	—
Wood	2000	160	2000	12000

A PV limit of 15000 ordinarily can be used for dry operation of carbon bearings. This should be reduced for continuous running with a steady load over a long period of time to avoid excessive wear. When operating with liquids which permit the development of a supporting fluid film, much higher PV values can be used.

A hard, rust-resistant shaft with at least a 10 μ m finish should be used. Hardened tool steel or chrome plate is recommended for heavy loads and high-speed applications. Steel having a hardness over Rockwell C50, bronzes, 18-8 stainless steels, and various carbides and ceramics also can be used.

Certain precautions should be observed in applying carbon-graphite. Since this material is brittle, it is chipped or cracked easily if struck on an edge or a corner, or if subjected to high thermal, tensile, or bending stresses. Edges should be relieved with a chamfer. Sharp corners, thin sections, keyways and blind holes should be avoided wherever possible. Because of brittleness and low

coefficient of expansion (about 1/4 that of steel), carbon-graphite bearings are often shrunk into a steel sleeve. This minimizes changes in shaft clearance with temperature variations and provides mechanical support for the carbon-graphite elements.

The PV factor, used as a load-speed limit also provides a basis for estimating relative wear rates. The total volume of material worn away is approximately proportional to the total normal load multiplied by the distance traveled in a length of time.

Thus,

$$R = K(PV) T$$

where:

R = radial wear in a sleeve bearing (in)

K = wear factor (in³•min/ft•lb•hr)

P = load (psi)

V = surface velocity (fpm)

T = time (hrs)

This equation does not always provide accurate absolute values for wear rate, but it is useful for estimating relative wear rates for alternative materials. In general, K wear values with fillers are lower than unfilled materials. If wear values are important for specific components, life tests should be made. These might employ moderately accelerated load and speed conditions to obtain a K value representative of the plastic, the shaft and its finish, and the application conditions.

K values should be increased by 50% for cast iron and bronze shafts, and more than 5 times with soft stainless steel or aluminum alloys. Increased surface hardness can markedly reduce wear, while surface roughness of the shaft often has an optimum value in the 4 to 14 μin rms range. Lubrication also has a pronounced influence on wear. With oil impregnation, wear rates commonly drop to negligible values with plastics, wood, and porous metals.

The wear factor K values are shown as follows:

Table 3-3

Material	Wear Factor K (in ³ min/ft lb hr)	
	Filled*	No Filler
Nylon	16 x 10 ⁻¹⁰	200 x 10 ⁻¹⁰
Polyester	20 x 10 ⁻¹⁰	—
Polycarbonate	30 x 10 ⁻¹⁰	2500 x 10 ⁻¹⁰
Polyurethane	35 x 10 ⁻¹⁰	—
Polypropylene	36 x 10 ⁻¹⁰	—
Styrene Acrylonitrile	65 x 10 ⁻¹⁰	—
Polysulfone	70 x 10 ⁻¹⁰	—
Acetal	200 x 10 ⁻¹⁰	65 x 10 ⁻¹⁰

For 40 psi load at 2000 PV operating against carbon steel of hardness 20 Rc with a 6–12 μm finish.
 *Filled with 30% (by weight) glass fiber, 15% (by weight) PTFE.

Comparative values for plastics often used as bearing materials are given in the following table:

Table 3-4

Property	Graphitar (Carbon-Graphite)	Oilon PV® 80 (TFE)	Rulon® (TFE)
Coefficient of friction	0.04 to 0.25	0.05 to 0.10	0.15 to 0.20
Temperature range	Cryogenic to 1000°F in some grades	-40°F to +250°F	-400°F to +550°F
Approx. max PV (unlubricated)	15000	18000	10000 (sleeve bearing)
Max. P	*	3000 psi	1000 psi
Max. V	*	1700 ft/min	400 ft/min
Recommended shaft surface finish	≤ 30 rms	*	8 to 32 rms
Recommended shaft clearance	0.003 in/in for most unlubricated applications	$(tw)10^{-4} + 0.004"$ t = temp. °F w = bearing wall thickness (in)	*
Typical elastic modulus	$(0.5 \text{ to } 3.5) \times 10^6$ psi	$(3.5 - 3.8) \times 10^6$ psi	*
Tensile strength	1000 – 9500 psi, depending on grade	7200 psi	*

*Consult manufacturer

Data reprinted with the permission of the following manufacturers:

- (i) "Graphitar" Wickes, 1621 Holland Ave., Saginaw, MI 48601;
- (ii) "Oilon PV®" 80 Design Guide", TFE Industries, 148 Parkway Kalamazoo, MI 49006
- (iii) "Rulon® Standard Stock Bearings, Engineering Manual, Cat. 75", Dixon Corp., Div. of Dixon Industries, Bristol, RI 02809.

3.4 Coefficient of Friction vs. Load for Various Materials

The coefficient of friction varies with the bearing unit load. The following graph depicts this relationship for various plastic materials.

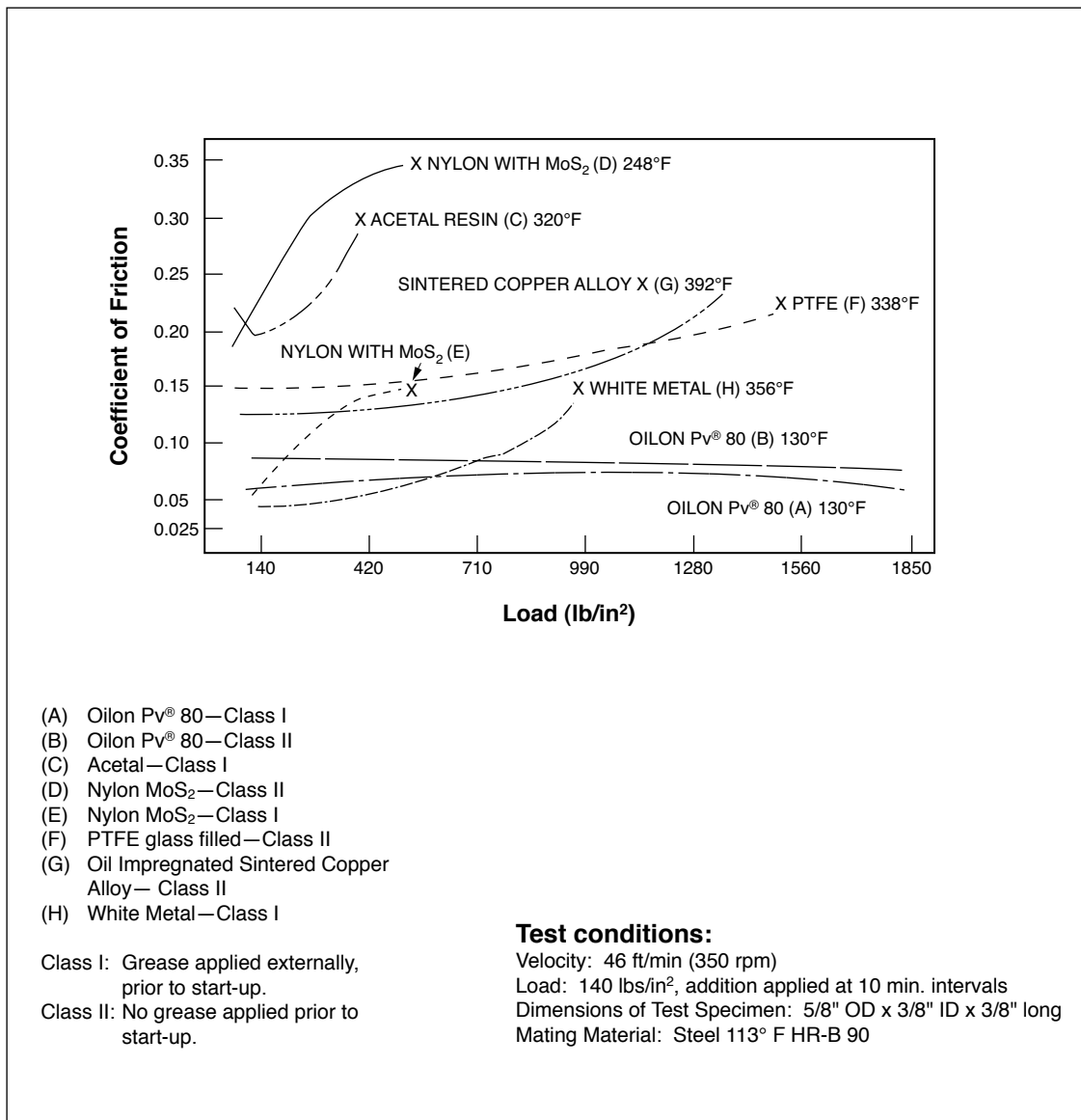


Fig. 3-1 Coefficient of Friction vs. Load

A comparison of frictional characteristics of various metallic and plastic materials is given in **Figure 3-1**. In some plastic materials, the coefficient of friction decreases with load, thereby greatly reducing or eliminating the stick-slip in the start-up of machinery.

In recent years, the properties of plastic bearing materials have been materially enhanced by the addition of fillers (such as fiber, powder, graphite and molybdenum disulfide) and composites (metal or other backings). If the cost is warranted, the mechanical properties of such bearings can be dramatically improved.

3.5 Example

A shaft of 1/2" in diameter is supported by two plastic bearings. The force equals 10 lbs. The bearing length is 3/4". The shaft rotates at 750 rpm.

$$PV = \frac{0.262 \cdot F \cdot \text{rpm}}{l} = \frac{0.262 \times 10 \times 750}{0.75} = 2619 \text{ fpm} \cdot \text{psi}$$

From the tables showing the maximum PV values, the proper material can be chosen. If the computed value exceeds the value in the table for the chosen material, the dimensions of the

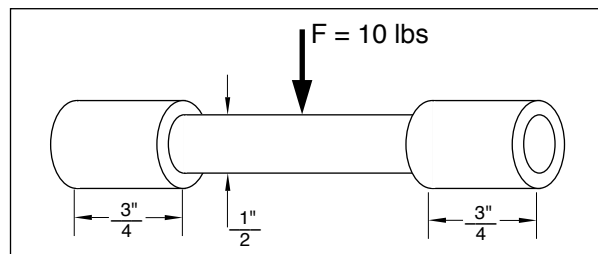


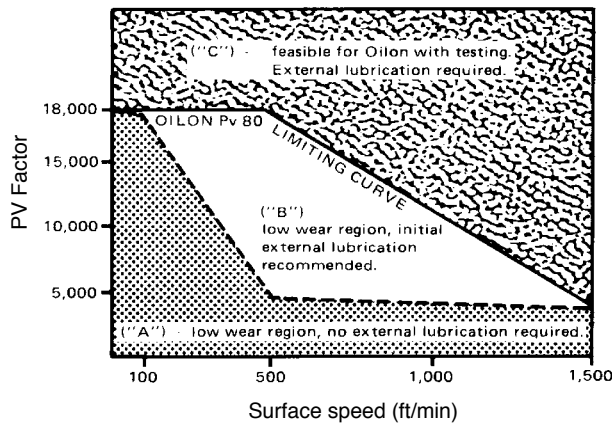
Fig. 3-2

shaft and of the bearing should be changed.

3.6 Lubrication

Lubricants reduce the static and dynamic coefficients of friction and permit materials to operate at higher PV's than without lubrication. While most plastics do not require lubrication, some type of lubricant will generally enhance bearing performance. In many cases, water will provide sufficient lubrication and cooling during bearing operation. At the time a plastic bearing is installed, it is a good idea to apply a light film of grease on the ID of the bearing prior to mounting on the shaft.

The effect of lubrication on the factor of a particular material (in this case, Oilon PV-80) is shown on the following graph:



- (A) — low wear region, no external lubrication required
- (B) — low wear region, initial external lubrication recommended
- (C) — feasible for Oilon with testing. External lubrication required.

Fig. 3-3

3.7 Conclusion

Plastic and nonmetallic bearings are widely used in appliances, toys, general machinery and applications ranging from cameras and toys to office machinery and automobiles. When properly designed, their light weight and economy can be highly attractive.

Calculations of bearing loads, as shown in the example, are also applicable on plastic and nonmetallic bearings.

EQUIVALENT PRECISION CLASSES OF DIFFERENT STANDARDS

ABEC	RBEC	ISO	DIN
1	1	0	Normal
3	3	6	P6
5	5	5	P5
7	None	4	P4

ABEC — Anti-Friction Bearing Manufacturers Association (Ball Bearings)

RBEC — Anti-Friction Bearing Manufacturers Association (Roller Bearings)

ISO — International Organization for Standardization

DIN — Deutsche Industrie Normen

Characteristics and Advantages of Frelon® Lined Linear Bearings

BEARING LOAD:

- Frelon lined bearings can tolerate up to 1500 psi over the portion of the bearing that is carrying the load.
- These bearings carry 4 to 8 times the load of ball bearings.
- A 1/2" I.D. Frelon bearing will carry as much load as a 1" I.D. ball bearing.

WEAR RATE:

- Although wear rates are affected by surface finish, shaft hardness, length of travel, contamination and lubrication, these bearings last on average 4 to 8 times longer than ball bearings.

BEARING PV:

- P = Pressure in psi on the projected area.
- V = Velocity of the wear surface in ft/min
- The maximum PV is 10,000 psi x ft/min

BEARING SPEED:

- The maximum average linear speed without lubrication is:
 - 140 ft./min. - continuous
 - 400 ft./min. - intermittent
- When lubricated, the maximum continuous speed exceeds 400 ft./min.

CANTILEVERED LOADS:

- The distance between the bearings and the drive source or load should not exceed a maximum ratio of 2:1.

SHAFT FINISH AND HARDNESS:

- A shaft with a finish of 8-12 $\mu\text{in } R_a$ and a hardness of Rc 60 is recommended for best results. Acceptable performance can be attained with a finish of 8-16 $\mu\text{in } R_a$ and a hardness of Rc 35.

- Softer shafting will cause an accelerated wear to both the shaft and the bearings.
- Optional liners are available for both nonhardened shafting and for use in food applications.

RUNNING CLEARANCES:

- Precision Series - approximately .001". High precision, similar to a preloaded ball bearing.
- Standard Series - approximately .002". Excellent for parallel shaft applications, similar to a typical ball bearing.

LUBRICATION:

- Frelon lined bearings are self-lubricating.
- Additional lubrication reduces friction 50%, minimizes wear, reduces heat, allows greater speed, and extends wear life.
- Acceptable lubrication includes SAE 10 to 40W, way lube oils, petroleum-based greases and even water.
- DO NOT USE PTFE FLUOROCARBON AND/OR SILICONE OILS, GREASE, SPRAY, OR WD40.

NO CATASTROPHIC FAILURE:

- No shaft scoring or shock load damage. Liner dampens shock loads and vibration. These bearings provide more surface contact area than ball bearings.
- No corrosion or rust.
- No temperature induced bearing seizure. Temperature range of -400°F to +500°F. Operates with consistent friction and load bearing characteristics throughout temperature range. Liner allows heat to dissipate through the shell.

Technical Data on Rod Ends and Spherical Bearings

Rod ends and spherical plain bearings are intended for linkage applications where a bearing must accommodate significant misalignment. While spherical plain bearings offer flexibility in housing and mounting design, the user bears the responsibility for housing design and the cost of housing manufacture. Rod ends offer greater mounting convenience and provide a compact, lightweight, economical design alternative to the spherical plain bearing. QBC offers a wide selection of rod ends and spherical bearings.

Rod End Construction

There are three basic rod end constructions. The *four-piece rod* end uses race inserts, typically of brass, to provide lubricity in the bearing area. This design offers reduced internal clearance, and provides smoother operation. It is ideal for dynamic applications. The *two-piece* rod end uses a rod end body which is formed around a spherical ball. The comparatively heavy cross section of the rod end body in the two-piece design provides high-strength. This makes the two-piece rod end ideal for highly loaded, static applications where high-strength is required. The *cartridge type* rod end consists of a spherical plain bearing mounted in a rod end body. This design allows the optimum selection of materials for ball, race and rod end body. The cartridge type rod end can also accommodate a PTFE liner for self-lubrication. This design is best suited for aircraft and military applications where material selection is a primary design consideration. While aircraft and military style components are not shown in this catalog, they are available from QBC on special order. The reader is encouraged to call for design assistance.

Self-lubricating Rod Ends

QBC offers metal-to-metal rod ends and self-lubricating rod ends. All metal-to-metal rod ends, including brass insert four-piece types, require regular lubrication. This can be accomplished by splash or immersion oil lubrication, or by greasing through optional lubricators (grease fittings). Self-

lubricating types are used where relubrication is not practical, or in applications where relubrication is not desirable, such as on food processing machinery or in clean environments. Self-lubricating rod ends are available with bonded PTFE fabric liners, or with molded, engineered thermoplastic race inserts.

Rod End Grades

Rod ends are offered in four grades: precision, commercial, aircraft and military. *Precision* rod ends are manufactured to tight tolerances for applications requiring improved linkage accuracy and reduced looseness. *Commercial* rod ends are produced using standard materials and manufacturing methods, and are an economical choice for industrial applications. *Aircraft* rod ends use premium materials, and have magnafluxed rod end bodies. Originally intended for aircraft applications, aircraft rod ends are used in many industrial applications where a high degree of reliability is required. *Military* rod ends are produced in strict accordance with all applicable military specifications and are typically used in military and commercial aviation applications, or when MIL-spec approval is required.

Precision Rod Ends Styles BRFHMP/BRFHFP four-piece precision rod ends use brass race inserts for lubricity and clearance control. They are produced to tight tolerances for applications requiring a more precise rod end; for example, a linkage where positioning accuracy is essential. These rod end bodies and balls are plated for corrosion resistance. Styles BRFHMX and BRFHFX four-piece precision extra capacity rod ends are the high-strength series intended for more heavily loaded, static and dynamic industrial applications. These rod ends have heat-treated bodies for increased strength and aluminum bronze race inserts for high bearing capacity. The rod end bodies are protective coated for corrosion resistance and the balls are chrome plated for superior wear and corrosion resistance. Series BR-FHMX (male) have oversized shanks for additional shank strength.

Commercial Rod Ends Series BRCHMC and BRCHF C four-piece commercial rod ends use the brass race insert design for lubricity and clearance control. These rod ends are preferred for dynamic applications. Our commercial rod ends have zinc plated bodies and nickel plated balls for corrosion resistance. Series BRCMCR and BRCFCR two-piece commercial rod ends offer high-strength for heavy static loads. The unique manufacturing process for two-piece rod ends yields the industry's best conformity between ball and body for maximum bearing capacity. Less expensive commercial rod ends are offered in the BRRODM and BRRODF series.

Aircraft Rod Ends Series* Four-piece aircraft rod ends have magnafluxed rod end bodies for a high degree of assurance of rod end integrity. The bearing surface is a chrome plated ball on brass race inserts. This series was originally intended for general aviation applications and is also used in many industrial applications where rod end reliability is critical. Special purpose aircraft rod ends use materials and construction identical to aircraft rod ends but have different dimensions. Self-lubricating aircraft rod ends use UNIFLON® PTFE liner and cartridge type construction. The UNIFLON® PTFE liner is approved to MIL-B-81820.

Military Rod Ends* Military rod ends use Type E UNIFLON® PTFE liner and cartridge type construction. Rod end bodies are made from 4340 alloy steel, heat-treated to MIL-H-6875, and are cadmium plated. The outer races are made from heat-treated 17-4PH stainless steel (AMS 5643). The balls are made from heat-treated 440C stainless steel (AMS 5630). The UNIFLON® PTFE liner is approved to MIL-B-81820, while our MIL-spec aircraft rod ends are approved to MIL-B-81935. These premium rod ends are primarily intended for use in commercial and military aviation applications.

Metric Rod Ends Four-piece, precision, metric rod ends, BRFSMGM and BRFSFGM series, use brass race inserts for lubricity and clearance control. They are produced to tight tolerances for applications

where a precision rod end is required in a metric size. Series BRCSMEM and BRCSFEM two-piece, self-lubricating metric rod ends, use Type E UNIFLON® PTFE liner. They are ideal for metric applications where relubrication is not practical. The two-piece construction offers the added benefit of high-strength for high loads. QBC also offers a wide variety of other metric rod ends. Contact QBC for availability and specifications.

Optional Rod End Features

























Rod ends are available with male and female threaded shanks. Standard rod ends are available in right-hand or left-hand threads. Lubricators are standard on selected series and are available as an option on all other series. Shank keyways are optionally available on most series to engage lock washer tangs. A wide range of other optional features includes plain shanks and special plating.

Military Specifications* Many of the processes used in the manufacture of rod ends are performed to U.S. Military Specifications. A partial list of these specifications follows:

Table 1 Military Specifications	
Process	Performed in accordance with:
Anodize	MIL-A-8625 Type 1 or 2
Cadmium Plate	QQ-P-416 Type 1 Class 2
Chrome Plate	QQ-C-320 Class 2 (.0002 min)
Heat Treat	MIL-H-6875 MIL-H-7199
Magnetic Particle Insp.	ASTM-E-1444
Penetrant Inspection	MIL-I-6866

***NOTE:** Aircraft and military style components are available on special order.

TABLE 2: ROD END SELECTION GUIDE

Series and Size Ranges		Product Features	Customer Benefits	Common Applications	Loading			Max. Temp. (°F)	Race Material
					Static	Oscillating	Reversing		
Inch	Metric	BRFSMGM BRFSFGM 5 - 25 mm	Low Friction, Long Dynamic Life Smooth Feel, Good Conformity	Control Linkages, For Reduced Play, Accelerator Linkages	   	   	250	Brass	
									BRCSMEM BRCSFEM 3 - 12 mm
Inch	Metric	Precision Grade Brass Inserts Four-Piece Construction	High Capacity Version	Heavy-Duty Applications	   	   	250	Aluminum Bronze	
									Precision Grade Aluminum Bronze Inserts, High-Strength Body Four-Piece Construction
Inch	Metric	Commercial Grade Brass Inserts Four-Piece Construction	High Loads Reversing Loads Shock Loads Cost-Effective	Brake and Clutch Pedals for Heavy Machinery, Satellite Dish Controls	   	   	250	Steel	
									Commercial Grade Two-Piece Construction

 **Best**
 **Better**
 **Good**

Static Radial Load (See Figure 2)

The maximum static radial load permissible for a rod end depends on three factors: race material compressive strength, rod end head strength, and shank strength. The maximum static radial load is determined by taking the *lowest* of the three following values:

- Race material compressive strength (R)

$$R = E \cdot H \cdot X$$

- Rod end head strength (T)

Insert construction

$$T = [D - (E + .176 H)] \cdot H \cdot X$$

Cartridge type construction

$$T_1 = \left[\left(\frac{H}{2} \sqrt{D^2 - H^2} \right) + \left(\frac{D^2}{2} \cdot \sin^{-1} \frac{H}{D} \right) - (O.D. \text{ of Bearing} \cdot H) \right] \cdot X$$

where angle of $\frac{H}{D}$ is expressed in radians.

- Shank strength (S)

Male threaded rod end

$$S = [(\text{root diameter of thread}^2 \cdot .785) - (N^2 \cdot .785)] \cdot X$$

Female threaded rod end

$$S_1 = [(J^2 \cdot .785) - (\text{major diameter of thread}^2 \cdot .785)] \cdot X$$

where:

- E = Ball diameter
- H = Housing width
- X = Allowable stress (see table)
- D = Head diameter
- N = Diameter of drilled hole in shank of male rod ends
- J = Shank diameter of female rod end

Static Axial Load* (See Figure 2)

The maximum available axial load for a rod end is determined by the following formula. This formula does not take into consideration bending of the shank due to a moment of force. Also, this formula does not consider the strength of the stake in cartridge type of construction:

- Axial strength (A)

$$A = .78 [(E + .176 H)^2 - E^2] \cdot X$$

where:

- X = Allowable stress (see table 3)
- E = Ball diameter
- H = Housing width

*Data also applies to spherical bearings.

Table 3 Material Stress*	
Material	Allowable Stress (PSI)
Brass	30000
Aluminum Bronze	35000
300 Series Stainless Steel	35000
Low Carbon Steel	52000
Alloy Steel	140000

Misalignment

The angle of misalignment in a rod end is controlled by the outside diameter of the head. The maximum degree of misalignment is obtained when the head contacts the side of the fork or clevis in which it is mounted.

Maximum misalignment is calculated by the following formula:

- Rod End Angle (α)

$$\alpha = \sin^{-1} \frac{W}{D} - \sin^{-1} \frac{H}{D}$$

where:

- D = Head diameter or diameter of outer race
- H = Housing width
- W = Ball width

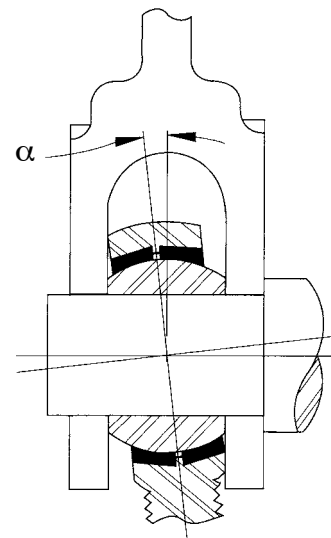
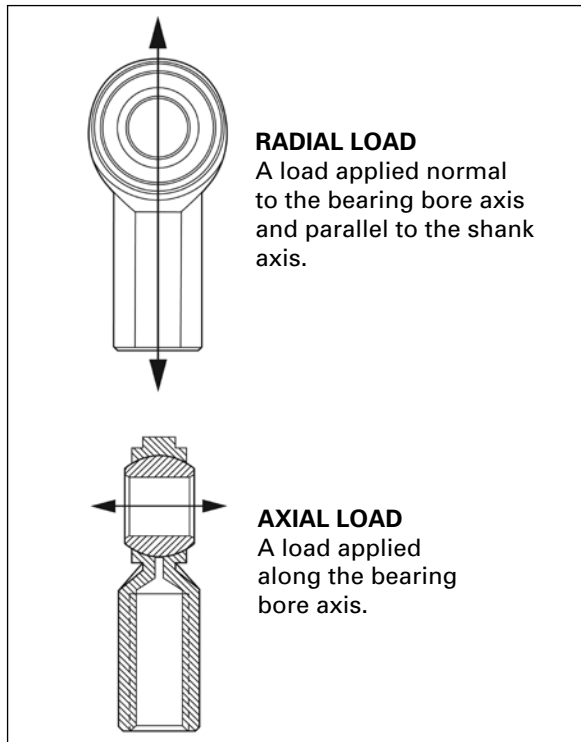


FIGURE 1

Table 4 Angles of Misalignment*

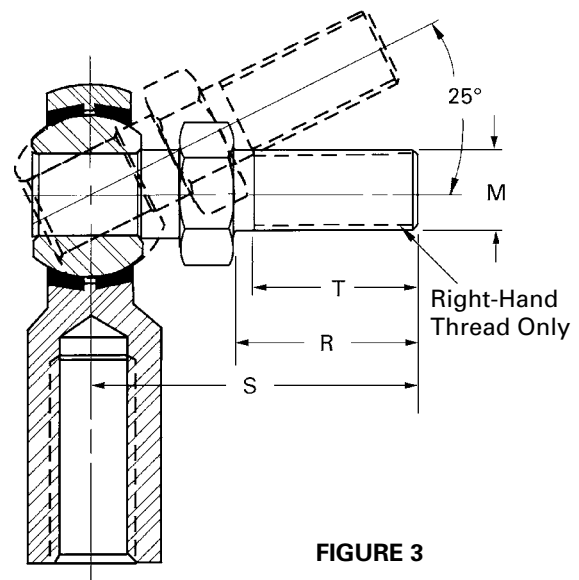
Rod End Bore (inch)	Misalignment +/- Degrees
.1900	6.5 (8.0)
.2500	8.0 (10.5)
.3125	7.0 (9.0)
.3750	6.0 (9.0)
.4375	7.0 (8.5)
.5000	6.0 (8.0)
.6250	8.0 (11.0)
.7500	7.0 (10.0)
1.0000	8.5 —

*These figures apply to all rod ends in this catalog except BRRODM and BRRODF series, which are in parentheses.


FIGURE 2
Studs

Studs are used in combination with rod ends to simplify mounting.

The stud is designed to accommodate up to $\pm 25^\circ$ misalignment in any direction and has a wrench flat to facilitate tightening. They are available on special order for BRFHMX, BRFHFX, BRCHMC, BRCHF, BRCMCR and BRCFCR series. Call for price and delivery information.

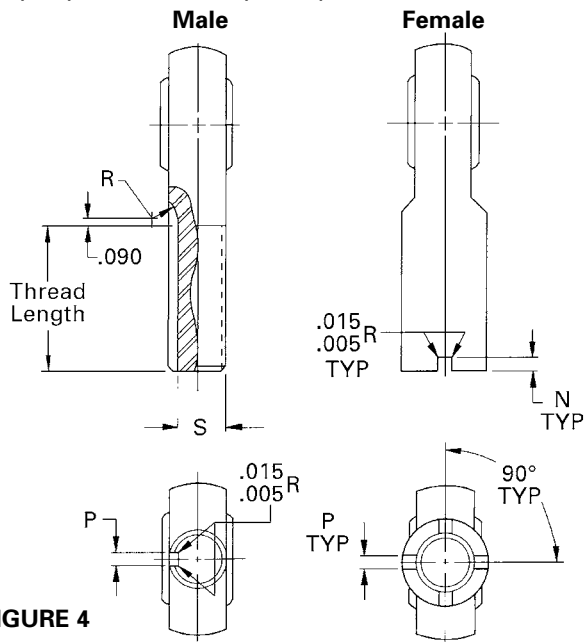

FIGURE 3
Table 5 Stud Dimensions

To Fit Rod End Bore Size	Dimensions in Inches			
	R	S	T	M
	$\pm .010$	$\pm .030$	REF	UNF-2A
.1900	.500	.969	.437	.1900-32
.2500	.562	1.047	.500	.2500-28
.3125	.687	1.234	.594	.3125-24
.3750	.906	1.540	.812	.3750-24
.4375	1.125	1.930	1.000	.4375-20
.5000	1.125	2.000	1.000	.5000-20
.6250	1.500	2.500	1.375	.6250-18
.7500	1.812	3.000	1.625	.7500-16

Studs available on special order.

Keyways

Keyway slots, where available, are determined as follows. Contact our Sales Department to determine keyway slot availability on a particular size.


FIGURE 4
Table 6 Rod End Keyway (Ref NAS 559)

Thread O.D. Reference	Dimensions in Inches			
	N	P	S	R
	+0.005 -0.000	+0.005 -0.000	+0.000 -0.005	REF
.2500	.056	.062	.201	.255
.3125	.056	.062	.260	.255
.3750	.056	.093	.311	.255
.4375	.069	.093	.370	.255
.5000	.069	.093	.436	.255
.5625	.077	.125	.478	.255
.6250	.077	.125	.541	.255
.7500	.077	.125	.633	.255
.8750	.086	.156	.777	.318
1.0000	.094	.156	.900	.318
1.1250	.094	.187	1.010	.382
1.2500	.116	.187	1.136	.382
1.3750	.116	.250	1.236	.445
1.5000	.116	.250	1.361	.445
1.6250	.129	.250	1.477	.445
1.7500	.129	.312	1.589	.508
1.8750	.129	.312	1.714	.508
2.0000	.129	.312	1.839	.508
2.1250	.129	.312	1.955	.508
2.2500	.129	.312	2.080	.508

Design Options

Rod Ends and Spherical Bearings can be ordered with the following design options at extra cost.

Table 7

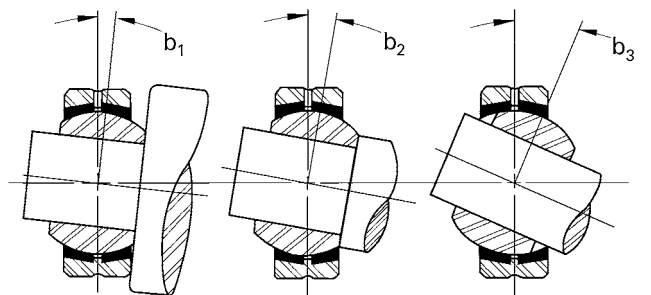
Option	Available on Series
Keyway / Keyslot	BRFHMP- BRFHFP- BRFHMX- BRFHFX- BRCHMC- BRCHFC-
Zerk Type Lubricators	BRFHMP- BRFHFP- BRCHMC- BRCHFC-
Flush Type Lubricators	BRFHMP- BRFHFP- BRFHMX- BRFHFX- BRCHMC- BRCHFC-
300 Series Stainless Steel Inserts	BRFHMP- BRFHFP- BRFHMX- BRFHFX- BRCHMC- BRCHFC-
Stud	BRFHMP- BRFHFP- BRCHMC- BRCHFC-
Chrome Plated Balls	BPFLSX- (Spherical Bearings)
Cross Drilled Oil Hole	BPFLSS- BPSLHS- BPFLHA- BPFLHB- BPFCOM- (Spherical Bearings)

Table 8 Housing Bores					
Bearing Code	Bearing O.D. D	Housing Bore			
		Steel		Aluminum	
	+0.0000 -0.0005	Max.	Min.	Max.	Min.
BPFLSX Series					
030	.6250	.6245	.6241	.6244	.6239
040	.7500	.7495	.7491	.7494	.7489
050	.8750	.8745	.8741	.8744	.8739
060	1.0000	.9995	.9991	.9994	.9989
070	1.1875	1.1870	1.1865	1.1869	1.1863
080	1.3125	1.3120	1.3115	1.3119	1.3113
100	1.5625	1.5620	1.5613	1.5619	1.5611
120	2.2500	2.2495	2.2488	2.2494	2.2486
160	2.3750	2.3745	2.3738	2.3744	2.3736
190	2.6250	2.6245	2.6238	2.6244	2.6236
240	3.2500	3.2495	3.2488	3.2494	3.2486
300	4.0000	3.9995	3.9988	3.9994	3.9986
Series BPFLSS, BPSLHS, BPFLHA, BPFLHB, BPSLSE & BPF COM					
020	.4687	.4682	.4678	.4681	.4676
030	.5625	.5620	.5616	.5619	.5614
040	.6562	.6557	.6553	.6556	.6551
050	.7500	.7495	.7491	.7494	.7489
060	.8125	.8120	.8116	.8119	.8114
070	.9062	.9057	.9053	.9056	.9051
080	1.0000	.9995	.9991	.9994	.9989
090	1.0937	1.0932	1.0928	1.0931	1.0926
100	1.1875	1.1870	1.1866	1.1869	1.1864
120	1.4375	1.4370	1.4366	1.4369	1.4364
140	1.5625	1.5620	1.5616	1.5619	1.5614
160	1.7500	1.7495	1.7491	1.7494	1.7489

Misalignment Specifications

The angle of misalignment in a spherical bearing is calculated somewhat differently from that of the rod end because the housing is not spherical. There are three different types of mountings in which these bearings may be used as shown, and the angle of misalignment is governed by the type of mounting adopted.

Shown in **Figures 5, 6 and 7** are the common mountings for spherical bearings and the corresponding formula for calculating the angle of misalignment.



$$b_1 = \sin^{-1} \frac{W}{V} - \sin^{-1} \frac{H}{E}$$

$$b_2 = \sin^{-1} \frac{W}{E} - \sin^{-1} \frac{H}{E}$$

$$b_3 = \cos^{-1} \frac{B}{E} - \sin^{-1} \frac{H}{E}$$

FIGURE 5
FIGURE 6
FIGURE 7

Reference Letters:

B = Bore of ball

C = Chamfer on outer race

D = Bearing O.D.

E = Ball diameter

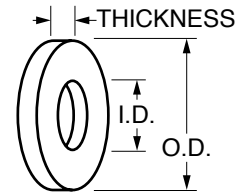
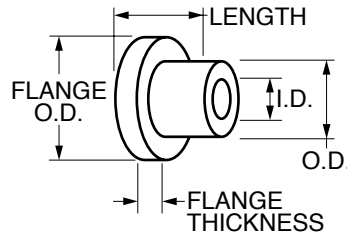
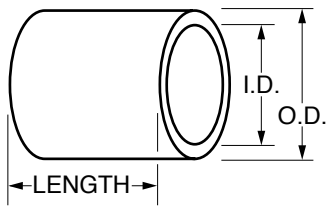
H = Housing width

V = $\sqrt{(D - 2C)^2 + H^2}$

W = Ball width

NOTE: See product page for dimensions.

Table 9 Misalignment Specifications			
Bearing Code	Maximum Misalignment (+/- Degrees)		
	b ₁	b ₂	b ₃
BPFLSX Series			
030	9.0	16.5	34.5
040	8.0	14.5	29.0
050	9.0	14.0	30.0
060	8.0	12.5	27.0
070	6.5	11.0	25.0
080	7.5	12.5	23.0
100	8.0	12.0	23.0
120	9.0	15.0	27.0
160	6.5	10.0	25.0
190	6.0	8.5	23.5
240	5.0	7.0	23.0
300	5.0	7.0	25.0
Series BPFLSS, BPSLHS, BPFLHA, BPFLHB, BPSLSE & BPF COM			
020	8.5	13.5	28.0
030	7.0	11.0	29.5
040	9.0	13.0	30.0
050	8.0	12.0	26.0
060	7.5	10.5	23.5
070	6.5	9.5	20.5
080	7.0	10.0	20.0
090	7.5	10.0	20.0
100	7.0	9.0	19.0
120	7.0	9.0	21.0
140	7.0	9.0	16.0
160	7.5	9.5	16.0



PLAIN AND FLANGED BEARINGS

Dimensions		Tolerances
Over	Up to & Incl.	

Inside and Outside Diameters (Inches)

—	1/2	+0.000 -0.001
1/2	1	+0.000 -0.001
1	1-1/2	+0.000 -0.001
1-1/2	2-1/2	+0.000 -0.0015
2-1/2	3-1/2	+0.000 -0.002
3-1/2	4-1/2	+0.000 -0.0025

Length

—	1-1/2	±.005
1-1/2	3	±.0075
3	4-1/2	±.010

Flange Diameter – Based on Flange O.D.

—	1-1/4	±.005
1-1/4	2-1/2	±.010
2-1/2	4	±.015
4	4-1/2	±.025

Flange Thickness – Based on Flange O.D.

—	1-1/4	±.0025
1-1/4	2-1/2	±.005

Flange Fillets, Radii – Based on Body O.D.

—	1	1/32 ±.010
1	2	3/64 ±.010
2	2-1/2	1/16 ±.010
2-1/2	4	3/32 ±.1/64

Concentricity, I.D. with Respect to O.D. (Maximum Total Dial Indicator Reading) Based on I.D.

—	1	.003
1	1-1/2	.003
1-1/2	3	.004
3	4-1/2	.005

THRUST BEARINGS

Dimensions		Tolerances
Over	Up to & Incl.	

Inside Diameter

—	1-1/4	±.005
1-1/4	2-1/2	±.010
2-1/2	4	±.015

Thickness

		±.0025
--	--	--------

Outside Diameter

—	1-1/2	±.010
1-1/2	3	±.015
3	4-1/2	±.020

Parallelism of Faces – Based on O.D.

—	1-1/2	.002
1-1/2	3-1/2	.003
3-1/2	4	.004

RUNNING CLEARANCE

Proper running clearance for bearings depends to a great extent on the particular application. Only minimum recommended clearances for oil-impregnated bearings used with ground steel shafting are listed.

Running Clearances

Shaft Size in.	Clearance, min. in.	
	Bronze Base	Iron Base
Up to .760	.0005	.001
.761 to 1.510	.001	.0015
1.511 to 2.510	.0015	.002
Over 2.510	.002	.0025

PRESS-FITS

Plain cylindrical journal bearings are commonly installed by press-fitting the bearing into a housing with an insertion arbor. For housings rigid enough to withstand the press-fit without appreciable distortion and for bearings with thickness approximately one-eighth of the bearing outside diameter, the press-fits shown are recommended.

Recommended Press-Fits

Outside Diameter in.	Press-Fit, in.	
	min.	max.
Up to .760	.001	.003
.761 to 1.510	.0015	.004
1.511 to 2.510	.002	.005
2.511 to 3.010	.002	.006
Over 3.010	.002	.007

ACKNOWLEDGMENTS

We are expressing our thanks and we are crediting the following publications for providing material for this text, by the permission of the publishers:

1. *Design of Machine Elements*, M. F. Spotts, Late Professor Emeritus of Mechanical Engineering Department, Northwestern University and T. E. Shoup, Dean of Engineering, Santa Clara University, Prentice Hall, Upper Saddle River, New Jersey 07458, 1998.
2. *Machine Design*, Joseph Edward Shigley, Associate Professor, Dept. of Mechanical Engineering – University of Michigan, McGraw Hill Book Company, 1956.
3. *Standard Handbook of Machine Design*, Chapter 27 “Rolling Contact Bearings”, Charles Mischke, Ph.D., P.E., Professor Emeritus of Mechanical Engineering, Iowa State University, McGraw Hill Book Company, 1996.
4. *Handbook of Shafts, Bearings and Couplings*, Technical Staff of Stock Drive Products and Sterling Instrument (SDP/SI), 1993.

For further study of this subject matter, the following references are provided:

1. Allan, R. K., *Rolling Bearings*, London: Sir Isaac Pitman & Sons Ltd., 1945.
2. Bamberger, E. N., T. A., Harris, W. M., Kacmarsky, C. A., Moyer, R. J., Parker, J. J., Sherlock, and E. V., Zaretsky, *Life Adjustment Factors for Ball and Roller Bearings*, ASME, New York, 1971.
3. *Bearings Reference Issue, Machine Design*, No. 42, June 18, 1970.
4. *Boundary Lubrication – An Appraisal of World Literature*, New York: American Society of Mechanical Engineers, 1969.
5. Dowson, D., and G. R. Higginson, *Elasto-hydrodynamics Lubrication*, 2nd ed., New York: Pergamon Press, Inc., 1977.
6. *Engineering Journal*, Sec. 1, The Timken Company, Canton, Ohio, 1972, revised 1978.
7. Harris, T. A., “Predicting Bearing Reliability,” *Machine Design*, vol. 35, no. 1, Jan. 3, 1963, pp. 129-132.
8. Harris, T. A., *Rolling Bearing Analysis*, New York: John Wiley & Sons, Inc., 1966.
9. *Load Ratings and Fatigue Life for Ball Bearings*, Arlington, VA: The Anti-Friction Bearing Manufacturers Association, Inc., 1979.
10. Morton, H. T., *Anti-friction Bearings*, 2nd ed., Ann Arbor, Michigan: H. T. Morton, 1965.
11. Palmgren, A., *Ball and Roller Bearings*, 3rd ed., Philadelphia: SKF Industries, Inc., 1959.
12. Rothbart, H. A., Ed., *Mechanical Design and Systems Handbook*, New York: McGraw Hill Book Company, 1964, Section 13.
13. Shaw, M. C., and E. F. Macks, *Analysis and Lubrication of Bearings*, New York, McGraw Hill Book Company, 1949, Chapter 10.
14. *SKF Engineering Data*, SKF Industries, Inc., Philadelphia, 1979.

AEROSPACE



AUTOMOTIVE



INDUSTRIAL



- Sourcing of hard to find bearings
- Relubing of bearings in certified class 1000 clean room
- Custom-made bearings and shafting to customer print
- Visit our on-line eStore which allows you to check price and availability, place an order or request a quote any time
- Large inventory of bearings and shafting
- Authorized stocking distributor for many of the world's largest bearings manufacturers

MANUFACTURING





A

Angular Contact Ball Bearings
 Double Row 28
 Single Row 31
Angular Contact Style Ball Bearings
 Thin Section 43
Axial Needle Roller Thrust Bearings 56
Axial Thrust Washers 57

B

Ball Bearings
 Angular Contact Style, Thin Section 43
 Angular Contact,
 Double Row 28
 Single Row 31
 Conrad Style, Thin Section 40
 Flanged Conveyor, Plastic Raceways 51
 Flanged, Precision 21
 Four Point Contact, Thin Section 37
 Insert,
 Plastic Flange Mounting Blocks 53
 Plastic Pillow Blocks 55
 Standard Duty 82
 Linear,
 Closed Type 91
 Open Type 96
 Miniature Instrument 2
 Plain,
 Commercial 22
 Corrosion-Resistant, Stainless 35
 Plastic Raceways 48
 Double Row 50
 Single & Double Row 52
 Precision 19
 Single Row 23
 Self-Aligning, Double Row 30
Banded Thrust Bearings 58
Bar Stock
 Cored, Sintered Bronze 186

Bar Stock (Continued)
 Solid, Sintered Bronze 188
Bearing Spacers,
 Inner Ring 243
 Outer Ring 247
Bearings Technical Section T-1
Bearings
 Ball 2
 Inserts 82
 Linear 91
 Plastic Raceways 48
 Collar, Clamp Type 46
 Linear 100
 Needle Roller 67
 Nonmetallic 134
 Self-Lubricating 140
 Sintered Bronze 166
 Sleeve, Frelon® Lined 112
 Spherical,
 Commercial 242
 Precision 236
 Thrust 56
 Ultraprecision, Sleeve 160
Block, Linear Guide, Standard Type 121
Blocks
 Mounting,
 Cast Iron Housing 78
 Plastic 53
 Pillow,
 Cast Iron Housing 76
 Frelon® Lined 117
 Plastic 55
Bushings, Support, V Groove, Eccentric & Concentric 127
C
Cam Followers, Needle Bearing 130
Cam Yoke Rollers, Needle Bearing 133

C

Ceramic Coated

- Aluminum,
 - Predrilled, One-Piece Support Rail..... 90
 - Predrilled, Shafting 89
 - Solid, Shafting..... 89
- Collar Bearings, Clamp Type**..... 46
- Conrad Style Ball Bearings, Thin Section**..... 40

D

Delrin

- Flange-Mounted, Pressbearings..... 213
- Pressbearings 195

F

Flange Mounting Blocks, Plastic with Insert Ball Bearings . 53

Flanged Ball Bearings, Precision..... 21

Flanged Conveyor Ball Bearings, Plastic Raceways 51

Flangette Unit..... 47

Four-Point Contact Ball Bearings, Thin Section 37

Frelon Lined®

- Flange-Mounted Sleeve Bearings..... 116
- Linear Bearings,
 - Closed Type..... 100
 - Open Type 106
 - Thin Wall..... 110
- Pillow Blocks,
 - Closed Type..... 117
 - Open Type 119
- Sleeve Bearings,
 - Plain..... 112
 - Flanged..... 114

G

Guide Wheel Journals, Eccentric & Concentric 126

I

Inner Races for Needle Bearings 72

J

Journals, Guide Wheel, Eccentric & Concentric 126

L

Linear Ball Bearings

- Closed Type 91
- Open Type 96

Linear Bearings

- Closed Type, Frelon® Lined 100
- Open Type, Frelon® Lined..... 106
- Thin Wall, Frelon® Lined..... 110

Linear Guide Block, Standard Type 121

Linear Guide Rail, Standard Type 122

Linear Systems, Rosa Sistemi 251

Lubricants 1

M

Miniature Instrument Ball Bearings 2

Mounting Blocks

- Flange,
 - Plastic with Insert Ball Bearings..... 53
 - Standard Duty..... 78

N

Needle Bearing Cam Followers..... 130

Needle Bearing Cam Yoke Rollers 133

Needle Bearings, Inner Races 72

Needle Roller Bearing Flange-Mounted Pressbearings..... 215

Needle Roller Bearing Pressbearings 201

Needle Roller Bearings, Shell Type, Open End 67

Needle Roller Clutch Pressbearings..... 207

Nonmetallic Sleeve Bearings

- Flanged..... 138
- Plain 136
- Plain/Flanged 134

P

Pillow Blocks

- Closed Type, Frelon® Lined 117



P

Pillow Blocks (Continued)

- Open Type, Frelon® Lined 119
- Plastic with Insert Ball Bearings 55
- Standard Duty 76

Plain Ball Bearings

- Commercial 22
- Corrosion-Resistant, Stainless 35
- Plastic Raceways 48
 - Double Row 50
 - Single & Double Row 52
- Precision 19
- Single Row 23

Plastic Flange Mounting Blocks with Insert Ball Bearings ... 53

Plastic Pillow Blocks with Insert Ball Bearings 55

Plastic Raceways Flanged Conveyor Ball Bearings 51

Plastic Raceways Plain Ball Bearings 48

- Double Row 50
- Single & Double Row 52

Pressbearings

- Delrin 195
- Flange-Mounted,
 - Delrin 213
 - Sintered Bronze 211
- Needle Roller Bearing 201
 - Flange-Mounted 215
- Needle Roller Clutch 207
- Sintered Bronze 189

R

Rail

- Linear Guide, Standard Type 122
- One-Piece Support,
 - Predrilled Ceramic Coated Aluminum 90

Rod Ends

- Commercial 225
 - Extra Capacity 233
 - Stainless Steel 231
- Extra Strength, Aluminum 235
- Precision 219
 - Extra Capacity 223

Roller Clutches, Shell-Type, Unidirectional Drive 74

Rosa Sistemi Linear Systems 251

- Applications 252
- Frictionless Roller Tables “TR” 288
- Frictionless Tables “TRL” 296
- Rails 264
- Technical Section 253

S

Self-Aligning Ball Bearings, Double Row 30

Self-Lubricating Thrust Washers 62

Self-Lubricating

- Split-Type,
 - Flanged Sleeve Bearings 157
 - Plain Sleeve Bearings 140

Shafting

- Predrilled Ceramic Coated Aluminum 89
- Solid 303 Stainless Steel, Precision 84
- Solid Ceramic Coated Aluminum 89

Shell-Type Needle Roller Bearings, Open End 67

Shell-Type Roller Clutches, Unidirectional Drive 74

Sintered Bronze Cored Bar Stock 186

Sintered Bronze Flange-Mounted Pressbearings 211

Sintered Bronze Pressbearings 189

Sintered Bronze Sleeve Bearings

- Flanged,
 - Small Series 168
 - Standard Series 183
- Plain,
 - Small Series 166
 - Standard Series 170

Sintered Bronze Solid Bar Stock 188

Sintered Bronze Thrust Washers 64

Sleeve Bearings

- Flanged,
 - Frelon® Lined 114
 - Sintered Bronze,
 - Small Series 168
 - Standard Series 183
 - Split-Type, Self-Lubricating 157

S

Sleeve Bearings (Continued)

Flanged, Ultraprecision	163
Flange-Mounted, Frelon® Lined	116
Nonmetallic,	
Flanged.....	138
Plain.....	136
Plain/Flanged.....	134
Plain,	
Frelon® Lined	112
Sintered Bronze,	
Small Series	166
Standard Series.....	170
Split-Type, Self-Lubricating.....	140
Ultraprecision.....	160

Spacers

Bearing,	
Inner Ring	243
Outer Ring	247

Spherical Bearings

Commercial.....	242
Precision.....	236

Stainless Steel Solid Precision Shafting..... 84

Standard Duty

Ball Bearing Inserts.....	82
Flange Mounting Blocks.....	78
Pillow Blocks.....	76

Support Rail, One-Piece,

Predrilled Ceramic Coated Aluminum 90

T

Technical Data, Thrust Bearings..... 59

Technical Section

Bearings.....	T-1
Rosa Sistemi Linear Systems	253

Thin Wall Frelon Lined Linear Bearings..... 110

Three-Piece Set Thrust Bearings & Washers 60

Thrust Bearings & Washers, Three-Piece Set 60

Thrust Bearings

Technical Data	59
Banded.....	58
Needle Roller, Axial.....	56

Thrust Washers

Axial	57
Self-Lubricating	62
Sintered Bronze	64

Track, V Groove 128

U

Ultraprecision

Flanged, Sleeve Bearings.....	163
Plain, Sleeve Bearings.....	160

V

V Groove

Guide Wheels	123
Support Bushings, Eccentric & Concentric	127
Track.....	128

W

Washers, Thrust 57

Wheels, V Groove Guide..... 123



REQUEST FOR QUOTE

FAX TO: 516-616-0443

To: **Quality Bearings & Components**
125 Railroad Avenue
Garden City Park, NY 11040-5016

From: Name: _____

Company: _____

Address: _____

Phone: _____

FAX: _____

e-mail: _____

Date: _____

FAX REF: _____

Please Provide Pricing and Delivery on the Following Items.

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Terms are: NET 30 NET 30 Pending Credit Approval COD Credit Card

Quoted By: Name: _____

Date: _____



REQUEST FOR QUOTE

FAX TO: 516-616-0443

To: **Quality Bearings & Components**
125 Railroad Avenue
Garden City Park, NY 11040-5016

From: Name: _____

Company: _____

Address: _____

Phone: _____

FAX: _____

e-mail: _____

Date: _____

FAX REF: _____

Please Provide Pricing and Delivery on the Following Items.

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Terms are: NET 30 NET 30 Pending Credit Approval COD Credit Card

Quoted By: Name: _____

Date: _____



REQUEST FOR QUOTE

FAX TO: 516-616-0443

To: **Quality Bearings & Components**
125 Railroad Avenue
Garden City Park, NY 11040-5016

From: Name: _____

Company: _____

Address: _____

Phone: _____

FAX: _____

e-mail: _____

Date: _____

FAX REF: _____

Please Provide Pricing and Delivery on the Following Items.

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Part Number: _____	Price each: _____
Quantity: _____	Delivered in: _____
Description: _____	Price is valid for: _____

Terms are: NET 30 NET 30 Pending Credit Approval COD Credit Card

Quoted By: Name: _____

Date: _____

125 Railroad Avenue | Garden City Park | NY 11040-5016

Phone: 516.616.0436 FAX: 516.616.0443

AEROSPACE



AUTOMOTIVE



INDUSTRIAL



- Sourcing of hard to find bearings
- Relubing of bearings in certified class 1000 clean room
- Custom-made bearings and shafting to customer print
- On-line eStore
- Large inventory of bearings and shafting
- Authorized stocking distributor for many of the world's largest bearing manufacturers

MANUFACTURING

